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Editorial

Cloud Computing and IT Services Development

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Cloud computing breaks the constraints on the space and time of software applications tied to a single machine. All applications require computing power, storage, bandwidth, power, etc. In addition, in the cloud computing model, software sales will be sold from the software package and end user license authorization, into the sale of cloud computing services, as long as the use of cloud, you need to pay. Compared with the impact of cloud computing on the software industry, cloud computing has greater impact on the IT services industry. From the service content point of view, the Internet will provide more level of service.

After cloud computing applications, users need not care about software purchase, maintenance and upgrades, these work will be completed by cloud computing. Thus, the RISTI – Revista Iberica de Sistemas e Tecnologias de Informacao presents actual papers on main topics of journal specialization to address and focus new data mining and related technologyin information technologies. The Vol. 2016, No. E12, has selected 40 extended articles presented at the panel discussion on cloud computing application in June 2016 in Beijing China, which aims to more deep insights about the development of "Challenges of the era of big data and information technology application".

We gratefully appreciate the authors for their scholarly contributions, and all the included contents were anonymously reviewed by distinguished experts to maintain academic excellence and integrity. We assure our readers that RISTI – Revista Iberica de Sistemas e Tecnologias de Informacao will serve as a key exchange platform for publications in information science & technology field. The authors and readers can count on the journal.

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A Novel Natural Image Super Resolution Reconstruction Algorithm based on Compressed Sensing and Deep Learning

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Pages: 1–13

Abstract: Along with rapid development of imaging science and engineering, the requirement of the image quality is rising during the time. Under this condition, this paper proposes a novel natural image super resolution reconstruction algorithm based on compressed sensing and deep learning. Along with the sparse code and the compression sensing theory gradually development, the image ultra-resolution algorithm already became one of the research hot spots. In our model, in order to reduce regularization parameter to the high frequency detail suppression, the noise reduction to reconstructs the image the influence, and we propose the novel regularization parameter. The linear regularization parameter has the certain restraining effect on the recovery of the high frequency components, while the suppression effect on the subpixel level noise information is small. Besides this, the deep learning and compressive sensing are integrated to enhance the algorithm's result. The experiment results show the effectiveness of the proposed method.

Keywords: Natural Image, Super Resolution, Compressed Sensing, Deep Learning, Reconstruction Algorithm

1. Introduction

The ultra-resolution reconstruction is used in many images the sub-picture element information, through Asian picture element information effective conformity, thus reconstructs the high quality high resolution image. In usual sub-picture element information is similarly containing the primary sub-picture element level noise also reconstructs while conformity image high frequency ingredient noise information, causes the picture quality to drop, finally affects SR the reconstruction effect (Arai, 2015). We can see from the Shannon sampling theorem that restoring the original image from the sample is mainly limited by the two parameters. One is the sampling interval, which basically determines the resolution of the restored image; the second is the number of samples, which determines the high-frequency part of the image of the aliasing; these two parameters are mutually affected (Bar,2015; Kwon, 2015). If the image space is bounded, then the band is infinite, only an infinite number of samplers to get all spectrums so as to completely recover the entire space bounded image. We may know from above discussion must want to enhance the digital image the

resolution and must increase the gain the high frequency information(Mousavi,2016). But as the ultra-resolution "the spirit" is used each kind known and the unknown information, the increase image high frequency information. For the better modelling of our methodology, in the table one, we firstly review the state-of-the-art super-resolution approaches.

Methodology	Features and Characteristics
Non-uniform interpolation method.	First in low resolution image between each frame for motion estimation and registration, and then to non-uniform interpolation, finally to blur and noise.
Deterministic regularization method.	The regularization algorithm merit is may join the prior restraint directly in the solution can guarantee solution existence and only, noise reduction ability strong and the restraining stability higher.
Adaptive filtering method.	The least-mean-square algorithm is applied to the super-resolution reconstruction and the least mean square algorithm is designed to reduce the effect of isolated points in the image sequence on the reconstruction.
Indirect maximum posteriori estimation method.	The local method by rebuilding the high frequency component to obtain from the resolution image and not the global method of high resolution image reconstruction or low resolution input image segmentation in frequency, but reconstructing high resolution image from the whole.
Pocs.	POCS has the advantage of being able to easily add a priori information can be very good to maintain high-resolution images on the edge and the detail.

Table 1 – The Review of the State-of-the-art Super-resolution Approaches

The above mentioned methodologies focus more on the inner feature of the images while not emphasis enough attention to the learning procedure, to deal with this, in the paper, we propose a novel natural image super resolution reconstruction (SRR) algorithm based on compressed sensing and deep learning. The rest of the article is organized as the follows. In the section 2, we theoretically review the techniques and methodologies of the image restoration technology which contain the subject of SRR. In the section 3, we introduce the proposed algorithm under prior discussion of the compressive sensing, traditional neural network and the CNN. In the section 4, we simulate the proposed method to test the performance. In the section 5, the conclusion is drawn and the final review of the whole paper is given.

2. The Image Restoration Technology

In the acquisition, transmission and storage of images, the image quality will be degraded due to various reasons, such as noise, blur, etc. In many applications, a clear and high quality image is needed, in this basic case and the image recovery technology came into being (Chan, 2015; Polatkan, 2015). On the mosaic color interpolation there are many

commonly used algorithms are neighborhood interpolation, linear interpolation, cubic convolution interpolation, neural network interpolation and so on, the more complex the selection method, the higher the quality of the image produced by interpolation, but also the time required for processing. In the traditional system, the restoration problem can be modelled as follows.

$$f(x_s) = \sum_{i=1}^{k} p_i N(x_s \mid \mu_i, \sigma_i) \tag{1}$$

$$(x_s \mid \mu_i, \sigma_i) = \frac{1}{\sigma_i \sqrt{2\pi}} \exp[-\frac{1}{2\sigma_i^2}(x_s - \mu_i)^2] \tag{2}$$

$$\begin{aligned} f(x_s \mid y_s) &\propto f(x_s) f(y_s \mid x_s) \propto \sum_{i=1}^{k} p_i \{\frac{1}{\sigma_i \sqrt{2\pi}} \exp(-\frac{(x_s - \mu_i)^2}{2\sigma_i^2})\} \\ &\times \{\frac{1}{\sigma\sqrt{2\pi}} \exp(-\frac{(y_s - x_s)^2}{2\sigma^2})\} \propto \sum_{i=1}^{k} p_i \{\frac{1}{\sigma\sigma_i 2\pi} \exp(-\frac{(x_s - \mu_i)^2}{2\sigma_i^2} - \frac{(y_s - x_s)^2}{2\sigma^2})\} \end{aligned} \tag{3}$$

Where $f(x_s)$ represents the re-construction estimator, $f(x_s \mid y_s) \propto f(x_s) f(y_s \mid x_s)$ represents the rule of dimensional analysis. In the high frequency region of the image, such as the edge of the image and the region of large color difference, the aliasing phenomenon cannot be well controlled; and the basic cubic convolution interpolation algorithm and neural network interpolation algorithm in calculation process will use a lot of the convolution complex operations, more suitable for computer processing, but the use of hardware to achieve great difficulty. In formula 4, we show the complexity measurement standard.

$$\mathrm{E(X)} = \int_{-\infty}^{\infty} x_s \sum_{i=1}^{k} p_i N(x_s \mid \mu_i, \sigma_i)\, dx_s = \sum_{i=1}^{k} p_i \left(\int_{-\infty}^{\infty} x_s N(x_s \mid \mu_i, \sigma_i)\, dx_s \right) \tag{4}$$

The image goes to the fuzzy question the essential step first calculates the accurate nuclear function, then carries on the image counter-convolution, simultaneously suppresses the image the noise (Schmidhuber,2015; Patel, 2016). Assigns a movement fuzzy image, first builds image pyramid, then from to fine, in turn estimate thickly the movement fuzzy nuclear function and restores the clear image that contains the listed procedures.

1. Hysteresis threshold method. In the estimation of the kernel function, we often contain some of the noise must suppress these noise. According to the continuity of movement kernel function also has continuity. And noise is often isolated,

and from the kernel function in RMS distance is relatively far away. Therefore, we propose a hysteresis threshold method to suppress the noise of the kernel function. The experimental results show that the hysteresis threshold method can suppress the noise of kernel function well by three times of conditional expansion operation.

2. Kernel function center relocation. When repositioning, we first take the minimum rectangle that contains the valid value of the kernel function, and then translate the rectangle to align the center of the center with the center of the kernel function. By re positioning not only avoid the kernel function kernel function beyond the effective value of a given size, but also makes clear after the effective value of image restoration is concentrated in the middle, and will not cause a large error of the edge.

In order to maintain the strength of the restored image, we extend the conventional bi-directional filter to the spatial intensity convolution to obtain a more general bi-directional filter. This extended bidirectional filter will be used as an intensity preserving filter for image restoration of general contrast images. The traditional bi-directional filter performs weighted averaging in the neighborhood. The basic modelling procedure can be expressed as the formula 5~7.

$$\frac{\partial l}{\partial m_i} = \sum_{s=1}^{n} \frac{p_i}{\sum_{i=1}^{k} p_i N(x_s \mid m_i, D_i)} \cdot \frac{\partial N(x_s \mid m_i, D_i)}{\partial m_i} \tag{5}$$

$$\frac{\partial l}{\partial D_i^2} = \sum_{s=1}^{n} P(i \mid x_s) \cdot \frac{\partial \ln(N(x_s \mid m_i, D_i))}{\partial D_i^2} \tag{6}$$

$$\frac{\partial F(\hat{i})}{\partial \hat{i}} = 2Q^T Q\hat{i} - 2\alpha H^T (i_D - H\hat{i}) = 0 \Rightarrow \hat{i} = (H^T H + \frac{1}{\alpha} Q^T Q)^{-1} H^T i_D \tag{7}$$

By allowing the definition of the key pixels, bidirectional filters have the ability to control the output. When the filter whose coefficient is $\frac{\partial l}{\partial m_i}$ as a pulse filter, the result is a predefined key pixel $\frac{\partial \ln(N(x_s \mid m_i, D_i))}{\partial D_i^2}$. The process of selecting a key pixel is considered to be a basic pre-filtering process. This property can be used to control the output when the desired $\frac{\partial F(\hat{i})}{\partial \hat{i}}$ is designed according to the specific requirements. If we change the key pixels, in fact, change the weight distribution center. As opposite an all picture element gradient all carries on the approach in the Gaussian distribution to the image

in 0 restraints, the sparse restraint only carries on the restraint to the gradient small picture element spot that causes its approach in 0, but is small to a gradient big picture element restraint. Not only therefore this restraint can weaken in the image the noise, suppresses the ringing effect well, moreover also can maintain the image the strong edge. Although the sparse gradient distributes restores the clear image in the restraint in the effect to have the good nature, while this energy function optimization uses the Gaussian distribution to restrain the image gradient to have to be much more complex than because optimized this function was already not smallest two rides the question.

$$U^{sim} = \frac{1}{2}\sum_{i=1}^{n}\sum_{j=1}^{n}|w_{ij} + \lambda g_{ij}| \le \frac{n^2}{2}\sqrt{\frac{1}{n^2}\sum_{i=1}^{n}\sum_{j=1}^{n}|w_{ij} + \lambda g_{ij}|^2} \quad (8)$$

As addressed in the formula 8, the optimization challenge is well transferred. In the iterative process of calculation of kernel function, kernel function according to the need of current blind deconvolution to get clear image as the input image the next iteration. At this time, the gradient of the image is modeled by Gauss distribution. Boundary-based interpolation algorithms are used in the horizontal or the vertical interpolation, that the boundary in the most ideal direction, but in fact, the border is the certain angle. A more accurate approach is to calculate the gradient of each pixel in the horizontal and vertical direction, and then according to the gradient values is given in the weighting coefficients in both directions, and then calculates final G channel interpolation results. Accordingly, in the figure 1 and 2, we show the image restoration from the imaging level and visualized level, respectively.

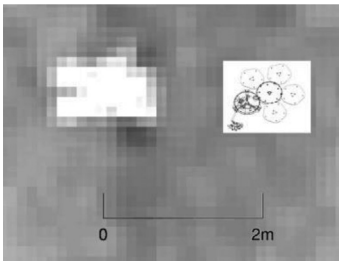


Figure 1 – The Image Restoration from the Imaging Level

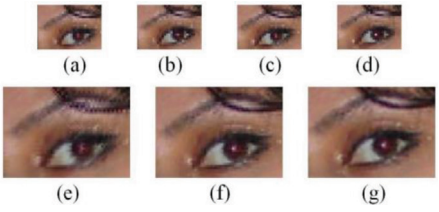


Figure 2 – The Image Restoration from the Visualized Level

3. Our Proposed Algorithm

3.1. The Compressive Sensing and Images

Compression sensing theory shows that a sparse signal can be reconstructed by a small amount of observation. Moreover, in the signal acquisition without the need to care about the characteristics of the signal itself, but using a unified random observation matrix to observe the general signal acquisition data, and thus in the information acquisition stage is relatively as simple (Zhang, 2015). On the other hand, it when restructuring may act according to the signal the a priori knowledge, the free choice image sparse territory or some kind of characteristic space carries on restructuring. Therefore, the reasonable selection signal characteristic space causes it to tally with the signal sparse characteristic has become in the compression sensation theory the very important link, it is finally deciding the restructuring effect.

$$W_N = \frac{H}{G} = \begin{bmatrix} \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \\ -\frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -\frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \end{bmatrix} \tag{9}$$

As shown in the formula 9, we demonstrate the sparse matrix. So long as the signal is may compress or in some transformation territory is sparse, then might choose one to transform obtained high Uygur signal technique shade with transformation base non-correlated observation matrix to lower in the Uygur space to one, then through will solve a value optimization question to be possible to restructure the original signal from these few observed values by the high probability, and might prove these general projection value has contained the restructuring signal enough information. Single space reconstruction algorithm with single feature signal just have good results, such as frequency domain signal reconfiguration rules apply to texture, TV adaptation to signal,

MARX adapted to the signal with large structure. For the general image signal, because of its stability, there is no guarantee that the signal contains only a single global sparse characteristics while therefore, for the characteristics of the signal, use a single space sparse prior cannot achieve ideal sparse degree, thereby limiting the recovery of the signal quality (Wang, 2016). Under this basis, in the figure 3, we show the signal compressive sensing analysis framework. First of all, the non-adaptive linear projection of the signal is collected, and then the sparse representation of the root signal, that is, when the signal is projected onto the orthogonal transform base or redundancy dictionary, the absolute value of most of the projection coefficients is very small, or approximately sparse. Then the linear projection matrix of the original signal is obtained by the product of the original signal and measurement matrix. Reconstruction algorithm is used to reconstruct the original signal, which is the key of the compressed sensing algorithm.

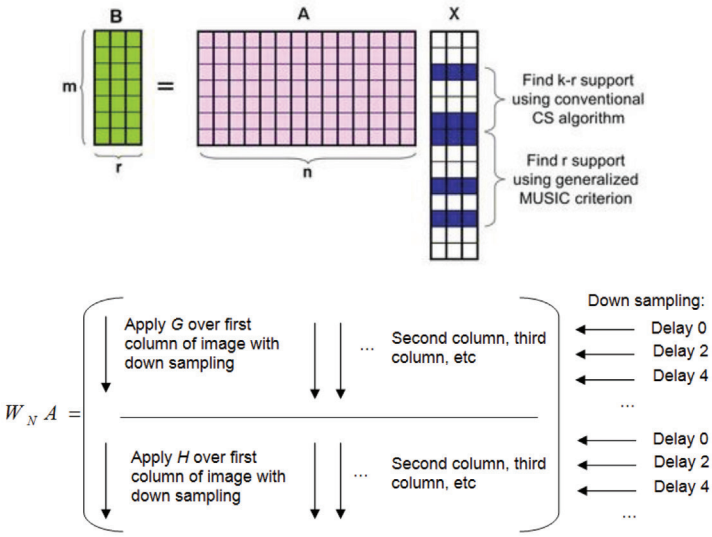


Figure 3 – The Signal Compressive Sensing Analysis Framework

3.2. The Traditional Neural Network Model

Artificial neural network is a special topological structure and learning algorithm, which is distributed parallel processing capability of huge information, can achieve rapid economic image compression, therefore, is widely used in the field of image compression. However, with the deepening of the application and the continuous emergence of practical problems, neural network for the image compression of the limitations and shortcomings are gradually revealed. The BP network widespread serviceability is because it can realize any shines upon continuously, once and that reflected the actual problem the network power trained has been good, while this network application was only a simpler computation, moreover when the actual problem sample changed, the common network structure was invariable, so long as changed its power then. In the following equation 10 and 11, we show the function of the traditional neural network as the whole.

$$y = f\left(\sum_{i=0}^{n} x_i w_i\right) \tag{10}$$

$$f(x) = \begin{cases} 1 & if \quad \sum_{i=1}^{n} x_i w_i > 0 \\ 0 & if \quad \sum_{i=1}^{n} x_i w_i \le 0 \end{cases} \tag{11}$$

In general, E(w) is a very complicated nonlinear function, so we cannot get the optimal step length η in the BP algorithm by the method of minimizing the optimal value, so η is relatively fixed in BP algorithm. It is noted that BP The error surface of the network has a flat area, such as η is too small in the flat area to increase the number of iterations, and when w falls to the place where the error is drastically changed, the step size is too large and the error is increased, but the number of the iterations increases the convergence speed. For this, the formula 12 shows general solution of enhancing the training speed.

$$d\mathbf{w} = -\frac{L_1}{2L_2}\mathbf{G} - \frac{1}{2L_2}\mathbf{u} \tag{12}$$

In additional, listed modifications should be considered. (1) Additional momentum factor is used to transfer the weight change. With the addition of the momentum method, the influence of the error on the gradient and the change trend on the surface is considered when the weight is modified by the network. (2) The learning rate η is also called the step size and is constant in the standard BP algorithm. (3) The global adaptive adjustment algorithm of learning rate decreasing method is used to modify the global parameters using the knowledge of the whole network state, and adaptively adjusts each adjustable parameter according to the learning situation. The learning rate gradually small method of its essence is to reduce the learning rate during training. (4) Adjust the local adaptive symbol transform based on adaptive learning rate BP algorithm based on symbol transform is a kind of local learning rate adaptive adjustment. Local adaptive adjustment refers to the use of the learning rate of each expression alone can adjust the parameters, by looking for the optimal learning rate. In the local expression of each weight strategy used a separate learning rate to achieve each connection, the use of specific information only to modify the weights of specific parameters, through the observation of the last two gradients to complete adaptive adjustment of learning rate. Accordingly, in the figure 4, we show the neural network connection model.

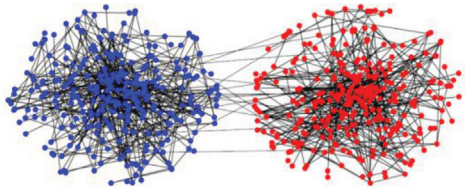


Figure 4 – The Neural Network Connection Model Illustration

3.3. The CNN and Deep Learning Model

Radial Basis Function Neural Network (RBFNN) is known as well-behaved forward network which has both biological background and function approximation theory. It is suitable for multivariable function approximation and has the advantage of only the best approximation point. It is applied in the fields of pattern recognition, function approximation, adaptive filtering, and nonlinear time series prediction. The CNN can be designed based on the following steps.

1. As well as carries on the test in the training network in the process, selects LIVE in the 2D database picture size most for 768×512, the picture whole enters the network the enormous degree influence network speed as well as the rate of accuracy. Considered in the picture each place distorted degree is same, the original picture division for the size same 32×32 picture block, and as carries on through the partial standardized method processing, this will weaken the influence which the picture distortion will bring and then promotes the network to in contrast gradient change situation robustness.
2. It will get the image block input to the depth of the pretreatment of the convolution neural networks, by convolution pooling processing, get the image block advanced features, then uses the mass fraction of the original image through neural network BP training for basic parameters of model.
3. Get the basic model of the first stage of training, the stereo image pair of left and right images respectively through 2D and while the same image preprocessing, the image blocks of the same location and input to the basic model, the image block to get the final two basic groups of the advanced features of the model by using the regression network learning.

The function of the hidden node will produce a local response to the input signal, that is, when the input signal is close to the central range of the kernel function, the hidden layer node will produce a larger output. Has the advantage of fast learning speed. In classics time domain law, the people discovered is sensitive to the noise, when the noise intensity increases, the time domain method error sharp growth causes this method not available. Therefore, this article introduces the radial direction base network to carry on the pulse response function extraction as below.

$$\mathbf{u} = \mathbf{w}_t - \mathbf{w}_{t-1}, L_1 = (I_{uG} - 2L_2\delta Q) / I_{GG},$$
$$L_2 = -\frac{1}{2}\left[\frac{I_{GG}I_{uu} - I_{Gu}^2}{I_{GG}(\delta P)^2 - (\delta Q)^2}\right]^{1/2} \tag{13}$$

We may know by above algorithm, the network bottom-up and the top-down connection weight study that is carries on in between the competition achievement node. It with based on erroneous smallest mean square criterion algorithms and so on reverse dissemination compares, here network weight study is a principle which matches based on the template, it does not exist based on erroneous smallest mean square criterion questions and so on method weight vibration or the restraining precision, therefore may

complete well to shoulders the data the cluster question. In the figure 5, we show the corresponding image projection paradigm with CNN.

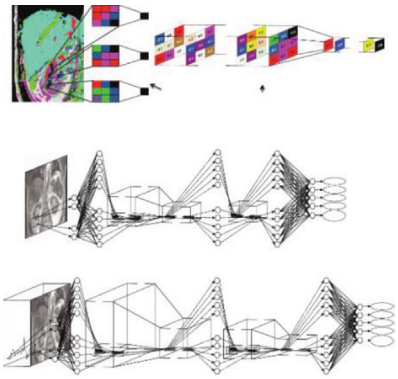


Figure 5 – The Image Projection Paradigm with the CNN

3.4. The Flow of the Proposed Algorithm

Based on the prior discussion, this part organizes the flow of the proposed method. In this paper, the iterative formula of SR reconstruction is obtained by deriving the cost function from the cost function of the nonlinear regularization parameter term. In the iterative process, the regularization parameter and the iterative step factor are modified adaptively and rebuild the image. Based on the equation of 1~6, and 7~10, we can propose the formula 14, and 15, respectively.

$$Cost(g) = \sum_{k=1}^{p} r_k C_k \left[\lambda_k (g), g \right] \tag{14}$$

$$C_k \left[\lambda_k (g), g \right] = \left\| y_k - W_k g \right\|^2 + \lambda_k (g) \left\| Fg \right\|^2 \tag{15}$$

In order to reduce the regularization parameter to the high frequency detail suppression, the noise reduction to reconstructs the image the influence, and we propose the new regularization parameter. The linear regularization parameter has a certain restraining effect on the recovery of the high frequency components, while the suppression effect on the subpixel level noise information is small, so that the reconstructed image is fuzzy or has obvious noise ripples and then this paper proposes nonlinear regularization parameters and ensures the convexity of the cost functions and regularization parameters.

4. Experiment and Systematic Tests

In this part, we conduct simulation on the proposed methodology. In the figure 6, we use the MRI image to test the performance the red labelled areas can reflect the performance of different methodologies.

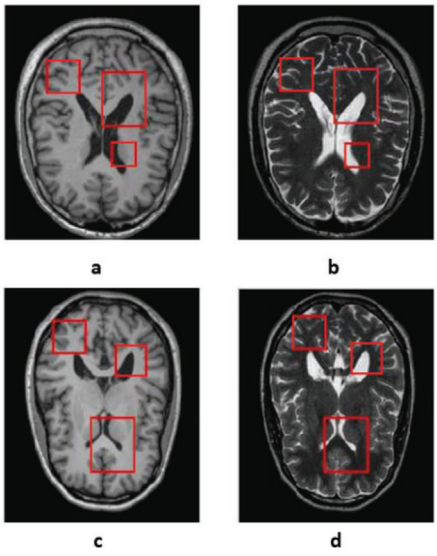


Figure 6 – The Test on the MRI Datasets

At the same time, in the figure 7, we show the result on the natural images, it can be reflected that the proposed method outperforms. In the figure 8, we show the basic simulation on the re-construction efficiency and robustness.

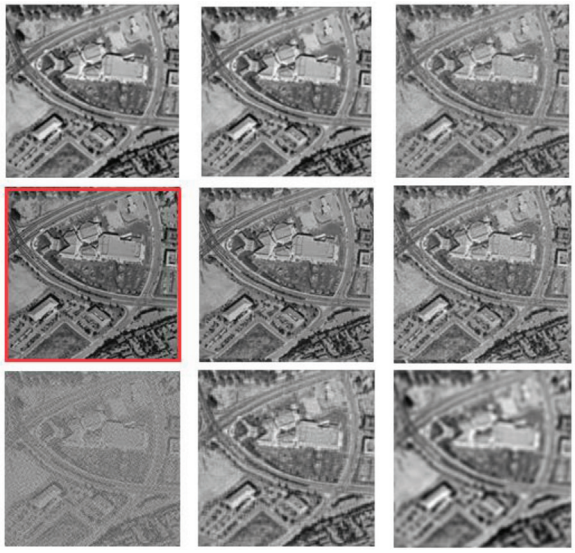


Figure 7 – The The Test on the Natural Image Datasets

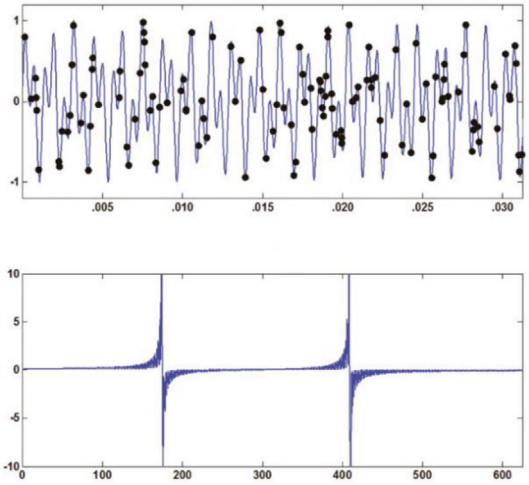


Figure 8 – The Simulation on the Re-construction Efficiency and Robustness

5. Conclusion

In this paper, we propose the novel natural image super resolution reconstruction (SRR) algorithm based on the compressed sensing and deep learning. In many applications, the clear and high quality image is needed, in this basic case and the image recovery technology came into being. In the field of image processing, many super-resolution algorithms have emerged, which are divided into two categories: one is based on the reconstruction algorithm and the other is based on the example learning algorithm. The main disadvantage of the algorithm is that if there is not enough constraint conditions or the super-resolution ratio is too high, the effect of the obtained image is obviously decreased. Examples based on learning algorithm can better overcome this shortcoming, it first learn low-resolution image block and high resolution And then obtain the corresponding high-resolution image through this relationship. This paper proposes the NN and CS guided method that can then re-construct the images with higher accuracy.

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Construction and Simulation on Bridge Wind Resistant Model based on Finite Element Analysis and Wavelet Packet Theory

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Abstract: In this paper, we conduct analysis on bridge wind resistant model based on the finite element analysis and wavelet packet theory. The large-scale bridge structure response and the state analysis are an extremely complex process, should adopt structure power response modern analysis methods and so on analog computation and general structure health monitor, the condition recognition, partial damage analysis unifies carries on. In the structure health monitor and in the structure recognition process that also has many essential theories and the technical question at present urgently awaited to be solved. The self-vibration characteristic of bridge structure is basic data of dynamic analysis of bridge structure, and no matter which kind of dynamic problem is analyzed and calculated while the self-vibration characteristic of the structure should be well understood. Under this basis, this paper integrates the FEA and wavelet packet theory to construct the countermeasure. The experiment result shows the effectiveness of the proposed method.

Keywords: Bridge, Wind Resistant, Finite Element Analysis, Wavelet Packet Theory, Construction and Simulation.

1. Introduction

Large span of new bridge, such as cable-stayed bridge, suspension bridge, usually with steel box girder, combined with flexible cable or basic cable, constitute a more complex structural mechanical system, power in the temperature, wind, traffic and other external factors, in the dynamic characteristics of the deformation. In order to monitor the safety operation of these long-span bridges, the monitoring system with the certain content is often arranged(Bass,2016). How to reasonably deal with the large amount of daily observation data to obtain the real-time behavior of bridge work, to study the main factors of dynamic deformation as it is a matter of concern that the emergence of combination of adverse safety factors and effective implementation of the daily operation of the safety monitoring(Gu, 2012).. When the vehicle passes through the bridge will cause

the vibration of bridge structure, and the vibration of the bridge structure effect on the vibration of vehicles, the coupled vibration problem between the interaction problems is the vehicle and bridge.



Figure 1 – The General Bridge Architecture Demonstration

As shown in the figure one, the general bridge architecture is shown. For solving the bridge stability issue, we are always taking the listed two countermeasures.

1. The axle system is divided into two sub-systems: vehicle and bridge. The vibration equations of the vehicle and bridge are respectively established. The equilibrium relationship between the wheel-wheel contact and the interaction is established and then the iterative method is used to solve the system response.
2. The vehicles and the bridge all degree of freedom pair association in the same place, establishes the unified system of the equations, carries on the synchronized solution.

However, these two methodologies do not host enough robustness. Therefore, in this paper, we conduct research on the bridge wind resistant model based on finite element analysis and wavelet packet theory (Graeff, 2013; Hoi, 2013). The rest of the manuscript is organized as the follows. In the section 2, we systematically analyze the wavelet packet theory to serve as the theoretical basis for the further analysis. In the section 3, we start from the analysis of finite element analysis and then propose the novel bridge wind resistant model. In the section 4, we simulate the methodology to test the overall performance. In the section 5, we conclude the work with summarizations.

2. The Wavelet Packet Theory and the Revised Form

Wavelet analysis is a new branch of mathematics which has been widely used in science and engineering. As the vast majority of information in the real world is multidimensional, the study of the high-dimensional wavelet theory has attracted people's attention (Huang, 2015). The traditional method of the high-dimensional wavelets is to obtain the high-dimension separable wavelet by tensor product of one-dimensional wavelet. The equation 1 and 2 define the structures of wavelet.

$$d_j^{2i}(k)=\int B(t)\psi_{j,k}^{2i}(t)dt=\sum_n h(n)d_{j-1}^i(2k-n)$$
$$d_j^{2i+1}(k)=\int B(t)\psi_{j,k}^{2i+1}(t)dt=\sum_n g(n)d_{j-1}^i(2k-n) \quad (1)$$

$$\psi_{j,k}^{2i}(t)=\frac{1}{\sqrt{2^j}}\psi^{2i}(\frac{2^j k-t}{2^j})=\sum_n h(n)\psi_{j-1,2k-n}^i(t)$$
$$\psi_{j,k}^{2i+1}(t)=\frac{1}{\sqrt{2^j}}\psi^{2i+1}(\frac{2^j k-t}{2^j})=\sum_n g(n)\psi_{j-1,2k-n}^i(t) \quad (2)$$

Wavelet packet can be more flexible to adapt to multi-scale characteristics of the signal, but famous Mallat wavelet decomposition algorithm is directly introduced into the wavelet packet transform in the formation of wavelet packet algorithm, the signal decomposition components of the natural order (Lambiase, 2013; Sawanobori, 2013). This is not conducive to our understanding of the time-frequency characteristics of the signal wavelet packet decomposition components in practical applications. Therefore, the author tries to find out universal law of the frequency ordering of the wavelet packet by studying the frequency order of the Harr wavelet packet as follows.

$$\Psi(x,y)=\frac{1}{2\pi\sigma_x\sigma_y}\exp\left[-\frac{1}{2}\left(\frac{x^2}{\sigma_x^{\ 2}}+\frac{y^2}{\sigma_y^{\ 2}}\right)+2\pi j\omega_x x\right] \quad (3)$$

$$\Psi(x,y)=\frac{1}{2\pi\sigma_x\sigma_y}\exp\left[-\frac{1}{2}\left(\frac{(x-m_x)^2}{\sigma_x^{\ 2}}+\frac{(y-m_y)^2}{\sigma_y^{\ 2}}\right)+2\pi j\omega\ (x+y)\right] \quad (4)$$

It is a new multiresolution analysis method, and analyze the time domain and the frequency domain has the time-frequency localization and multiresolution analysis and application characteristics, so is suitable for signal processing, but only part of the low-frequency wavelet method of signal decomposition as not used to partition the high-frequency part(Singh, 2012; Wang, 2016). Compared with the wavelet transform, the wavelet packet transform can decompose the high-frequency part of the signal, and has stronger adaptability, so it is more suitable for the signal processing. Wavelet packet analysis is the linear time-frequency analysis method, which has the good time-frequency positioning characteristics and adaptive ability of the signal, which can be a variety of time-varying signal for effective decomposition.

As shown in the figure 2, the wavelet signals are shown. Asks the stand from under analysis the basis only to use the small wave packet the nature theorem one, and therefore suits in all small wave packets, also is any small wave packet all has the same result and the natural order and the frequency order are different, moreover with produces the

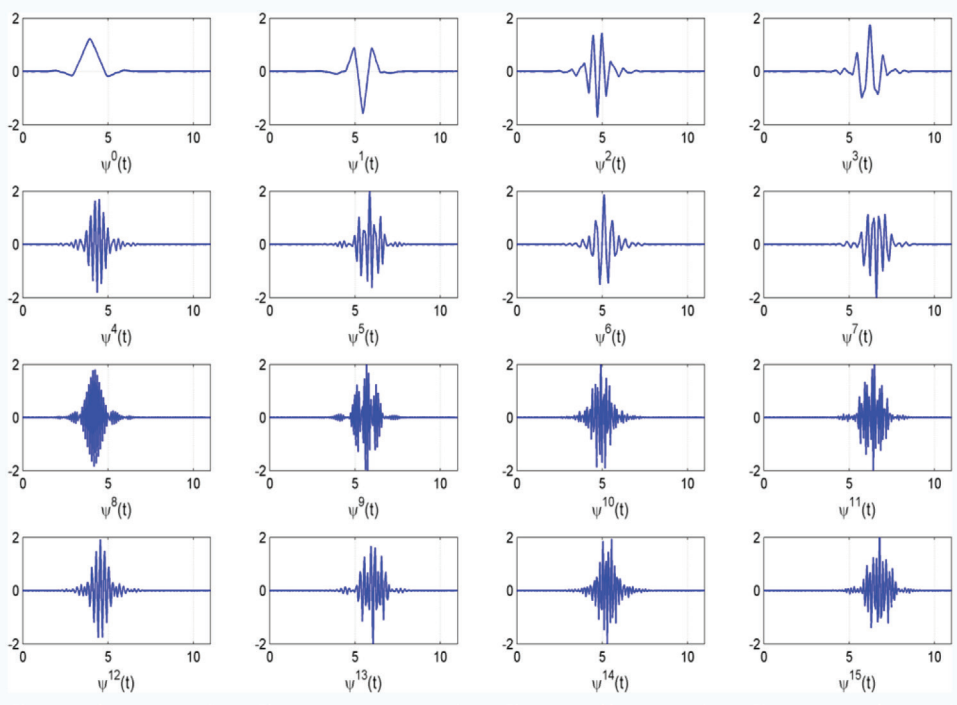


Figure 2 – The Architecture of the Wavelet Signals

small wave packet by the theorem one determination small wave packet frequency order confused situation the criterion function to have nothing to do with; In other words, the small wave packet frequency order all is same. Obtains this conclusion is extremely useful, because of as the matter stands, we only must through study some special criterion function production the small wave packet frequency arranged in order rule to be possible to obtain any small wave packet frequency order which can be expressed as equation 5 and 6.

$$B(t)=\sum_{i=0}^{2^{j-1}-1}\sum_{k=0}^{2^{N-J}-1} d_j^{2i}(k)\psi_{j,k}^{2i}(t)+\sum_{i=0}^{2^{j-1}-1}\sum_{k=0}^{2^{N-J}-1} d_j^{2i+1}(k)\psi_{j,k}^{2i+1}(t)= \sum_{k=0}^{2^{N-J}-1} d_j^{o}(k)\phi_{j,k}(t)+\sum_{i=1}^{2^{j-1}-1}\sum_{k=0}^{2^{N-J}-1} d_j^{i}(k)\psi_{j,k}^{i}(t) \tag{5}$$

$$\int B(t)^2\,dt=\int[\sum_{k=0}^{2^{N-J}-1} d_j^{o}(k)\phi_{j,k}(t)+\sum_{i=1}^{2^{j-1}-1}\sum_{k=0}^{2^{N-J}-1} d_j^{i}(k)\psi_{j,k}^{i}(t)]^2\,dt=\int[\sum_{k=0}^{2^{N-J}-1} d_j^{o}(k)\phi_{j,k}(t)]^2\,dt+ \int[\sum_{i=1}^{2^{j-1}-1}\sum_{k=0}^{2^{N-J}-1} d_j^{i}(k)\psi_{j,k}^{i}(t)]^2\,dt]^2+2\int\left(\sum_{i=1}^{2^{j-1}-1}\sum_{k=0}^{2^{N-J}-1} d_j^{o}(k)d_j^{i}(k)\phi_{j,k}(t)\psi_{j,k}^{i}(t)\right) \tag{6}$$

The formula 6 is the extended version of the equation 5, which consider the time factor that can be later demonstrated. We choose Harr wavelet packet to study the frequency sequence of the wavelet packets. The Walsh-Paley function of the Harr wavelet packet sequence of natural order is proved to be consistent on the interval [0, 1]. Since the Walsh-Kaczmarz function and the Walsh-Paley function are in the same order, and the corresponding relationship. Based on the formula 5, we can then find out the optimal solution for the term as the formula 7.

$$\sigma \frac{\partial \bar{A}}{\partial t} + \nabla \times \left(\nu \nabla \times \bar{A} \right) = \sigma \nabla V + \nabla \times \bar{H}_c \tag{7}$$

Where the ∇ represents the wavelet degree reduction orientation, the $\bar{H}_c$ denotes the revised weight element, the $\bar{A}$ represents the original term.

3. The Designed Systematic Architecture

3.1. Finite Element Analysis (FEA)

The finite element analysis program involves three different disciplines of general mechanics, applied mathematics and computer science theory and method, so the preparation work is very complex, and the program is large and error-prone. It has mainly applied the physical conceptions and so on the structure, load, node, unit, degree of the freedom, matrix, material, grade point average, boundary condition, solution and assistance computation in finite element analysis process.

Therefore acts according to object-oriented programming method to be possible to determine the finite element analysis process the object is: Structure object, load object, node object, unit object, degree of freedom object, matrix object, material object, the Gauss grade point average object, boundary condition object, solution object and assistance computation object and so on as the follows.

- Element is the most important physical concept in finite element analysis process, and it is the core of the whole finite element analysis process, and the unit object is determined to be the most important and important object during the process of identifying the object association.
- The structure object, the solution object and the assistance computation object is by the unit object service object, the structure object containing unit object, solution object and assistance computation object use object.
- Boundary conditions of object, freedom object indirect effect on unit object boundary conditions and structure of the object is inclusive the unit object indirect use of the degrees of freedom. The object is the node object and indirect object unit inclusive tolerance.

As for the FEA modelling of bridges, we should consider the listed aspects.

1. **Abutment model**. In the model, considering stiffness of the structure of the abutment portion is infinite, and to simulate the bridge deck protection layer uniform support hard, the abutment shear lug is part of a bridge deck protection

layer connect the concrete slab and bridge deck protection layer in horizontal direction(Wang, 2014,). The middle layer is used to separate the concrete track bed from the bridge deck protective layer. The separation layer can prevent the bonding between the concrete track deck and the bridge deck protective layer and allow the relative horizontal displacement between the concrete track deck and the deck protective layer so that the concrete track bed is free from the restraint deformation and the bridge deflection.

2. **Middle layer model**. The middle layer of the vertical support of concrete track bed board that does not produce tension. A horizontal concentration of interaction between the shear bosses and the underlying bridge deck.
3. **Rail and fastener models**. Above these are simplified in order to ensure the rail under the load generated by the displacement response and stress response of the same principle (Xie,2016). Using elastic connection between rail and the steel plate. According to the specification of the rail fastener system, transverse and horizontal spring characteristics are defined as reshaping of the real model as much as possible.

The mechanism design duty is in the system design foundation, according to the principle plan which determined, determined and draws specific structure drawing, manifests the function which requests will abstract the principle of the work will change into some kind of component or spare part specifically, the concrete content for during the determination structural element material, the shape, the size, the common difference, the heat treatment way and surface condition will still need to consider its questions and so on processing craft, intensity, rigidity, precision as well as with other components mutually between relations(Xing, 2013). Based on the idea of the structural classification, the basic complex structure is simplified and the boundary conditions of the sub-problems under the whole working condition are considered. Then the sub-problems are synthesized and the excellent structure is obtained. In the figure 3, we show the FEA result of the bridge models.

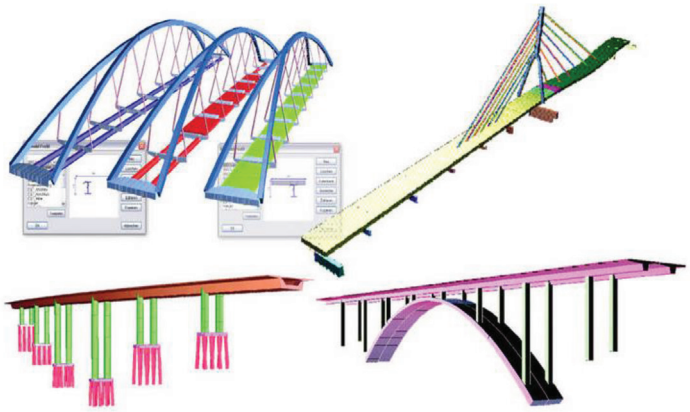


Figure 3 – The Finite Element Analysis (FEA) Result of the Bridges

3.2. Theoretical Modelling of the Bridge Architectures

The safety monitoring model of long-span bridges should be considered in general combination with its dynamic characteristics, but the safety monitoring model usually studied in this paper mainly embodies the characteristics of "static", and it is difficult to meet the needs of safety monitoring of the bridge. In addition, the safety monitoring requirements. It is necessary to study the dynamic monitoring model of bridge under the influence of external factors such as temperature, wind and traffic flow so as to carry out the research on some other factors such as the displacement, bridge type change and so on, of the control, to ensure the safety of the bridge (Zhang,2016). The bridge flutter research mainly concentrates in the flutter jitter mechanism and the flutter critical condition aspect, as the flutter critical condition research has the practical significance and the project value. In order to avoid the difficulties of high order equation, the solution of the simultaneous equations can be transformed to optimization problems as establish a search of the flutter critical wind speed of tablet double parameter optimization model, search the optimization model and put forward a practical method of the optimal solution.

Duplicate modality flutter analysis step general as the follows: First obtains the different wind speed or under conversion wind speed condition flutter derivative, then when restructuring different wind speed or conversion wind speed the system state space matrix, then carries on the characteristic value to decompose, from this may calculate obtains modality parameters and so on modality relative amplitude, phase difference, frequency and damping basic ratio, finally acts according to the different wind speed or that under the conversion wind speed condition modality parameter carries on the flutter analysis. When some of the wind speed some step modality damping ratio is equal to the zero hour, the system achieves the flutter critical state. In bridge safety monitoring, must be accurately determined the state factor, in addition, the model will sometimes diverge, resulting in state parameter estimation error variance, the initial form and dynamic noise state parameters are difficult to accurately select, which will have a direct influence on the processing results. In the later section, we will start the modelling.

3.3. The Bridge Wind Resistant Model

When the object is a vibrating system, the periodic vortex force will induce the vortex-induced vibration of the structural system, and the vortex resonance will occur when the vortex shedding frequency coincides with the natural frequency of the structure. Although this kind of vibration generally does not directly cause the bridge destabilization damage, but it reduces the comfort, and even lead to normal use; the other hand, because the vortex-induced vibration at low wind speed that can occur, which easily lead to fatigue of the bridge components, especially for the lighter, less damping of steel structure. The road great span bridge wind resistant stability appraisal mainly is carries on in road great span bridge wind resistant ability and in the basic bridge site place wind environment two major part factor generalized analysis foundation. But these two major part contains the decision road great span bridge goes against the wind the stable factor to have very much, this article according to the road great span bridge the characteristic in particular bridge site place wind environment characteristic, the selection fold back frequency compared to and so on 7 structure factors and the angle of attack effect coefficient and so on 5 location factors takes the complete appraisal target.

The three component coefficient is one of the basic contents of the bridge wind engineering in. According to the three component coefficients obtained that can be obtained in bridge structure resistance, lift and torque, and further analysis of the bridge structure under static wind load stress and displacement, and aerostatic stability analysis. The numerical test principle of three component coefficients is based on discrete mathematics model is established, the differential equations into algebraic equations for solving algebraic equations that calculated the velocity and pressure of each node within the region, section of pressure and friction force of as each point of the resultant is section of the drag and lift and pitch moment, three we got three dimensional element component coefficients as the follows.

$$C_H = F_H / \left(\frac{1}{2} \rho U^2 D \right) \tag{8}$$

$$C_V = F_V / \left(\frac{1}{2} \rho U^2 B \right) \tag{9}$$

$$C_M = F_M / \left(\frac{1}{2} \rho U^2 B^2 \right) \tag{10}$$

The computation hydrodynamics may regard as is in the flowing fundamental equation (mass-conservation equation, conservation of basic momentum equation, energy-conservation equation) under the control to the mobile value simulation. Through this kind of value simulation, may obtain in the extremely complex question flow field in each position basic physical quantity (for example speed, pressure, temperature and so on) the distribution, and as well as these physical quantities along with time change situation as modelled as follows.

$$c_2 \ddot{f}(t) + c_1 \dot{f}(t) + c_0 f(t) = d_2 \ddot{g}(t) + d_1 \dot{g}(t) + d_0 g(t) \tag{11}$$

The experience indicated, when outside the boundary region is bigger than the model cross section characteristic size 20 times outside, may as far as possible avoid the separated vortex which afterbody curls up projecting on in the boundary, also reflects outside, simultaneously also causes the boundary condition which the boundary vicinity flow field parameter distribution well and that raises to be accommodating, the basic solution may achieve the very good astringency. Outside therefore, takes the boundary region is bigger than the model sectional width 30 times of rectangles for the length and the width. When division finite element grid, overall evaluation computer computation ability as well as the general computation precision, are dense to the interior boundary region grid division but outside region grid division then suitable architecture is thick as follows.

$$f(t) = e^{\sigma t} (a_1 \cos \omega t + b_1 \sin \omega t) \tag{12}$$

$$g(t) = e \quad (a_2 \cdot \cos \omega t + b_2 \cdot \sin \omega t) \tag{13}$$

It can periodically structures, modal test and compare the identification of modal parameters, used for general structural health monitoring and damage detection, determine the structure of the life and the safety degree. Environmental incentive refers to wind load, earthquake excitation, such as the vehicle load caused by the random vibration. The fluid inlet boundary conditions and the upper and the lower boundary conditions for the outer boundary conditions are velocity boundary conditions. The fluid outlet boundary conditions are pressure boundary conditions and the fluid inlet boundary velocity is the same as the upper and lower boundary velocities. The inner boundary conditions are the velocity boundary conditions, ie, the inner boundary velocity is zero. In addition, the internal boundary turbulence kinetic energy and turbulence function dissipation rate is also taken as 0. This truly simulated the actual bridge section in the wind environment.

$$(s) + c_1 sF(s) + c_0 F(s) = d_2 s^2 G(s) + d_1 sG(s) + d_0 G(s) \tag{14}$$

$$(s) = \frac{Cs^3}{(s^2 + 2s\omega_s h_{s+} \omega_s^2)(s^2 + 2s\omega_g h_g + \omega_g^2)} \tag{15}$$

In order to achieve the effective turbulent boundary layer flow around the grid resolution, surrounding objects often require very fine division, and the object of the research of wind engineering often geometric size is large, if the full size model is calculated, the number of grids will be huge, and the leakage current for the slow convergence speed, so by the calculation of resource constraints, the numerical simulation is often adopted in large model, so that the listed should be considered.

- The rotary table rotating part and the lifting platform of the derrick by thick shell, gear wheel, counterweight and other components, using a two-dimensional shell element and solid element mesh.
- As a typical truss structure, the working platform and derrick are simplified by using beam element and rod element, which greatly reduces the number of elements, and has advantages of simple modeling and small calculation.
- According to the finite element computation request, in does not affect the computation precision under the premise, carries on suitable simplification to the model, simplifies the ladder, exterior attached part and so on, by concentrates these parts the quality unit to replace.

4. The Experiment and Simulation

In this section, we conduct the numerical simulation on the proposed method. According to the material and geometric properties of the structure of the bridge, the bridge space finite element model is established. Uses the multi-dimensional simulates 50 spots from the return model along the bridge floor the wind speed time interval curves, and will

simulate the wind speed curve power spectrum and the goal power spectrum will carry on the contrast, might see through the contrast, the simulation effect will be good. In the figure 4, we show the result.

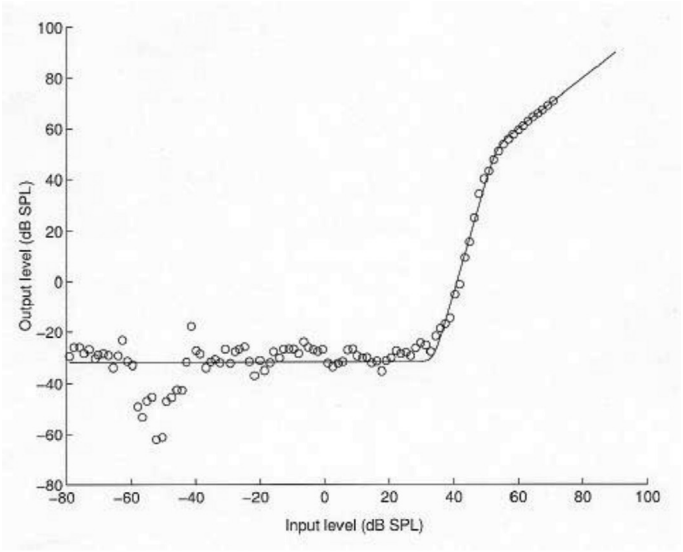


Figure 4 – The Result of the FEA Analysis Model

The vertical and lateral forces of the simulated wind load are respectively loaded on the surface and the side of the finite element model which has been established and converted into surface force. The measuring points are arranged at the mid-span and 1/4 span of each bridge of the rigid frame bridge. The pneumatic self-excited force

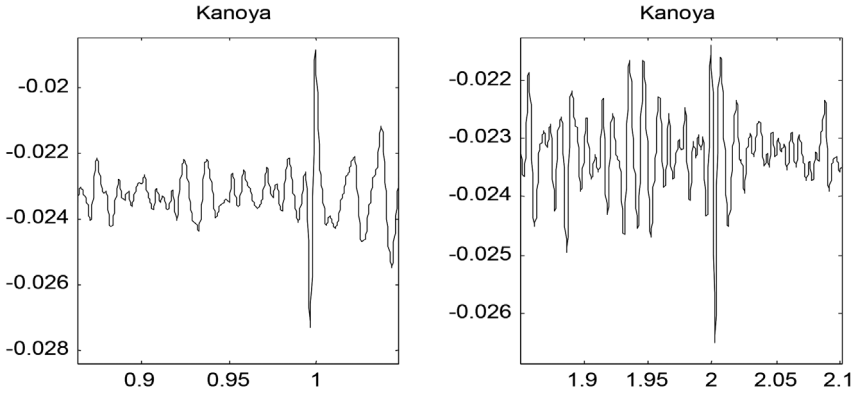


Figure 5 – The Stability Test under the Noise Conditions

acting on the model can be obtained by the balance force, the suspension section force and the integral method of pressure measurement. The dynamic self-excited force on the model section can be obtained directly from the dynamic pressure time history integral of each measuring point. The balance force and the suspension section force must first get the dynamic general force acting on the dynamometer section and then remove the disturbance load such as the inertia force to get the pneumatic parameter shown as the following figures.

Mode	Modal testing	FE analysis					
	Frequency/Hz	Beam-element model			Shell-element model		
		Frequency/Hz	Error/%	MAC	Frequency/Hz	Error/%	MAC
V1	3.18	3.09	-2.8	0.99	3.12	-1.9	0.94
V2	3.91	3.81	-2.6	0.94	3.96	1.3	0.86
V3	4.19	4.12	-1.7	0.95	4.13	-1.4	0.94
V4	4.79	4.67	-2.5	0.88	4.66	-2.7	0.85
V5	5.66	5.44	-3.9	0.58	5.37	-5.1	0.67
V6	7.15	7.03	-1.7	0.90	6.77	-5.3	0.85
T1	7.92	8.29	4.7	0.43	8.55	8.0	0.65
L1	1.86	1.85	-0.5	0.99	2.01	8.1	0.96
L2	2.56	2.61	2.0	0.94	2.93	14.5	0.92
L3	3.65	3.44	-5.8	0.86	3.30	-9.6	0.88
L4	4.54	4.49	-1.1	0.71	4.39	-3.3	0.88
L5	5.57	5.79	4.0	0.77	4.91	-11.9	0.91
L6	6.61	7.37	11.5	0.83	6.10	-7.7	0.87
L7	7.61	8.92	17.2	0.46	7.05	-7.4	0.60
L8	9.32	11.65	25.0	0.59	8.70	-6.7	0.44

Figure 6 – The Numerical Simulation Result on the Proposed Methodology

5. Conclusion

In this paper, we conduct analysis on bridge wind resistant model based on the finite element analysis and wavelet packet theory. The monitoring of structural safety, integrity and durability of important large bridges to ensure their safe and normal operation has become an important subject of great concern. Limited to research methods and testing technology, damage detection and the assessment of bridge structure in the past mainly non-destructive testing and artificial inspection and only visible defects appear within the scope of the structure and components in human to be effective. Obviously, for the long-span bridge built in recent years a large number of important, such detection and the evaluation method has been far behind the requirements of the situation. Under this condition, this paper proposes the new methodology. In order to effectively achieve the goal of health monitoring, the structural health monitoring system composed of sensors and computer systems must be used to monitor the structure on-line for a long time and to utilize the information of the monitoring information to invert the state of structures. FEA is applied to test the performance. The numerical simulation proves effectiveness of the methodology. In the future research, more relate simulation will be adopted to verify the systematic robustness of the model.

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Modelling and Analysis on Flutter Stability of Bridge Section based on Simulated Annealing Algorithm

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Abstract: This paper conducts the modelling and analysis on flutter stability of bridge section based on simulated annealing algorithm. Along with the bridge span unceasing increase as well as the light quality excel in the material application, the greatly cross bridge flutter stability problem is more and more prominent, the greatly cross bridge flutter occurs how mechanism as well as fast analyze the appraisal bridge flutter stability already to then become the universal precisely the matter of concern. The revised SAA model is applied into the system for the systematic implementation. Compares with the CFD numerical method, usually thought the stage model wind tunnel test obtains the bridge cross section flutter derivative to be most direct and the most effective method. The capacity spectrum method is the ability to reflect the structure of the pushover analysis capacity spectrum curve with representative seismic demand response spectrum curve to the same coordinate system. The proposed model integrates sufficient mathematical analysis to construct the new flowchart of the modelling paradigm which performs well.

Keywords: Flutter Stability, Bridge Section, Simulated Annealing Algorithm, Systematic Modelling, Experimental Simulation

1. Introduction

So far, scholars at home and abroad have carried out a lot of research work on the suspension bridge system bridges mainly concentrated in the structural system, static and dynamic performance and economic performance of its wind stability research is very small and insufficient (Dai, 2013). With that becomes the bridge condition to compare, in the construction hangs pulls the combination system bridge because not yet forms the final structure system, and the structure rigidity in particular torsional rigidity weakens obviously, while under the wind action the structure will produce the bigger distortion gentle breeze to inspire the response, the structure wind resistant stability problem hastens sternly (Manavizadeh, 2013). Therefore, the research of wind resistant stability early only for bridge state of the cable-stayed suspension bridge is not enough, we should study on the construction of cable-stayed suspension bridge wind stability strengthen the key to ensure the structure safety of the construction process (Ma, 2012; Kolahan, 2012). Along with the bridge span unceasing increase as well as the light quality excel in the material application, the greatly cross bridge flutter stability problem

is more and more prominent, the greatly cross bridge flutter occurs how mechanism as well as fast analyze the appraisal bridge flutter stability already to then become universal precisely the matter of concern (Matusiak,2014). Due to the differences in different cross section shape of the girder, the aerodynamic measures for the bridge, on a bridge vibration suppression effect remarkable suppression measures for another bridge may not be effective need through the wind tunnel test study on the corresponding pneumatic suppression measures.

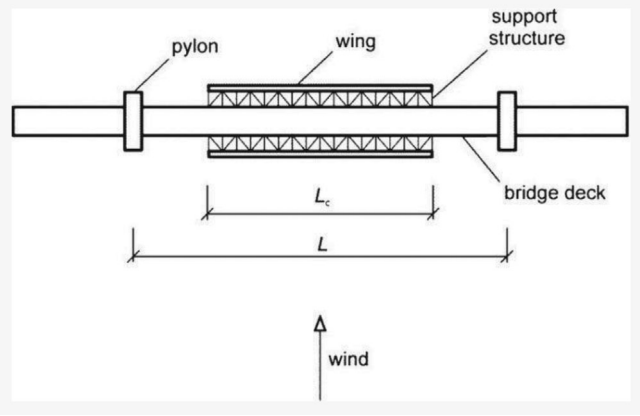


Figure 1 – The Flutter Stability of Bridge Illustration

As shown in the figure one, the stability factors are demonstrated, goes against the wind today in the great span bridge which the stable performance can guarantee and the excitation asks the topic with serviceable and the durable correlation to be day by day prominent, how effective anti-vibration or that damps inspires into an important research topic. Starting with this goal, this paper proposes the novel and new flutter stability of the bridge section model based on the simulated annealing algorithm (Soni,2013; Wang, 2014). The method is used to calculate the flutter of two large span bridges. The reliability of the flutter stability is verified by the analysis and verification of the calculation results. This method can quickly and efficiently evaluate the flutter stability of long span bridges the goal. In the later sections, we will introduce the proposed methodology in detail. The rest of the paper is organized as follows. In the section 2, we modified the traditional simulated annealing algorithm to make it fit with our application scenario. In the section 3, we propose the model from the perspectives of general bridge structure, section of bridge and stability modeling, respectively. In the section 4, the numerical simulation is conducted. In the section 5, we summarize the work and propose the potential optimization methods.

2. The Modified Simulated Annealing Algorithm

In many optimization problems with non-linear constraints, especially engineering optimization problems, how to find the optimal solution of this type of problem does not exist foolproof method. At present, there are analytic and some numerical methods to solve the problem of the functions optimization(Matsumoto,2013). In order to solve the

problem of function optimization, we must derive the objective function and the constraint function, and then use the extremum of the function to find the extreme point of the function and finally, the solution of the extremum as the function optimization problem (Xin, 2013). The simulated annealing algorithm is a heuristic random search algorithm based on Monte Carlo iterative algorithm, algorithm proposed by the N Metropolis et al. most as early as 1953, but it is used in the combinatorial optimization and VLSI design is in the 1983 by S Kirkpatrick and V. Cemy et al. proposed respectively. The algorithm will combine in the optimized question and statistics thermal equilibrium question analogy has in the addition warded off the combination optimization question new way(Gouder,2015). Its starting point is in the physics annealing process, namely when carries on the annealing processing to the solid matter, usually is first it heats up causes its granule to be possible the free motion, then the temperature decrease, the granule forms the low energy state gradually the crystal, if nearby dew point under temperature enough slowly, then the solid matter can certainly form the lowest energy the ground state.

Due to the slow convergence speed of genetic algorithm, early maturity and fall into local optimum, and the simulated annealing algorithm in convergence speed and jump out of local optimal advantage is very significant, so the NSGA is still can be room for improvement (Körlin, 2012; Brusiani, 2013). Before the optimization, we firstly introduce the original version of the SAA. Simulated annealing algorithm is a kind of algorithm based on the mechanism of metal annealing. The specific steps of the simulated annealing operation are as follows. Firstly, it has an initial optimum point stochastically, and it took the current optimum point, and calculates the goal function value. Then, we set the simulated annealing initial temperature as follows.

$$T_{initial} \to \theta \tag{1}$$

And the temperature can be then updated as the follows.

$$T_{updated} = T_{initial} / t^{\beta} \tag{2}$$

Randomly change the current optimal point to produce a new optimal point, and calculate the new objective function value, and calculate the increment of objective function value. The optimal point could be then defined as the formula 3.

$$p_{optimal} = \begin{cases} 1 & \Delta < 0 \\ \exp(-\Delta / \theta) & \Delta \geq 0 \end{cases} \tag{3}$$

Although the simulation annealing algorithm can discover the objective function by the probability search technology from the probability significance and the overall situation most dot, while grasps the entire search process ability to be insufficient, it is not advantageous for the causes the search process to enter the most hopeful search region, the cause simulation annealing operation efficiency is not high. In figure 2, we show the visualized demonstration of SAA optimization procedures.

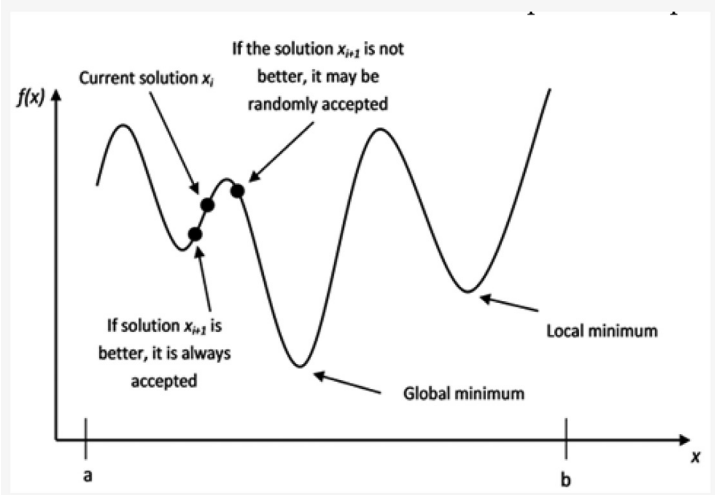


Figure 2 – The Visualized Demonstration of the SAA Optimization Procedures

The genetic algorithm first encodes the feasible solution of the problem in some form. The coded solution is called the individual and randomly generates the initial population of the M individuals. Then the fitness of each individual is calculated according to the predetermined evaluation function, and then the next generation population is generated by genetic operation such as selection, crossover mutation and so on, and the individual adaptability is improved. NSAG can be served as the optimization of the traditional SAA, its main mentality is that in genetic algorithm foundation, before each generation of choice pair first carries on sorting according to the solution individual non-control relations, the identical rank is one, then to each level according to density sorting, then the choice, overlapping, the variation obtains the filial generation, merge

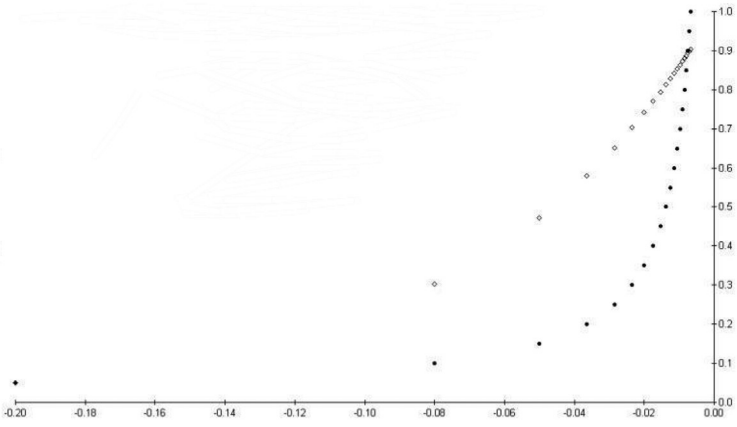


Figure 3 – The Visualized Demonstration

father generation of and the filial generation, according to the level order, after selects the merge a half solution to take next time iterates father generation. If selects level and size cannot satisfy condition exactly the size, then finally selects to it the level according to density comparison operator sorting, selects according to sequence needs the integer solution. In evolutionary algorithm, in order to avoid falling into the local optimum, there will be a certain probability to accept the poor quality of the solution, those who are about to be replaced the best solution to save up that is the elite strategy. In order to preserve the convergence and diversity of the solutions, we use fast non-dominated sorting and density comparison operators as shown in the figure three.

The state transition of immune algorithm can be described by the Markov chain, algorithm restraining is refers after the algorithm iterates to enough many number of the times, in the community contains the overall situation best individual the probability to approach in one. This kind of definition namely for probability one restraining which usually said. The equation 4 expresses this feature.

$$\lim_{x\to\infty}\sum_{S_i\cap S\neq\varnothing} p\left\{A_k^i\right\}=1 \tag{4}$$

When the NSGA-II algorithm is improved, a multi-objective simulated annealing algorithm is combined to retain the essence of the NSGA-II algorithm that is the elites retention strategy, followed by its non-dominant sort operator and density comparison operator and can be defined as equation 5.

$$x^*=\left\{x\in X\mid f\left(x\right)=\max_{x_i\in X} f\left(x_i\right)\right\} \tag{5}$$

3. The Proposed Flutter Stability of Bridge Section Model

3.1. The bridge structure review and analysis

In recent years, most of the important long-span bridges at home and abroad set up structural safety and the health monitoring system, and has made many gratifying achievements and progress which can be generally reflected from the listed aspects. (1) By measuring the response of the structure of the sensing device can be obtained to reflect the behavior of the structure of the various records, and bridge operation after the continuous or intermittent monitoring of structural status, and strive to obtain the bridge structure of the continuous, complete information. (2) Comprehensive monitoring content. In addition to monitoring the general state and behavior of the structure itself (stress, displacement, inclination, acceleration, dynamic characteristics, etc.), monitoring and recording of modern environmental conditions (wind, earthquake, temperature, vehicle load, etc.) is also emphasized. (3) Diversified monitoring instruments, advanced monitoring capabilities continue to improve. Many monitoring systems are fast and large capacity of information collection, communication and processing capabilities, and network sharing.

The entity degeneration unit is in senate unit in and so on three dimensional the entity foundations, through uses the revision elasticity coefficient matrix and the restraint corresponding relative displacement method, introduces the board shell directly and so on each kind of basic component simplification hypothesis obtains. Because is based on senate unit structure and so on three dimensional an entity, therefore entity senate unit and so on degeneration unit and entity have the same grid shape, the node degree of freedom and the shape function. Entity degeneration unit and the entity isoparametric compared to the biggest feature is reflected in the elastic matrix, the entity isoparametric elastic matrix of elastic mechanics space problem to reflect the stress and strain relations, while the entity degradation unit through the elastic matrix to reflect different types mechanical characteristics of the components. For the degraded series unit, through block integral technique, a unit can be divided into the plurality of regions, each partition can be of different materials, such as the steel and concrete can have different geometry and can have different mechanical characteristics, such as plate and beam the empty region as an independent partition as only the physical and the mechanical parameters of the materials are set to zero. Then, we can start modelling some parameters.

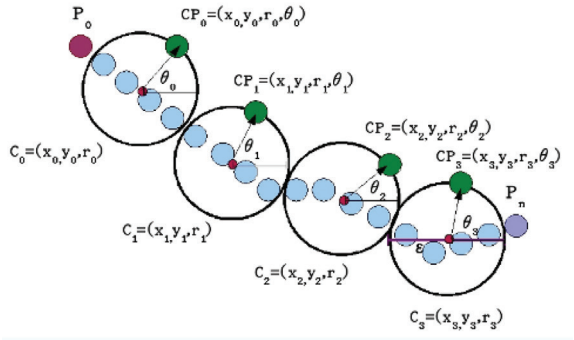


Figure 4 – The Bridge Structure Modelling Demonstration

The figure 4 illustrates the modelling connections and the relationships. When the moving load is moved on the simply supported girder bridge and the stress in the structure is directly proportional to the magnitude of the load in the elastic range. The lower edge stress of i -th main girder is defined as follows.

$$\sigma_i = M_i / W_i \tag{6}$$

Assuming that the main beam section is the same and then the sum of the main beam bending moment can be defined as the equation 7. Therefore, the king post obtains sum of the strain the proportion the bending moment which receives in the beam bridge whole. Sum of the strain may obtain by the WIM system strain sensor, EW respectively is the material and the section attribute, speaking of in the service bridge that may actual obtain. Thus, the WIM system turned the strain which the vehicles load caused to be possible to know, but vehicles load actually unknown inverse. Because serves in the

service bridge certain age limit as well as the construction with becomes between the bridges the error, the section EW already between the same design values has possibly had the certain change as this value should by the scene gauging result primarily.

$$M = \sum_{i=1}^{m} M_i = \sum_{i=1}^{m} EM_i\varepsilon_i = EM\sum_{i=1}^{m} \varepsilon_i \tag{7}$$

The effective stress of the bridge structure is the effective stress after the deduction of the stress loss, and the loss of the pre-stress should be reasonably estimated in the analysis of the pre-stressing effect. In this, according to the pre-stressed muscle action mechanism, divides into the loss of pre-stress two kinds: One kind is the loss which has nothing to do with the structure distortion, like the pipeline friction and the anchorage retraction causes loss and so on; Another kind is distorts the related loss with the structure, while like the concrete elastic compression, the contraction continuous variation and so on cause loss. Regarding first kind of the loss, when computation equivalent node load according to standard its deduction as regarding the second kind of loss, uses this article the steel bar model in the structure analysis time includes automatically which can be defined as the formula 8,

$$\sigma + \frac{1}{\beta}\dot{\sigma} = g_0\varepsilon + \frac{g_0 + g_1}{\beta}\varepsilon \tag{8}$$

3.2. Section of bridge modelling and analysis

In flutter analysis, the unsteady aerodynamic forces caused by the movement of the bridge girder are usually expressed by the aerodynamic derivative, which depends on the profile of the girder cross-section, the wind speed and the wind speed. At the present the hydromechanics to holds flows the mechanism not to understand, causes in the numerical method to hold with the aid of the experience flows the model also causes the value simulation existence difference and the uncertainty. Compares with the CFD numerical method, usually thought the stage model wind tunnel test obtains the bridge cross section flutter derivative to be most direct and the most effective method. CBHM algorithm is a multi-input and multi output time-domain modal parameter identification method. Compared with the ERA algorithm, the algorithm has a small amount of computation fast recognition speed, and with the algorithm has the same recognition accuracy. Without considering the lateral movement of the structure, a bridge section with two degrees of freedom of vertical bending and torsional motion is used. The equation of motion is expressed as the equation 9 and 10, respectively.

$$m\left(\ddot{h} + 2\xi_h w_h \dot{h} + w_h^2 h\right) = L \tag{9}$$

$$I\left(\ddot{a} + 2\xi_a w_a \dot{a} + w_a^2 h\right)a = M \tag{10}$$

The ultimate goal of flutter analysis is to calculate the structure of the bridge or flutter critical wind speed, in order to evaluate the flutter stability. There are many ways to calculate structure bridge flutter critical wind speed, more classic is the flutter critical wind speed of the Scanlan solving method are used to calculate two degree of freedom structure flutter critical wind speed, by solving dimensionless flutter motion equations, flutter critical wind speed can be obtained. For solving this challenge, in the following equations, we provide the solutions.

$$f(x)=\sum_{n=0}^{\infty}c_n(x-x_o)^n=c_0+c_1(x-x_o)+c_2(x-x_o)^2+c_3(x-x_o)^3+O\left((x-x_o)^4\right) \quad (11)$$

$$\begin{aligned}
f(x_o+\delta x,y_o,z_o)&=f\left(x_o,y_o,z_o\right)+\left.\frac{\partial f}{\partial x}\right|_{x_o,y_o,z_o}\delta x+O\left(\delta x^2\right)\\
f(x_o,y_o+\delta y,z_o)&=f\left(x_o,y_o,z_o\right)+\left.\frac{\partial f}{\partial y}\right|_{x_o,y_o,z_o}\delta y+O\left(\delta y^2\right)\\
f(x_o,y_o,z_o+\delta z)&=f\left(x_o,y_o,z_o\right)+\left.\frac{\partial f}{\partial z}\right|_{x_o,y_o,z_o}\delta z+O\left(\delta z^2\right)
\end{aligned} \quad (12)$$

$$f(\vec{x}_o+\delta\vec{x})=f\left(\vec{x}_o\right)+\nabla f\left(\vec{x}_o\right)\cdot\delta\vec{x}+O\left(\left|\delta x\right|^2\right) \quad (13)$$

From the above, we know that the covariance block Hankel matrix method uses the covariance of the output vector, which can effectively reduce the impact of output noise, and through the output covariance Toeplitz matrix SVD, from the process of determining the order of the system the elimination of high-order noise mode for which has a strong anti-noise ability under the following restriction condition.

$$\begin{aligned}
\vec{u}\cdot\hat{n}dA&=-u\left(x_o-\frac{dx}{2},y_o,z_o\right)dydz+u\left(x_o+\frac{dx}{2},y_o,z_o\right)dydz\\
&-v\left(x_o,y_o-\frac{dy}{2},z_o\right)dxdz+v\left(x_o,y_o+\frac{dy}{2},z_o\right)dxdz\\
&-w\left(x_o,y_o,z_o-\frac{dz}{2}\right)dxdy+w\left(x_o,y_o,z_o+\frac{dz}{2}\right)dxdy
\end{aligned} \quad (14)$$

In order to simplify the numerical realization of forced vibration test, the model aerodynamic force is obtained, and the flutter analysis theory can be used to bridge flutter analysis and the specific steps are as follows.

1. Establishment of bridge cross section model. When under the guarantee computation speed premise, as far as possible the earth selection model and the

solid bridge cross section proportion causes the wind field value simulation the flow field and the actual Reynold's number is close.

2. Selected model motion the whole period of time discrete number n. The selected n must be able to fully characterize the motion state of the model in a period, and to calculate the convenience, the time is equal to interval.
3. Wind field simulation. The boundary conditions of the computational domain can be obtained from the boundary conditions of the bridge section model wall surface and the outflow velocity U, and the calculation can be obtained by solving the two-dimensional incompressible Navier-Stokes equations to calculate the wind pressure field.

3.3. Stability of the bridge modelling and discussion

Based on the discussion on the 3.1 and 3.2 parts, this section proposes systematic implementation of the model. The capacity spectrum method is the ability to reflect the structure of the pushover analysis capacity spectrum curve with representative seismic demand response spectrum curve to the same coordinate system, calculate the intersection point is the performance of structure in the blurring the solving steps are as follows. Based on the static analysis method, the shear force and displacement curve of the structure are calculated as the follows.

$$\frac{d}{r}=\left[6\left(\frac{C}{I}\right)\right]^{1/a} \tag{15}$$

$$N_R=\frac{1}{3}\left[M\cdot K\cdot A\cdot\left(\frac{C}{I}\right)_T\right]^{2/a} \tag{16}$$

By using the capacity spectrum of each order mode and the demand response spectrum of the 5% damping ratio, the maximum displacement and pseudo acceleration of each mode are determined by simplified capacity spectrum method. The essential parameters can ben then calculated as the follows.

$$n_s=n_f\left[\frac{1}{1.6v}\left(\frac{W/R}{E_b/N_0}-\frac{WN_{th}}{P_s}\right)+1\right]. \tag{17}$$

$$P_s=\frac{WN_{th}}{\frac{W/R}{E_b/N_0}-v\left(1+\frac{I_{out}}{I_{in}}\right)\left(\frac{n_s}{n_f}-1\right)}. \tag{18}$$

The present probabilistic model and the statistical parameter that aims at plans to construct the bridge to say while regarding in the service bridge, its load had own

particularity, if still according to planned to construct the structure probabilistic model and the statistical parameter to carries on the probability reliability in the service bridge to appraise, then had the unfairness. Theoretically said that, in the service bridge load may through the examination, the experiment be equal to the section obtains the enough information, thus carries on the analysis to it, definite load probability distribution and statistical parameter as follows.

$$I_{in} = \upsilon\left(\frac{n_s}{n_f} - 1\right)\frac{P_s}{W} \tag{19}$$

The main purpose of the bridge in service is to compare the roughness of the bridge in order to grasp the main parameters of the bridge.

4. The Experiment on the Proposed Model

In this section, we simulate the proposed method. In the bridge earthquake resistance design, ability spectral method is the most commonly used one kind, regarding the base local oscillation main function regular bridge, may neglect the higher order to inspire, carries on the comparison with the time interval method computed result, may obtain a more precise solution, the relative error in 10% that satisfies the precision request. The figure 5 shows the result under different levels.

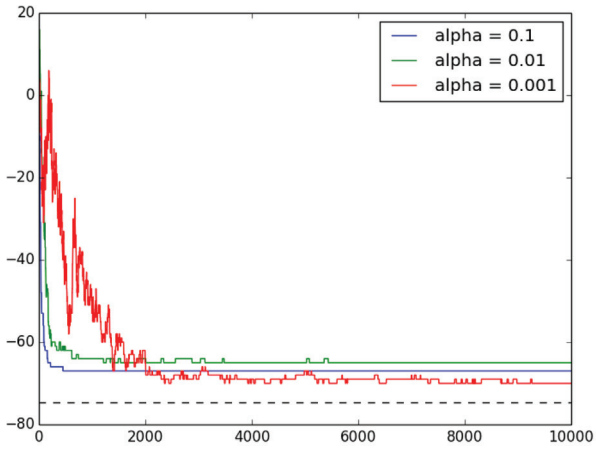


Figure 5 – The Bridge Structure Stability under Different Influencing Levels

Through two kinds of bridge structure with diaphragm beam test data comparison and theoretical calculation analysis, found that the bridge structure of cross beam both analysis process than the diaphragm beam stability data in dynamic analysis or static load, the stress strain and displacement of the number of the values are relatively small the transverse coefficient analysis of field test data are calculated, the bridge structure of cross beam than horizontal beam should be uniform. And in the figure 6, we show the overall bridge structure stability test simulation.

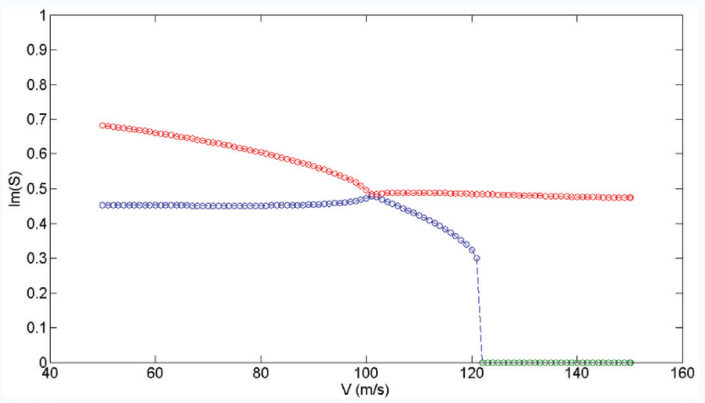


Figure 6 – The Overall Bridge Structure Stability Test Simulation

5. Conclusion

This paper conducts the modelling and analysis on flutter stability of bridge section based on simulated annealing algorithm. In view of this new combination bridge structure in the design aspect material flaw question, while through establishes the ANSYS finite element model, research internode web member rigidity these design parameters to the overall bridge structure stress performance influence rule. The conclusion indicated that, along with internode web member rigidity increase, the combination bridge structure cross most larges deflection non-linearity reduces. The revised SAA model is applied into the system for the systematic implementation. Compares with the CFD numerical method, usually thought the stage model wind tunnel test obtains the bridge cross section flutter derivative to be most direct and the most effective method. CBHM algorithm is a multi-input and multi output time-domain modal parameter identification method. Referring to the numerical simulation, the performance of the proposed model is well presented. In the future, we will integrate neural network to predict the stability of bridges under different conditions and restrictions to test of the overall robustness.

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Application of Cloud Computing and Big Data Platform in the Teachers Training of College Physical Education Optimization

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Abstract: Cloud computing can realize the integration of resources through networking and distributed storage technology, and the advantage of the cloud computing is increasingly prominent in the process of education and teaching practice. The authors analyze the application of cloud computing and big data platform in the physical teachers training. Through the questionnaire survey method, the results show that the contributing factors of the physical education teachers' training are as follows: 24.238%, 20.369%, 14.207%, 12.721%, cumulative 71.534%, all have statistical significance. The main causes of college physical education teachers' training problems are: Insufficient attention, lack of training needs analysis, training design is not detailed enough, training effect is not timely feedback.

Keywords: Cloud computing, Big data platform, Teachers training, Physical education

1. Introduction

Cloud computing is not a new technology, more like a business model. To achieve the integration of resources infrastructure through networking, virtualization, distributed storage technology, integrated management, the formation of the visitor on-demand computing and storage resources and software resources. It is considered a new generation of information technology tools and the next major wave of the development of the IT industry (Arrighetti, 2013; Chen, 2014). With the advantage of cloud computing in the process of education and teaching practice has become increasingly prominent, more and more attention to its education department and scholars(Guan, 2014). China's full implementation of the quality education, education reform, comprehensive education quality, rapid promotion of modern occupation education rise and the construction of teachers in the comprehensive development, in addition to the requirements of teachers with outstanding moral level and professional ability, but also has the teacher occupation career process of constant self perfection, this is an urgent need to strengthen and the improvement of teacher training, can promote teachers' comprehensive quality and practical ability to improve the development of

the whole society, meet the need of teachers(Li, 2015). College physical education teacher training to improve the quality of physical education teachers is an effective and important way of university sports teachers team construction has become one of the important issues in the development of higher education.

The first is to find out the countermeasures to solve the problems in the training of physical education teachers in Colleges and universities. This can provide a new way for the improvement of college physical education teachers training, training, training effect can provide more reference for the training department of physical education teachers in colleges can improve and promote the cultivation of talents in colleges and universities, and the adjustment and optimization of team (Asamani, 2013). The second is to maintain the orderly nature of college physical education teacher training, the implementation of the feasibility of college physical education teachers training measures and methods. Improve teachers' comprehensive quality, further mobilize the consciousness, enthusiasm and effectiveness of teachers' work, promote the comprehensive improvement of the quality of scientific research and teaching in Colleges and universities (Panikhina, 2012; Wang, 2013). Finally, it is to improve the training system of physical education teachers in Colleges and universities, and to find the effective content and methods of physical education in Colleges and universities. College physical education teacher training content innovation, rich college sports teacher training system, can promote the teaching and scientific research and development of college sports teachers, can cultivate more innovative talents.

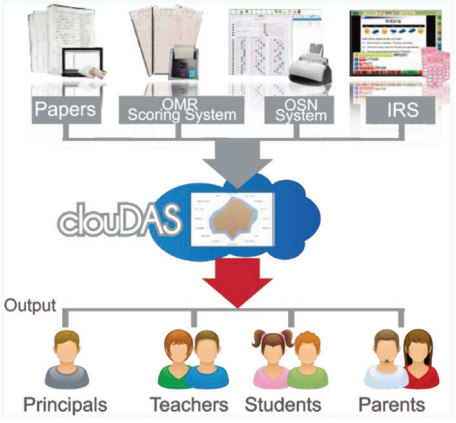


Figure 1 – The application of cloud computing in education

2. Cloud technology and application of large data

In recent years, the rapid development of cloud computing technology for learning, especially the learning concept has brought about change. Bai proposed the concept of cloud learning, the formation of this cloud learning concept, will help liberate teachers from the heavy burden in the use of technology, which will be paid more

attention to the design of effective learning (Zhang, 2014). They believe that cloud learning can fully embody the learner centered on the learning task as the goal, to assist as a form to resources as the core, through active learning to build a personalized learning environment to support teachers' effective teaching and students, promote the development of students' high order thinking ability and wisdom of the group, is committed to building a lifelong learning and the learning society. This learning concept has a natural advantage of cloud computing, but requires sophisticated cloud computing platform support. The study of the impact of cloud computing technology on learning is also reflected in the learning environment and learning methods. For the change of learning environment, cloud computing can provide a favorable technical support for learners at any time and any place, bring more convenient learning tools, and improve learning efficiency. If the learner can be uploaded directly to learn the information to the cloud server, which I can anywhere in the network can find and share their learning materials, do not need the U disk or mail delivery, but also in the mobile phone to enter the URL to modify. There is a variety of learning software tools to learn, but also in support of cloud computing server to obtain, reducing the complexity of the local machine installation, to achieve real-time transfer of software between different platforms.

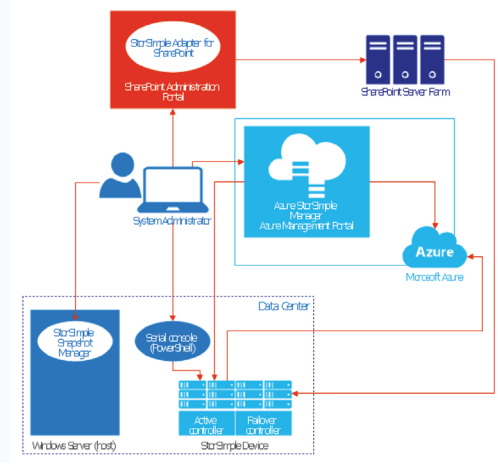


Figure 2 – Cloud computing platform

On the change of learning mode of cloud computing, scholars mainly from the two aspects of the transformation of collaborative learning and mobile learning to carry out specific research. The former is involved in a wide range of issues, the research issues are more in-depth, the research content mainly includes the design of collaborative learning and practical application research. The impact of cloud computing on mobile learning, the development of cloud computing based on the advantages of mobile learning, such as to make up for the lack of mobile learning mode; integration of resources; to create multiple independent support of virtual learning community; to reduce the requirements of mobile learning devices. Based on the above research results, construct the mobile learning model based on

Hadoop, the students can be feedback problems in learning and learning resources for the needs of information for administrators and teachers, learning for students and teachers can also put forward some suggestions and requirements, supervise learning, constantly improve the system administrator according to the views of users.

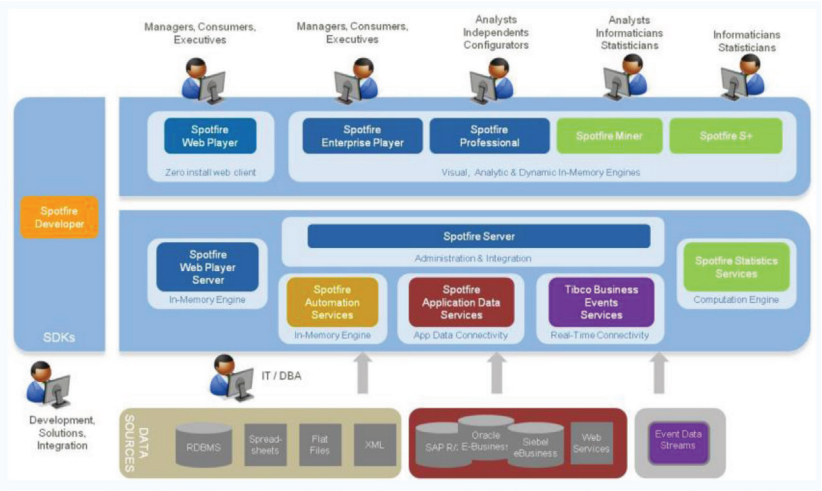


Figure 3 – Big data platform for education

Over the years as the state of digital educational resources to promote the process of the development of domestic scholars from all walks of life made the course database, web course database and courseware, animation, test material library

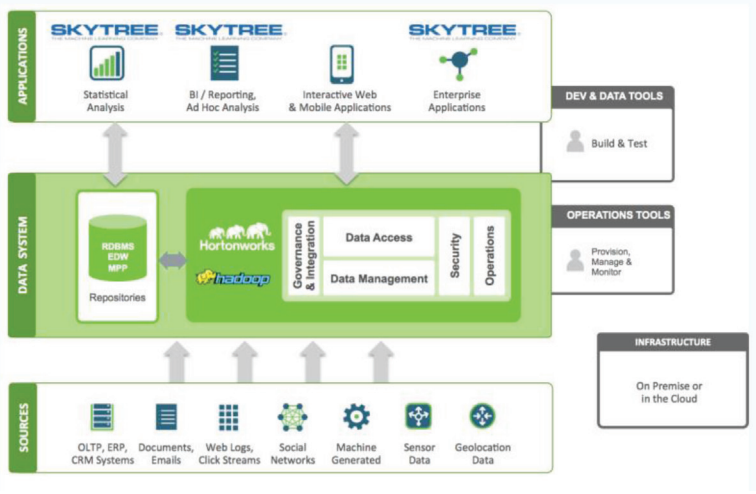


Figure 4 – Hadoop education platform

digital resources, but due to in the development of the teaching resources design, did not fully consider the versatility and compatibility of different teaching platform, so that not to be able to effectively share and use many educational resources, educational resources and waste caused by the loss of value. In addition, most of the existing teaching platform using B/S network structure of centralized access to teaching resources, at the same time when the user visits reached saturation caused by network congestion, poor communication between the client and the server, so that visitors do not need to extract the teaching resources. Then there are the current network resources to learn most of the students self-study, lack of teacher guidance and interaction between teachers and students, seriously affect the teaching effect and teaching quality. In view of the above problems, the domestic scholars try to explore a reasonable digital resources to build, share the service system, to solve the teaching resources of isolation, duplication, low quality and difficult to share and so on.

3. The research object, method and innovation

3.1. The research object

1. The subjects of special subject interview

Table 1 shows that the basic characteristics of the interviewers are gender male (number = 13; percent= 65.00%), female (number =7 ; percent = 35.00%), age: 36-40 years (Number = 8; percentage = 40.00%), more than 51 (number = 3; percentage = 15.00%), less than 35 (number = 5; percentage = 55.00%), Graduate students (number = 11; percentage = 55.00%); undergraduate (number = 8; percentage = 40.00%), specialist (number = 1; percentage = 5.00%); The titles are: associate professors (number = 13; percentage = 65.00%),Instructor (number = 3; percentage = 15.00%),Professor (number = 2; percentage = 10.00%),Others (number = 2; percentage = 10.00%);Schools were: Jinggangshan University (number = 6; percentage = 30.00%),Jiangxi Normal University (number = 4; percentage = 20.00%),Shanghai Institute of Physical Education (number = 4; percentage = 20.00%),Ganzhou Normal University (number = 3; percentage = 15.00%),Fudan University (number = 3; percentage = 15.00%).

2. Questionnaire survey

Table 2 shows the results: the basic characteristics of a questionnaire information indicators were gender:Male (number = 39; percentage = 62.90%),Female (number = 23; percentage = 37.10%);The age was 36-45 years old (number = 20; percentage = 32.26%),46-55 years (number = 17; percentage = 27.42%),35 years of age (number = 15; percentage = 24.19%),56 years and older (number = 10; percentage = 16.13%);The titles are: instructor (number = 35; percentage = 56.46%),Associate Professor (number = 22; percentage = 35.48%),Professor (number = 3; percentage = 4.84%),Others (number = 2; percentage = 3.22%);The number of years of schooling is 6-10 years (number = 21; percentage = 33.87%),16-20 years (number = 14; percentage = 22.58%),11-15 years (number = 12; percentage = 19.35%),5

Index	Classification	The number	Proportion
Gender	Male	13	65.00
	Female	7	35.00
Age	Under 35 years of age	5	25.00
	36-40 years old	8	40.00
	41-50 years old	4	20.00
	Over 51 years of age	3	15.00
Education	Graduate student	11	55.00
	Undergraduate	8	40.00
	Junior college	1	5.00
Title	Professor	2	10.00
	Associate professor	13	65.00
	Lecturer	3	15.00
	Other	2	10.00
School	Jinggangshan University	6	30.00
	Jiangxi Normal University	4	20.00
	Shanghai Institute of Physical Education	4	20.00
	Ganzhou Normal University	3	15.00
	Yichun university	3	15.00

Table 1 – Feature information (n=20)

years and below (number = 9; percentage = 14.52%),21 years and above (number = 6; percentage = 9.68%);Education: followed by: undergraduate (number = 39; percentage = 53.23%),Master (number = 23; percentage = 37.10%);Specialist (number = 4; percentage = 6.45%);Dr (number = 2; percentage = 3.22%).

Index	Classification	The number	Proportion
Gender	Male	39	62.90
	Female	23	37.10
Age	Under 35 years of age	15	24.19
	36-45 years old	20	32.26
	46-55 years old	17	27.42
	Over 56 years of age	10	16.13
Title	Professor	3	4.84
	Associate professor	22	35.48
	Lecturer	35	56.46
	Other	2	3.22
Seniority	Under 5 years	9	14.52
	6—10 years	21	33.87
	11-15 years	12	19.35
	16-20 years	14	22.58
	Over 21 years	6	9.68
Education	Doctor	2	3.22
	Master	23	37.10
	Undergraduate	33	53.23
	Junior college and below	4	6.45

Table 2 – Basic characteristic information (n=62)

3.2. The main method

1. **Expert interview method:** because the questionnaire survey method has certain limitation, this research carries on the semi structure interview to some university's leaders and experts. Interview content mainly relates

to the training system of college physical education teachers, the previous training research situation, the training theory knowledge and the training development trend prediction and strategy and so on.

2. **Questionnaire survey:** one is the questionnaire design: according to the questionnaire design requirements, the analysis and research of the university teacher related training materials on the basis of the preparation and design questionnaire. Two is the questionnaire survey: the questionnaire survey object is the university teacher training management and the University teacher. The questionnaire used to distribute, to fully guarantee the recovery in the form of questionnaire and questionnaire recovery rate, in the recovery process, a face-to-face conversation with many respondents, to ensure the reliability and validity of the questionnaire.
3. **Statistics:** according to the purpose of the study, this study uses several statistical analysis methods of questionnaire to collect information for processing, inspection and measurement scale of the concept and verify the hypotheses proposed in the research model. Using SPSS22.0 and Excel2003 analysis, the main analysis methods include exploratory factor analysis (EFA), mean comparison, percentage statistics, correlation analysis, and according to statistical data to chart production.

3.3. Research and innovation

- ***The innovation of research content:*** Research on training for physical education teachers in Colleges and universities is not much, and the existing research results have limitations, the contents of a single feature, analysis of various factors and summarized the influence of training system of P.E. teachers in Colleges and universities involved in the construction of training system and corresponding training strategy, training system of college physical education teachers with innovation strong in research content.
- ***The innovation of research method:*** Empirical Analysis of college sports teacher training and training system by using the method of questionnaire investigation, statistical analysis. Based on the logical thinking with a small and a large number of questionnaire survey, this method uses interview method, questionnaire survey method and mathematical statistics method are combined, for more in-depth interpretation of college physical education teachers training management system.

4. Results and analysis

4.1. Factor analysis on the cause of the problem of the training of physical education teachers in Colleges

The causes of training of college sports teachers very much and complex, in order to study this issue, to extend the training of PE teachers in Colleges and universities part of 70 questionnaires, 65 were recovered, the recovery rate of 92.86%, excluding

3 invalid questionnaires, 62 valid questionnaires, the effective rate was 95.38%. Using SPSS16.0 to exploratory factor analysis of the results of the pilot survey, using the principal component method to extract the common factor, and take the characteristic value of more than 2 to intercept the standard of the common factor. In the "causes" training of college sports teachers 17 related projects, table 3 shows that the 4 factors explain the cumulative total variance was 71.534%, among them (first male, second common factor factor is 24.238%, occupy 20.369% of the third common factor occupies 14.207% and fourth male factor is 12.721%). For the convenience of study, table 4 shows: 1 public factors named training of College PE Teachers' leadership for sports teachers in the degree of importance ", including" lack of funding for training in degree, training time does not plan to cause "," training evaluation implementation causes degree "," training management is not in place of "and" the training plan is not comprehensive in "5 indicators; factor 2 was named the training of College PE teachers" training physical education teachers ", including" professional development needs not cause "," personal planning demand causes degree, combined with the actual needs of teachers is not enough reason "and" the government macro regulation and planning demand causes degree "4 indicators; factor 3 was named the training of College PE teachers" training methods of sports teachers ", including" case representativeness of origin "and" practice method cannot meet the professional sports cause degree "and" seminar targeted the causes of "and" theory teaching method causes too rigid degree "4 indicators; factor 4 was named the training of PE teachers in Colleges and universities" the effect of physical training teacher feedback ", including" on the training effect, causes the transformation and application of enough "to report the effect of training is not the cause of" and "on the training effect is not the cause of exchange" and "on the training effect of the summary is not enough causes" 4 indicators. Visible, constitute the college sports teacher training problem has four common factors.

Index	Initial eigenvalue			After rotation of the square sum of the load		
	Characteristic value	Contribution rate%	Cumulative contribution rate%	Characteristic value	Contribution rate%	Cumulative contribution rate%
1	4.120	24.238	24.238	3.344	19.671	19.671
2	3.463	20.369	44.607	3.128	18.398	38.069
3	2.415	14.207	58.814	2.887	16.980	55.050
4	2.162	12.721	71.534	2.802	16.484	71.534

Table 3 – Total variance analysis of physical education teacher training in Colleges and universities (n=62)

Index	Common factor			
	1	2	3	4
6 lack of training funds	0.861			
7 training time is not planned	0.701			
12 training assessment does not implement the degree of cause	0.593			
13 training management is not in place	0.628			
14 training plan is not comprehensive	0.851			
1 discipline professional development needs is not the cause of formation		0.948		
4 person plan demand is not enough		0.567		
10 teacher needs to combine the actual lack of reason		0.738		
17 the government's macro-control and planning demand is not enough		0.766		
3 case representation is not strong			0.628	
8 the field practice method can not meet the physical education professional degree			0.621	
11 seminar targeted at the cause of the degree			0.768	
16 theory teaching method is too rigid			0.769	
2 on the training effect of the transformation of the application is not enough				0.611
5 report on the training effect is not enough				0.813
9 the training effect of the exchange is not enough				0.721
15 summary of the training effect is not enough				0.816

Table 4 – The factor load matrix after the rotation of physical education teachers in Colleges and Universities(n=62)

4.2. Leadership is not enough emphasis on physical education teachers

Table 5 shows the importance of factors of PE Teachers' leadership with index as: "the lack of funding for training and loading causes" =0.861; "training time and loading plan causes of" =0.701 "; training evaluation is not implemented and the load causes" =0.593 "training; management is not in place of origin" and the load of =0.628; the training plan is not comprehensive and the load causes of =0.851. Ranking from high to low in order: lack of training funds, training programs are not comprehensive, training time is not planned, training management is not in place, training evaluation does not implement the cause degree.

Training funds refers to the physical education teachers in Colleges and universities to arrange or organize teachers to participate in the training or teachers voluntarily apply to participate in the training of the job related training fees, data fees, travel expenses, etc.. The training plan is starting from the physical education teachers in Colleges and universities long-term development strategy, to a comprehensive and objective analysis of training needs based on the pre arranged training content, training time, training venues, training, training objects, training mode and training cost etc.. Training time is the basis of the college physical education teachers in vocational training of the overall training program, the different time, different personnel training in different time arrangements. Training management is the foundation of training management through training needs analysis, planning, organization and implementation, evaluation process to do a comprehensive, training management system, the related theory, training management method, process, techniques and examples are applied to the analysis of the process and results in practical work. Training evaluation refers to the evaluation of physical education teachers in Colleges and universities on the training program, training process and effect. In the leadership of the importance of each factor in the widespread shortage of funds, the corresponding share in the training of limited funding to hire real strength training funding required is huge, at the same time, with the rapid development of science and technology in Colleges and universities promote social sports teacher training frequency accelerated, demand of sports teacher training urgency strengthen the shortage of training funds, further highlight. The training plan is not complete, the training time is not planning to the university leadership to reduce the importance of physical education teacher training. Training management is not in place, training assessment is not implemented so that the results of the training of the university leadership is not satisfied with the feeling rather than wasting the limited funds in training, it is better to put the funds in other immediate projects.

Serial number	Index content	Load capacity	Ranking
6	Lack of training funds	0.861	1
7	Training time is not planned	0.701	3
12	Training assessment does not implement the degree of cause	0.593	5
13	Training management is not in place	0.628	4
14	Training plan is not comprehensive	0.851	2

Table 5 – Leadership of the physical education teachers' attention to the content of the index, load and ranking analysis table (n=62)

4.3. Physical education teachers lack of training needs analysis is not enough

Table 6 shows that PE Teachers' training needs factor contained indicators: "professional development needs, and not cause" load "=0.948; personal plan demand causes" and

"load =0.567; according to the actual needs of teachers is not enough and the load causes" = 0.738; "government macro regulation and planning demand is not enough" and cause load =0.766. Ranking from high to low: professional development needs, not cause degree, government macro-control and planning demand causes degree, combined with the actual needs of teachers is not enough, cause personal plan demand causes degree.

College Physical Education Teachers' training needs include government training needs, training needs, individual training needs and training needs. Government training needs is reflected in the national macro-control of college physical education teachers, the government of the jurisdiction of the development of higher education and the construction of teachers' team has unified planning, to the direction of the development of higher education. Due to the uneven economic development in various parts of the country, the development of college sports teachers is not balanced. The training needs of colleges and universities is refers to the universities in the training process to the actual needs of faculty construction, discipline construction and construction of teachers as the basis, embodies the concentrated reflection in different development stages have different needs of teachers, is the most basic training needs. Individual training needs are the actual training needs of physical education teachers in the process of fulfilling the responsibilities of teaching and scientific research job and promoting their professional development, which has the characteristics of diversity, richness and stage. Different disciplines, different positions, different ages of teachers have obvious differences in training needs, the same teacher in different stages of their education also have different training needs. The subject is reflected in the training needs of students in different time periods, between families and the development of the subject in the process of the construction project of different training needs are not the same, the application of interdisciplinary science increasingly rich that common development training needs and interdisciplinary interdisciplinary development of the construction of the training needs. The training needs of subjects are more specific, specific, cooperative and cross.

Serial number	Index content	Load capacity	Ranking
1	Discipline professional development needs not cause degree	0.948	1
4	Individual plan demand is not enough	0.567	4
10	The teacher needs to combine the actual lack of reason	0.738	3
17	The government's macro-control and planning demand is not enough	0.766	2

Table 6 – Physical education teacher training demand index content, load and ranking analysis table (n=62)

4.4.PE teachers training methods of design are careful enough

Table 7 results show that the training method of physical education teachers in the design of the index is: "the case is not strong," and the amount of load =0.628;"Field practice method can not meet the physical education" and the load =0.621;"Seminar on the cause

of the non - strong communication" and the load =0.768;Theory teaching method is too rigid, and the load =0.769.Ranking from high to low in order: theory teaching method is too rigid, research and communication of the reasons for not strong, the case is not strong, the field practice method can not meet the physical education professional.

Serial number	Index content	Load capacity	ranking
3	Case representation is not strong	0.628	3
8	Can not meet the physical education professional	0.621	4
11	study of the cause of the exchange of non strong	0.768	2
16	The theory teaching method is too rigid	0.769	1

Table 7 – Design of training method for physical education teachers

4.5. Training effect is not timely feedback

Table 8 the results show that the training effect of physical education teachers feedback factors are included in the index: "the training effect is not applied to the cause of the transformation" and the load =0.611;"Report on the training effect is not enough" and the load =0.813; "the training effect of the exchange is not the cause of the degree" and the load =0.721;"Summary of the training effect is not enough" and the load =0.816. Ranking from high to low in order: the training effect is not summed up the cause of the degree of training effect on the cause of the report is not enough, the training effect of the exchange is not enough, the training effect of the transformation of the application is not enough.The training effect summary is refers to the physical education teacher after each training end, for further enhances the training organization training ability and the summary analysis in the whole training process manifests the superiority and the inferiority carries on the written description the process. Training effect report is the overall narrative process of the training effect summary of the relevant departments or relevant policy makers after the end of the training in an objective and impartial manner.

Serial number	Index content	Load capacity	ranking
2	Effect transformation is not used in the degree of genetic	0.611	4
5	Reporting on the training effect is not enough	0.813	2
9	The training effect of the exchange is not enough	0.721	3
15	Summarize the training effect is not enough	0.816	1

Table 8 – Training effect feedback

5. Main conclusions and recommendations

Factor causes college sports teachers training are: "the importance of the leadership factor", "sports teacher training needs factor", "training method design factor", "training effect feedback factor". The main causes of training of college sports teachers: leadership of PE teachers is not enough to pay attention to the design of physical education teachers, lack of training needs analysis, training methods of physical education teachers is not enough detailed, PE teachers on the training effect is not timely feedback. The main recommendations include updating the training system of College PE teachers concept planning, training strategy, to analyze the training needs of College PE teachers, the training methods of college physical education teachers should be targeted, college PE teachers need to evaluate the training results.

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Research on the Gene Sequence Analysis Model based on Data Association Pattern Mining and Pattern Classification Model

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Abstract: Most of the information mining calculations have been intended for business information, for example, advertising wicker container, however they are less productive for mining Deoxyribonucleic acid arrangements. Not at all like exchange arrangements in business, Deoxyribonucleic acid groupings commonly have a little letter set yet a much long size, and so mining Deoxyribonucleic acid successions faces distinctive difficulties from different applications. The motif discovery that is the repeating component has been effectively used to find interpretation variable restricting locales in many promoter groupings over the previous decade. Motif is the toolbox for the Common Desktop Environment. Be that as it may, there has not been sufficient work done in distinguishing motifs in the cutting edge sequencing information sets, which contain thousands of information groupings and thereby convey new test to make a decent recognizable proof in sensible time. To provide food this need, author proposes another held up motif discovery calculation named motif discovery by mining and combining (MDMC), which distinguishes by mining and combining developing substrings. Trial results on the reproduced information demonstrate that motif discovery by mining and combining can recognize motifs productively and viably in thousands to a large number of information successions and motif discovery calculations; motif discovery by mining and combining can distinguish motifs without known lengths, and has preferable ID precision over contending calculation.

Keywords: Motif discovery by mining and combining (MDMC); Deoxyribonucleic acid; Next-generation sequencing data sets; Motif.

1. Introduction

The improvement of sub-atomic science in the most recent decades has made different organic information coming. Utilizing information mining strategies to break down natural information has been turning into a vital examination issue (Aziz, 2015; Alipanahi,

2015; Gonçalves et al., 2015). In any case, it is actuality that most traditional information mining calculations were intended for business exchange information as the principal inspiration, and it additionally has been demonstrated that they are not more effective for dissecting deoxyribonucleic acid arrangements (Bevilacqua, 2015). When all is said in done, a deoxyribonucleic acid grouping can be spoken to as an in sequential order string in the natural databases, yet such a string frequently has distinctive elements from a business exchange arrangement.

In the first place, the deoxyribonucleic acid arrangements dependably have a little letter in order. That is, there are four distinctive nucleic acids: Adenine (Ad), Thymine (Th), Guanine (Gu), and Cytosine (Cy). Conversely, in an advertising database, the exchange arrangements are characterized in a huge letter set that speaks to hundreds or thousands merchandise. Second, a deoxyribonucleic acid grouping frequently is a long arrangement (Buil, 2015; DeKosky, 2015). For instance, the human genome is made of around three billion of nucleic acids. Conversely, in a promoting database, an exchange grouping for the most part is involved a considerable measure of shorter arrangements things. Third, a super long deoxyribonucleic acid succession with a little letters in order regularly contains a couple of appearance-incessant short sections, which dependably pay vital auxiliary or utilitarian parts (Francis, 2015; Greene, 2016). Accordingly, finding such section designs from the deoxyribonucleic acid groupings ought to be an alternate kind of study undertaking with different business information mining. As indicated by the exceptional elements of deoxyribonucleic acid arrangements, this paper will plan a called Association Matrix information structure, and making utilization of such an information structure, some novel calculations to proficiently mining key fragments from one or the different deoxyribonucleic acid groupings will be developed.

Xm discovery is a vital and testing issue in computational science. It assumes a key part in finding interpretation element restricting locales in deoxyribonucleic acid arrangements. Restricting destinations have a tendency to be short and deteriorate, so it is hard to recognize them from the info groupings. The planted Xm discovery is an acclaimed definition for Xm discovery.

Various calculations have been proposed to distinguish Xm in a few to many promoter successions from co-controlled or homologous qualities, either in view of agreement arrangements or position weight frameworks. Lately, the novel exploratory procedure took after by high-throughput sequencing permits the all-inclusive distinguishing proof of translation component restricting destinations (Goszczynski, 2015; Karch, 2015). The analyses can yield a rundown of interpretation component restricting areas, yet Xm discovery strategies are still expected to precisely finding translation element restricting destinations in these crest districts. The upside of an information set is that not just a high rate of groupings contains interpretation component restricting destinations, additionally every succession has a high determination (Liu, 2015; Owen, 2015). Be that as it may, a high-throughput sequencing information set is substantial in size and contains thousands or more groupings, requiring a high computational effectiveness of Xm discovery (Langer,2015). Tragically, all calculations intended for recognizing Xm in promoter arrangements turn out to be excessively tedious for high-throughput sequencing information sets. Cutting edge custom fitted forms of customary Xm discovery calculations have been proposed. These calculations typically exhibit

confinements on the information set size by selecting a little subset of the groupings to make Xm distinguishing proof. Disregarding this, despite everything they demonstrate a poor time execution because of keeping up the first calculation system.

A couple of new calculations are planned either taking into account addition tree, however they demonstrate poor time execution. In spite of the fact that DREME can investigate expansive information sets in minutes, it can just discover short Xm. To process full-measure high-throughput sequencing information sets proficiently, a few calculations taking into account word tallying are proposed. Against the foundation of recognizing Xm in high-throughput sequencing information sets, it is important to outline new calculations with the accompanying elements, for example, they can handle the full-estimate information successions, and likewise they can finish the calculation with a decent time execution and a decent distinguishing proof precision, at long last they can distinguish Xm without the one event for each grouping requirement (Prabhakar, 2015; Silva, 2015). To provide food these necessities, author proposed another Xm discovery calculation, named Xm discovery by mining and combining (MDMC), in view of mining and combining developing substrings, which are potential Xm occurrences. Author outlines Xm (motif) discovery by mining and combining (MDMC) regarding the zero or one event for each arrangement model. To handle extensive information sets, author likewise outlines a Map Reduce-based system to mine rising substrings dispersed. Motif discovery by mining and combining (MDMC) completely utilizes the rising substrings of various lengths, and can proficiently and viably distinguish Xm with or without a predefined length in full-measure high-throughput sequencing information sets.

2. The Related Work

Researchers depict information investigation systems intended to arrange deoxyribonucleic acid successions. A few perception and information mining procedures were utilized to approve and endeavor to find new strategies for recognizing coding deoxyribonucleic acid groupings from non-coding deoxyribonucleic acid arrangements. The objective of the information mining was to see whether some other, conceivably non-straight mix of the essential position subordinate deoxyribonucleic acid nucleotide recurrence qualities could be a superior indicator than the normal shared data. Author attempted a wide range of order methods including principle based classifiers and neural systems (Wang, 2014; Sachdev, 2015). Author additionally utilized representation of both the first information and the aftereffects of the information mining to confirm designs and to understand the qualification between the diverse sorts of information and orders. Specifically, the perception helped us create refinements to neural system classifiers, which have exactness's as high as any known technique. At long last, author examines the collaborations amongst perception and information mining and recommends an incorporated methodology.

Successive example mining is a critical information mining issue with expansive applications. In any case, it is likewise a troublesome issue following the mining may need to produce or analyze a combinatorial hazardous number of middle of the road subsequences. The vast majority of the already created consecutive example mining techniques, for example, worldwide framework situating, investigate a candidate era

and-test way to deal with decrease the quantity of candidates to be analyzed. To advance enhance the execution, a pseudo projection system is created in Prefix Span. An extensive execution study demonstrates that Prefix Span, by and large, outflanks the from the earlier based calculation GSP, a consecutive example mining calculation that receives vertical information design and incorporated with pseudo projection is the speediest among all the tried calculations. Moreover, this mining technique can be stretched out to mining consecutive examples with client determined limitations. The high guarantee of the example development methodology may prompt its further expansion toward proficient mining of different sorts of successive examples, for example, regular substructures.

Researcher's investigations are giving exceptional amounts of expansive information on quality expression designs. In spite of the fact that this strategy has been energetically created and connected in numerous natural settings, the administration and examination of the great many information focuses that outcome from these trials has gotten less consideration. Modern computational devices are accessible, yet the techniques that are utilized to investigations the information can impact the translation of the outcomes. A fundamental understanding of these computational devices is hence required for ideal trial outline and significant information examination.

Most information mining calculations require the setting of numerous information parameters. Two fundamental threats of working with parameter loaded calculations are the accompanying. In the first place, erroneous settings may bring about a calculation to fall flat in finding the genuine examples. Second, a maybe more guileful issue is that the calculation may report spurious examples that don't generally exist, or significantly overestimate the importance of the reported examples. This is particularly likely when the client neglects to understand the part of parameters in the information mining process. Information mining calculations ought to have as couple of parameters as would be prudent, in a perfect world none. A without parameter calculation would restrict our capacity to force our partialities, desires, and assumptions on the issue at hand, and would give the information itself a chance to address us. In this work, researcher demonstrates that late results in bioinformatics and computational hypothesis hold incredible guarantee for a sans parameter information mining worldview. The outcomes are spurred by perceptions in many-sided quality hypothesis. Be that as it may, as a useful matter, they can be actualized utilizing any off-the-rack pressure calculation with the expansion of only twelve or so lines of code. Researcher will demonstrate that this methodology is aggressive or better than the cutting edge approaches in peculiarity recognition, grouping, and bunching with exact tests on time arrangement or content or video.

Desire Maximization can be utilized to at the same time upgrade a position weight lattice portrayal of aXm, and the coupling probabilities for its related destinations as appeared in Figure 1. The weight network for the Xmis instated with a solitary subsequence, in addition to a little measure of foundation nucleotide frequencies. Next, for every objective grouping researcher computes the likelihood that it was created by the Xm as opposed to by the foundation arrangement conveyance. Desire boost then takes a weighted normal over these probabilities to create a more refined Xm model. The calculation emphasizes between figuring the likelihood of every site taking into account the current

Xm demonstrate, and ascertaining another Xm model in light of the probabilities. It can be demonstrated that this system plays out an inclination drop, uniting to a most extreme of the log probability of the subsequent model.

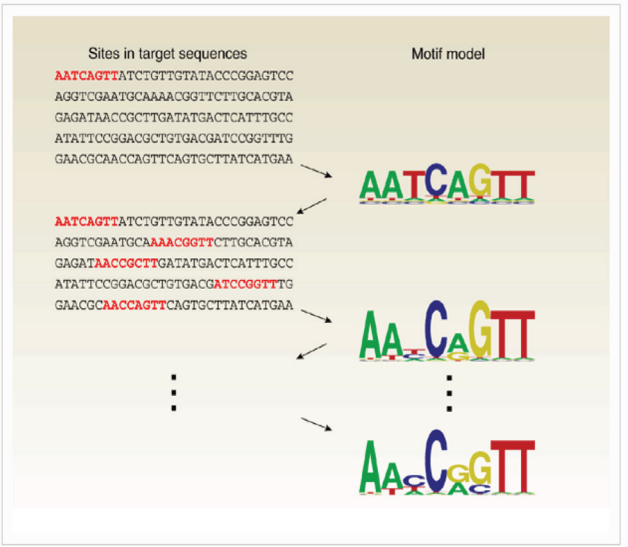


Figure 1 – The Target sequence along with Motif model

3. The Current Methodologies

Author first present a perception that a given occasion motif (Xm) may precisely happen various times in high-throughput sequencing information sets. High throughput sequencing information sets contain thousands or more Deoxyribonucleic acid groupings, and subsequently the Xm likewise has thousands or more cases. Since every case contrasts from m in at most d positions, researcher can hope to discover some Xm occurrences rehashing numerous times in thousands of basic successions. Researchers affirm this perception by utilizing probabilistic investigation and that show that Xm occasions have higher event frequencies of l-length string over Σ = {Adenine (Ad), Thymine (Th), Guanine (Gu), and Cytosine (Cy)} than the foundation; the related subtle elements can be found in the supplement. In perspective of these contemplations, researchers recognize Xm by mining and combining substrings with high event frequencies. As needs be, our calculation contains two principle steps, to be specific the mining step and the combining step.

In the mining step, researcher mine substrings of various lengths that is length-least less than1 which thusly is not as much as length-most extreme all the while, for i) the length of the distinguished Xm is obscure ahead of time and ii) a few portions of a Xm are additionally over-spoke to and mining them helps us acquire more Xm data. In addition, to diminish the aggravation of random over-spoke to substrings while the test

set contains the groupings that share the Xm to be distinguished, though the control set just comprises of the foundation successions. Thereby, the interest substrings or Xm occurrences are just over-spoke to in the test set instead of in the control set and researcher call such substrings developing substrings. Actually, researcher changes over our mining assignment to rising substrings mining issue as takes after.

In the combining step, author join developing substrings together by utilizing grouping techniques to acquire anticipated Xm. The key elements to consider are as per the following. To start with, the mining step may yield numerous rising substrings because of mining substrings of various lengths, and these rising substrings ought to be joined effectively. Next, author needs a strategy to ascertain the comparability between two substrings of various lengths.

The strides required in Mining have been talked about here. Author exploits the string mining calculation to ascertain the mining step effectively. Their mining calculation keeps running in ideal time. It first develops the postfix exhibit and the longest basic prefix cluster for the information sets. To alter their mining calculation to firmly fit our issue, author makes the accompanying upgrades. To begin with, since the event frequencies of Xm occurrences are diverse for unmistakable length, author set a versatile limit recurrence for every conceivable length l through probabilistic examination, as opposed to utilizing a settled one. Second, author plans a conveyed form of the mining calculation in view of Map Reduce to make it scale well for substantial information sets.

The parameters that are included in Mining are takes after. The limit recurrence "Tf" and the base development rate "mgr" are two vital parameters in the mining step. Author set "mgr" as 1 to diminish the aggravation of random over-spoke to substrings. In the accompanying dialog, author concentrates on the best way to set the edge recurrence 'Tf'. With a specific end goal to appropriately pick the edge recurrence "Tf" for mining potential occasions, author appraises the likelihood that a random case "Xm" is embedded in a given succession. The likelihood of event is figured by the follows.

Poc= Summation of probability of the hamming distance.

$$Poc=\sum P(Hd) \quad (1)$$

Where, Hd= Hamming distance, P= Probability, Hd= Hamming Distance. Moreover, author need to gauge the likelihood of hamming separation amongst m and m' which is equivalent to solidarity. For each of the d positions, let the likelihood that m' contrasts from m. On the above premise, author compute the edge recurrence 'Tf', where the parameter rate of information successions lies amongst 0 and 1represents the rate of information arrangements containing Xm examples. The separation is picked relying upon the comparing to the testing issue cases. At long last the edge recurrence is set as 0.003.

In mining developing substrings, despite the fact that the storage room required by the related information structures is direct in the span of info information sets, it will surpass the memory limit of a solitary machine when the info information sets are expansive. To take care of this issue, author proposes a rising substring mining

strategy in view of Reducing the Map. Assessment of surviving direct transmission misfortunes models by methodology.

Venture of Merging and combining: author portray the principle structure of the combining venture in Algorithm 1 utilizing the Esrrb information set. The combining step incorporates two phases: bunching rising substrings and grouping position weight matrices that relate to the groups of rising substrings. All bunching operations are finished by utilizing the MCL calculation.

In the calculation the progression 4 to step 12 indicates guarantee great time execution. Author iteratively bunch the developing substrings of the same length, as opposed to group all the rising substrings at one time. On the off chance that an acquired group contains fewer than five substrings, we call it an invalid bunch and call the substrings in it dispersive substrings. At first, author can adjust two substrings by adjusting their most extreme cover and get a score. Second, author adjusts all substrings in the group by building a most extreme weight spreading over tree utilizing Prim calculation. Authors

Algorithm 1 CombineEmerging Substrings
Input: the set of emerging substrings *Ses*
Output: the set of motifs *M*
Step 1: the set of dispersive substrings
Step 2: the set of position weight matrices
Step 3: the set of motifs
Step 4: for $i \leftarrow$ minimum length to maximum length do
Step 5: cluster the emerging substrings
Step 6: for each obtained cluster of emerging substrings do
Step 7: if cluster of emerging substrings less than five then
Step 8: align the substrings in cluster of emerging substrings and get a position weight matrices
Step 9: add weight matrices to the set of position weight matrices
Step 10: else
Step 11: add the substrings in cluster of emerging to Sds
Step 12: cluster the substrings in Sds and add obtained position weight matrices to set of position weight matrices
Step 13: cluster the position weight matrices in set of position weight matrices
Step 14: for each obtained cluster of position weight matrices combining position weight matrices do
Step 15: align the position weight matrices in combining position weight matrices and get a combined position weight matrices
Step 16: fetch the segment of weight matrices with high information content to
obtain a Xm
Step 17: add Xm to M
Step 18: return M

Figure 2 – The Algorithm Showing the Combining Emerging Strings

select the bunch focus as the begin hub of the spreading over tree. The bunch focus relates to the fragment of position weight lattices with high data content. For each substantial group, author needs to adjust the substrings in it to get position weight frameworks.

After the progression 13 in the algorithm appeared in the figure 2, author group got position weight frameworks, which add to taking out repetitive Xm data and combining parts of Xm data to shape entire Xm. For every group of position weight frameworks, author adjusts the position weight grids in it to get a joined position weight lattices. The adjusting procedure is like that of adjusting rising substrings, aside from utilizing an alternate comparability measure gave. Author gets the last Xm by getting the portions of the joined position weight networks with high data content. Given a consolidated position weight frameworks w, while recognizing Xmwith a predetermined length, author cross all fragments of length and get the section of w with greatest data content as the Xm. At the point when distinguishing general Xm without a predetermined length, author acquires the Xm by erasing the sections with low data content from two sides of w. All the more particularly, author discover a section “an” and a segment “b” such that for any “x” is not exactly the segment ‘a’, the data substance of segment “x” is littler than an edge, and author bring the fragment relating to segments i to j as the Xm.

In the combining step, our calculation needs to group two sorts of information components, to be specific developing substrings and position weight networks. Consequently, author plan two closeness measures for these two sorts of information components. Initially, author look at two given developing substrings regarding their most extreme cover. The two rising substrings may have distinctive lengths and are not adjusted. Author expects the cover of the two developing substrings speaks to the basic portion of Xm events. Figure 4. Xm discovery by mining and combining (MDMC). The blended calculation of motif discovery by mining and combining (MDMC) is depicted in Figure 3. Xm discovery by mining and combining (MDMC) can make Xm discovery with

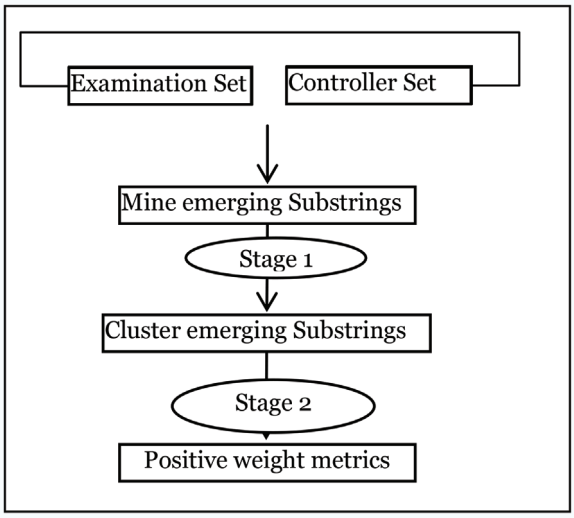


Figure 3 – The Steps that are Involved in Combine

no presets. Note that, mining proper measure of rising substrings is delicate to the edge recurrence 'Tf'. Subsequent to playing out the mining step and the combining step 2 to the progression 6, if the arrangement of Xm is void, author more often than not don't get enough developing substrings in the mining step.

Algorithm 2: motif discovery by mining and combining (MDMC)
Input: a test set Dt and a control set Dc of Deoxyribonucleic acid sequences
Output: the set of motifs M
Step 1: set mining parameters
Step 2: if test set added to control set is less than z' then
Step 3: perform mining step in a single machine
Step 4: else
Step 5:perform mining step distributedly using MapReduce
Step 6: perform combining step using Algorithm 1 and get M
Step 7: if M is the set then
Step 8: perform mining step and combining step again
Step 9: return M

Figure 4 – The Motif discovery by mining and combining (MDMC)

4. The Performance Discussion

Results on Simulated Data Simulated information give quantitative measures to think about the execution of various calculations author produce the test set in view of the technique that generatsaXm of length and t indistinguishably appropriated successions of length; then embed a random Xm example to a random position in each of the chose groupings. Note that, author produce each Xm example not quite the same as the Xm in at most positions, and control the preservation of the Xm by setting the estimation of likelihood. The control set comprises of random arrangements of length without embedded Xm occasions. Author actualize Xm discovery by mining and combining (MDMC). Author first shows the legitimacy of motif discovery by mining and combining (MDMC) for recognizing Xm. author pick three issue examples of various lengths, for every issue occurrence, author test motif discovery by mining and combining (MDMC) in all the high preservation cases. The outcomes are considered, where the image shows that the distinguished Xm and the embedded motif are indistinguishable. Xm discovery by mining and combining (MDMC) not just makes legitimate distinguishing proof for all these issue occurrences additionally has a significant short running time. On account of high protection, the running time of motif discovery by mining and combining (MDMC) is clearly bigger when compared to others.

And motif discovery by mining and combining (MDMC), some other Xm discovery calculations can likewise locate the embedded Xn effectively in vast information sets, for example, F-Xm. For this situation, the running time is a key marker used to evaluate

these calculations. Author think about the running time of motif discovery by mining and combining (MDMC) with two later and delegate Advznced-Xn discovery calculations. Advznced-Xm is an all the more intense xhaustive strategy for discovering Xm in extensive information sets contrasted with past heuristic and comprehensive pursuit calculations. Xm discovery by mining and combining (MDMC) runs much speedier than the other two calculations and can finish calculation on every one of these examples inside one moment. The tremendous contrast of running time is dictated by the utilized calculation systems. For Xm discovery by mining and combining (MDMC), the mining step depends on the ideal string mining and its running time is altered for the information of the same scale; the combining step depends on bunching and its running time relies on upon the quantity of mined rising substrings. The aggregate running time of Xm discovery by mining and combining (MDMC) becomes somewhat with the expansion of length and separation, since when handling arrangements with huge Xm discovery by mining and combining (MDMC) will get additionally developing substrings and take additional time in the combining step. Both Advanced-Xm are example driven calculations, and their running time becomes drastically with the expansion of length. Especially, neglects to take care of any of these issue cases; the reason is that its time intricacy under zero or one event for every succession display twofold the times that under one event for each arrangement model, where s speaks to the rate of information groupings containing Xm cases, and the estimation of 2 is vast for high-throughput sequencingdata sets.

Distinguishing General Xm has been talked about in the segment. In this segment, author test motif discovery by mining and combining (MDMC) without giving the length of the embedded Xm. Truly, the length of the recognized Xm is obscure ahead of time, which expands the issue trouble, and author calls such motifs general Xm. Author select contrasted calculations agreeing with the followings standards they can break down full size high throughput sequencing information sets, can finish the computation in a brief span and can make distinguishing proof without giving the Xm length ahead of time. At first, author do correlations on various length and separation issue occasions with altered time. For every issue occurrence, the outcomes are the normal of ones acquired by running calculations on three random information sets that compare to three sorts of protection. Distinguishing Xm in Larger Data Sets and at the point when handling vast information set, the storage room of motif discovery by mining and combining (MDMC) will then surpass the memory limit of a solitary machine. Author use MapReduce-based system to tackle this issue. Our tests of MapReduce are directed on a Hadoop group with eight PCs.

5. Conclusion

In this paper, Author proposes another word numbering based calculation named motif discovery by mining and combining (MDMC) for distinguishing motifs in extensive Deoxyribonucleic acid information sets. Xm discovery by mining and combining (MDMC) offers another point of view by mining every single rising substring of various lengths to completely utilize the data contained in successions. Exploratory results demonstrate that motif discovery by mining and combining (MDMC) can productively and adequately distinguish motifs in full-measure high-throughput sequencing information sets.

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Yu Liu, Wenhua Zhao contributed equally to this work. Corresponding author as Xiaohui Ai, Freshwater Fish Germplasm Quality Supervision and Testing Center, Ministry of Agriculture, Yangtze River Fisheries Research Institute, Chinese Academy of Fishery Sciences, Wuhan 430023, China.

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Dynamic Performance of Air Spring based on SIMPACK and Matlab Simulik Joint Simulation

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Abstract: The analysis model of air spring can be effectively used in the design of air spring equipment, such as vehicle, however, how to establish the general model of air spring is a major problem in this field. Because the air spring has a serious nonlinear stiffness and hysteresis effect, it is difficult to observe the traditional coil spring. The purpose of this study is to analyze the dynamic performance of air spring through the joint simulation of SIMPACK and Matlab Simulik, and to develop a general air spring model. This model has better stiffness and hysteresis characteristics, can design, connect a pneumatic system for the assumption of thermodynamic parameters does not change with the change of position, through the analysis of the model shows that the stiffness, volume change, and heat transfer changes will affect the air quality and effective area. It provides the basis for further optimization of the air spring vibration system.

Keywords: Air spring, Dynamic performance, SIMPACK, Matlab Simulik, Fluid solid coupling

1. Introduction

Air spring was born in the middle of 19th century, early in 1947, air spring was used in the Pullman Car of United States for the first time. In 1850, John Lewis carried out a lot of research work of on air spring, and apply for air spring patent: “Pneumatic Springs for Railroad Cars, Locomotive, Burden-Cars, Bumpers & c” (Li, 2012), as for its superior performance, air spring was widely used in automotive, aerospace and other fields by many European countries at first. In 1910, George Bancroft got an air spring patent, which is related to the use of air spring on the car suspension mechanism (Qi, 2013). In 1930, the United States Firestone Tire Company used air spring in cars for the first time, and it cooperated with General Motors to use air spring in passenger cars and carried out the relevant tests, the test results show that air spring has good damping performance and nonlinear characteristics. Subsequently, the air spring began to be used in various fields, and it has been widely used in cars. In 1955, the vehicle power laboratory of Japan National Railway Technology Research Institute made a deep research on the air spring and provides a valuable resource for the development and design of air spring (Li, 2012). In the same year, the vehicle power laboratory tested the vehicle with air spring and got

the test data. In recent years, some Japanese passenger cars and trucks are equipped with a variety of air springs. In 1975, George WJackson applied for a patent of air spring with control valve, which can effectively control the air flow situation in the vehicle suspension system Yang, 2012). In the 1990s, with the increasing demands of people on the speed of railway vehicles, such as trains, bullet trains and high-speed railways, and with the increasing demands of people on the comfort of cars traveling on the roads, the speed of railway vehicles is becoming more and more fast, air spring is widely used in these areas and it has got a great development.

In 1993, William E. Richeson obtained a patent of air spring with a hydraulic pneumatic mechanism (Chen, 2012). In 1995, John EAmold applied for a patent of air spring with a piston, and the air spring has the characteristics of easy assembly, as well as other characteristics, such as ensuring low-frequency vibration. In the past few years, the scholars in domestic and overseas have applied for a lot of patents on air springs.

Since 1990, with the rapid development of computer technology, scholars began to use computer simulation software, such as SIMPACK and Matlab Simulik, to study the air spring. In 1998, Alf Homeyer used the finite element method to carry on the optimized design to the air spring. In recent years, based on SIMPACK and Matlab Simulik software, many foreign scholars analyze the dynamic characteristics of air spring (Chen, 2013). In 2002, based on Matlab Simulik modeling, MALIN PRESTHUS analyzed the influence factors of air spring's vertical stiffness and damping (Facchinettia, 2014). In 2010, Alan Facchinetti, Laura Mazzola and others established the simulation analysis model of air spring, and the air spring parameter and locomotive dynamics performance were analyzed and compared to find out the influence of air spring parameter on it (Docquiern, 2015). In 2011, H.LIU and J.C.LEE analyzed the influence of the orifice's parameter and the additional air chamber's volume on the dynamic stiffness and damping of the air spring.

From the development situation at home and abroad, the theoretical research and simulation application of air spring are becoming more and more mature, but the key technology also needs to study continuously and makes breakthrough, in particular, the production and manufacture of China's air spring are mainly based on experience, so it needs to develop the research work. Therefore, this paper proposes the fluid solid coupling method, and then carries out joint simulation for the dynamic performance of air spring combined with the software SIMPACK and Matlab Simulik, which can overcome the nonlinear stiffness and hysteresis characteristics.

2. Analysis of air spring model

Nonlinear model of air spring has been established by scholars at home and abroad, and they carried out a large number of experiments. Based on the Matlab Simulik platform, a nonlinear model is established in the vertical direction of the mechanical structure of the air spring (Qin, 2013), then, based on the established nonlinear model, the nonlinear dynamical theory of air spring under different excitation (0.05Hz, 0.5Hz and 5Hz different frequency sinusoidal excitation) is analyzed and introduced. The purpose of this study is to based on the developing of general air thermodynamic equation, the spring model's change under without adiabatic or isothermal conditional assumptions and the change with air quality. Analysis and development of the model is one of the important parts

to be revealed, because the stiffness of the air spring directly affects the lag of dynamic performance. Therefore, the research purposes of current researches are to improve the dynamic stiffness of air spring, and to establish an optimal nonlinear model for this, in addition, the stability also is an important indicator to evaluate the air spring model.

2.1. Linear model

The linear model of the air spring can be deduced by the method of omitting the high-order infinitesimal linearization according to the equation of gas flow direction, the orifice or the pipeline gas mass flow linearization equation. The linear model is shown in Figure1.

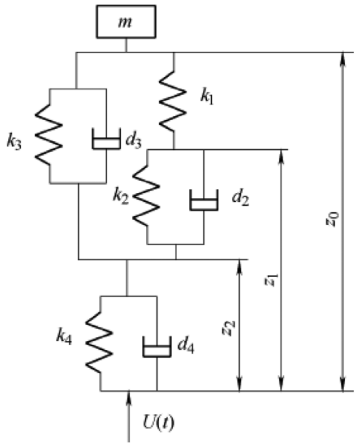


Figure 1 – Linear model of air spring

As shown in Figure 1, K_1 represents the stiffness of the air spring; the additional K_2 represents the stiffness of the air chamber; K_3 represents the effective area change rate stiffness; K_4 represents the vertical angle of series connection rubber pile; d_2 represents orifice or equivalent damping of connecting pipe; d_3 represents the rubber damping of air spring; d_4 represents the vertical damping of the series connection rubber pile; z_0 represents the total deformation of the air spring;

The formulas for each stiffness and damping value are shown in formula (1) - (6):

$$k_1 = \frac{np_0 A_e^{\ 2}}{V_{10}} \tag{1}$$

$$k_2 = \frac{V_{10}}{V_{20}} k_1 \tag{2}$$

$$k_3 = (p_0 - p_{at}) \frac{dA_e}{dz_0} \tag{3}$$

$$d_2 = C\rho_0 A_e^2 \tag{4}$$

$$d_3 = d_a \tag{5}$$

$$d_4 = d_r \tag{6}$$

In the formula, n is the gas variable index; p_0 is the internal gas pressure when the air spring is balanced; A_e is the effective area of the air spring body; V_{10} is the initial volume of the gas in air spring body; V_{20} is the initial volume of the gas in the additional air chamber; p_{at} is the atmospheric pressure; C is the drag coefficient between the air spring body and the additional air chamber; ρ_0 is the initial gas density inside the air spring body; d_a is the damping of the air spring body capsule; d_r is the damping of the series connection rubber pile.

2.2. Nonlinear Model

The core problem of establishing nonlinear model is how to establish the accurate sub-models of orifice, connecting pipe, series connection rubber pile, air spring body and additional air chamber. In addition, how to consider the multiple physical parameters of the air spring into the modeling is also a key issue of modeling. As the contact area with the wall is small when the air flows into the orifice, and the flow rate is fast, so this is regarded as one-dimensional isentropic flow (Liu, 2011), according to the Bernoulli equation, it can be deduced the flow rate at the orifice shrinkage is shown in formula (7):

$$v = \{\frac{2\mu}{\mu-1}\frac{p_u}{\rho_u}[1-(\frac{p_d}{p_u})^{\frac{\mu-1}{\mu}}]\}^{\frac{1}{2}} \tag{7}$$

In the formula, p_u is the absolute pressure of the gas in the upstream gas chamber of the orifice; p_d is the absolute pressure of the gas in the gas chamber downstream of the orifice; μ is the Poisson's ratio of the gas; and ρ_u is the density of the gas in the upstream gas chamber of the orifice.

According to the adiabatic equation, the ideal gas state equation and formula (7), the theoretical general mass flow of the orifice can be obtained:

$$q_{morl} = Ap_u\sqrt{\frac{2\mu}{\mu-1}\frac{1}{RT_u}[(\frac{p_d}{p_u})^{\frac{2}{\mu}}-(\frac{p_d}{p_u})^{\frac{\mu+1}{\mu}}]} \tag{8}$$

In the formula, A is the area of the cross-section at the orifice shrinkage; R is the molar gas constant; and T_u is the temperature of the gas in the upstream gas chamber.

Taking into account the flow loss of the gas through the orifice and the saturation characteristics of the orifice mass flow, the actual mass flow of the gas in the orifice is obtained.

$$q_{morl}=\begin{cases} C_q A p_u \sqrt{\dfrac{\mu}{RT_u}\left(\dfrac{2}{\mu+1}\right)^{\frac{\mu+1}{\mu-1}}} & \dfrac{p_d}{p_u}\le\left(\dfrac{2}{\mu+1}\right)^{\frac{\mu}{\mu-1}} \\ A p_u \sqrt{\dfrac{2\mu}{\mu-1}\dfrac{1}{RT_u}\left[\left(\dfrac{p_d}{p_u}\right)^{\frac{2}{\mu}}-\left(\dfrac{p_d}{p_u}\right)^{\frac{\mu+1}{\mu}}\right]} & \dfrac{p_d}{p_u}>\left(\dfrac{2}{\mu+1}\right)^{\frac{\mu}{\mu-1}} \end{cases} \tag{9}$$

In the formula, C_q is the flow coefficient of the orifice.

According to the Helmholtz effect, the gas in the connecting pipe can be modeled as a mass with fixed quality and volume, then the connecting pipe model can adopt the the air mass block oscillation model. According to the Helmholtz equation and the Bernoulli equation, the equation of the state of the gas mass in the connecting pipeline can be obtained as:

$$m_p y'' + \frac{\rho_p}{2} y'^2 \xi_p A_p + (p_{pu} - p_{ad}) A_p + \rho_p g (h_{pu} - h_{pd}) A_p + \frac{\rho_p}{2} (h'^2_{pu} - h'^2_{pd}) A_p = 0 \tag{10}$$

$$\xi_p = \lambda \frac{L_p}{d_p} + \sigma_{pd} - \sigma_{od} \tag{11}$$

In the formula, m_p is the mass of the gas mass in the connecting pipe, y is the displacement of the gas mass in the connecting pipe, ρ_p is the density of the gas in the connecting pipe, ξ_p is the total pressure drop coefficient of the connecting pipe, A_p is the area of the cross-section of the connecting pipe; p_{pu} is the absolute pressure of the gas in the air chamber upstream of the connecting pipe; p_{ad} is the absolute pressure of the gas in the air chamber downstream of the connecting pipe; g is the acceleration of gravity; h_{pu} is the centroid height of the gas in the upstream gas chamber of the connecting pipeline; h_{pd} λ is the centroid height of the gas in the downstream gas chamber of the connecting pipeline; λ is the friction coefficient of the connecting pipe wall; L_p is the length of the connecting pipe; d_p is the diameter of the connecting pipe; σ_{pd} is the pipe diameter drag coefficient of the connecting pipe; σ_{od} is the damping transfer coefficient of the orifice.

3. Analysis of air spring dynamic performance

3.1. The basic idea of fluid solid coupling

Fluid solid coupling mechanics is a branch of mechanics that is produced by the intersection of fluid mechanics and solid mechanics. As the name suggests, it is a

science to study the interaction of the various behavior of deformed solids under the action of the flow field and the influence of solid configuration on flow field. The important characteristic of fluid solid coupling mechanics is the fluid solid interaction: the deformable solid under the action of the fluid load will produce deformation or movement, and in turn the deformation or movement will affect the flow field, so as to change the distribution and size of the fluid load. It is this interaction will produce all kinds of fluid solid coupling phenomenon under different conditions. The three-dimensional schematic diagram is shown in Figure 2:

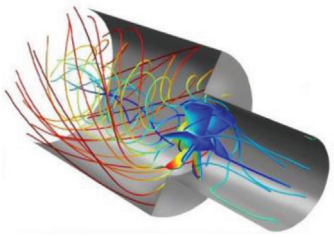


Figure 2 – Fluid solid coupling phenomenon

The fluid solid coupling problem can be defined by its coupling equation, the domains of which both include the fluid domain and the solid domain. And the unknown variables contain the variables that describe the phenomenon of fluid and the variables that describe the phenomenon of solid, in general, it has the following two characteristics:

1. Both the fluid domain and the solid domain cannot be solved separately.
2. Unable to obviously cut the describe of the independent variables of fluid motion and the independent variables of solid phenomena.

The basic idea of fluid solid coupling is to use the ABAQUS finite element software and STAR-CCM+ fluid analysis software to carry out co-simulation, that is, to establish the solid part of the ABAQUS software, its modeling process is similar to the air spring stiffness modeling method, but the density of structural material need to be added additionally. Then to establish the model of the fluid part in the STAR-CCM+ software, and divide the grids, define the fluid properties, select control equations, establish boundary conditions, and so on. After the successful operation respectively, then add the statement of the close analysis steps into the INP file of ABAQUS , and set the coupling analysis in STAR-CCM+ at the same time to carry out calculate. Fluid solid coupling includes one-way coupling and two-way coupling. The coupling method used in this paper is a two-way coupling, and it is a “instant” coupling, that is, STAR-CCM+ software will pass the gas flow and the size of pressure in air spring to the air spring in the ABAQUS software, At the same time, in turn ABAQUS will pass the displacement and deformation generated by the air spring to the gas of STAR-CCM+ . Repeat this cycle, and finally complete the calculation. In this paper, the more efficient simulation software SIMPACK and M*atlabSimulik* are used, and the joint simulation of the dynamic characteristics of the air spring is carried out.

After a series of studies, the science researchers found that the gas flow situation in the air spring is very complex, especially when up and down vibration frequency is high of the movement machine, it is very difficult to carry out modeling for the dynamic performance analysis, therefore, in order to explore the gas flow situation in the air spring, a gas partial model is established in M*atlabSimulik* in this paper. Assuming that there is no heat exchange between the air spring with the additional chamber and the outside air, the inner wall of the air spring system is adiabatic; assuming that the air in the air spring is the ideal gas.

3.2. Analysis of air spring dynamics

Based on the air spring nonlinear model has been established by the M*atlabSimulik* software, the analysis of the dynamic characteristics of air spring, than is stiffness, becomes very essential. The gas flow essence in air spring is the problem of fluid flow and heat transfer. Fluid flow is one of the most complex physical behaviors, and it is much more difficult to model and simulate compared with the problems of stress analysis in structural design area. However, for any complex fluid flow, mass conservation, energy conservation and momentum conservation are applicable, for gas, it also follows the gas state equation.

In which, the continuity equation is:

$$\frac{\partial \rho}{\partial t}+\frac{\partial(\rho u)}{\partial x}+\frac{\partial(\rho v)}{\partial y}+\frac{\partial(\rho w)}{\partial z}=0 \tag{12}$$

In the formula, ρ is the density of the fluid; u, v, w are the vector components of the velocity of fluid in the directions of X-axis, Y-axis, and Z-axis, respectively.

The energy conservation equations are:

$$\begin{aligned}
&\frac{\partial(\rho h)}{\partial t}+\frac{\partial(\rho u h)}{\partial x}=\frac{\partial}{\partial x}(k+k_x)\frac{\partial T}{\partial x}+S_h \\
&\frac{\partial(\rho h)}{\partial t}+\frac{\partial(\rho v h)}{\partial y}=\frac{\partial}{\partial y}(k+k_y)\frac{\partial T}{\partial y}+S_h \\
&\frac{\partial(\rho h)}{\partial t}+\frac{\partial(\rho w h)}{\partial z}=\frac{\partial}{\partial z}(k+k_z)\frac{\partial T}{\partial z}+S_h
\end{aligned} \tag{13}$$

In the formula, h is the entropy, k is the micro-element molecular conductivity, T is the gas temperature, S_h is the defined volume source, k_x, k_y, and k_z are the components of the conductivity in the X-axis, Y-axis, and Z-axis directions caused by the two-stage flow in the flow process.

The equation of state of the standard gas is:

$$PV=nRT \tag{14}$$

In the formula, P is the standard gas pressure, V is the standard gas volume; n is the amount of standard gas material, R is the standard gas constant, in which R value of the air is $287J/(kg \cdot K)$.

3.3. Experimental results analysis

The sinusoidal motion induced force responses are at 0.05 Hz, 0.5 Hz and 5 Hz (0.05 Hz and 5 Hz data represent lower or higher than the actual value of 200 N respectively). Simulation results do not include the effective area of hysteresis, while the experimental results include it, which is shown in Figure 3(a); The sinusoidal motion induced force responses are at 0.05 Hz, 0.5 Hz and 5 Hz (0.05 Hz and 5 Hz data represent lower or higher than the actual value of 200 N respectively). The simulation results include all the effects other than the change of air quality. The air quality in the air spring has an effect on the response due to the air quality, but no lag occurs, which is shown in Figure 3(b).

From formular (13), the force is defined by the effective area time, and the effective area pressure has a certain influence on the response lag. The change in the effective area will also lead to the change in vertical displacement. In addition, when the vertical displacements are the same, the effective areas change with the pressure, which resulting in the lag effective area. The lag can be seen in Figure 3(a) and Figure 3(b). The simulation results shown in Figure 3(a) do not include the of the effective area lag, but they are included in Figure 3(b). These figures indicate that the lagged effective area increases the force lag response. Finally, the experimental results of the comparison between the simulations confirm the validity of the air spring model.

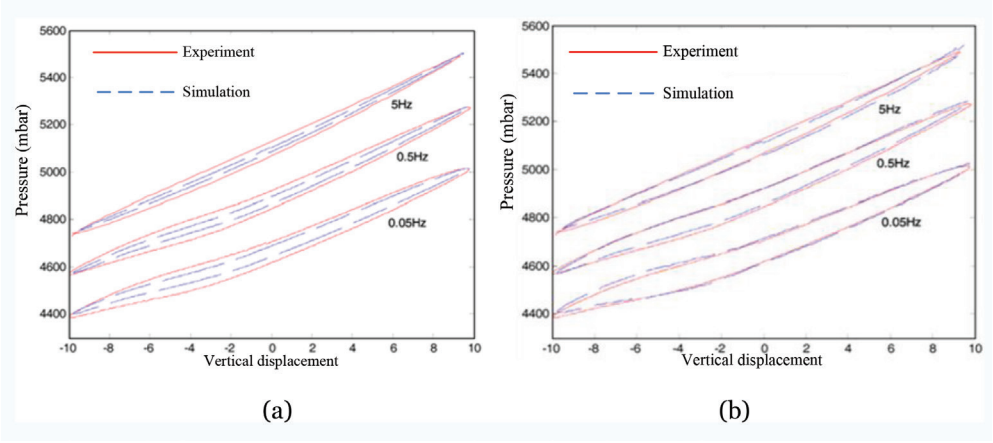


Figure 3 – The excitation response of sinusoidal motion

The changes of stiffness and frequency are shown in Figure 4, which show the pressure response only having the effect of heat transfer. The total pressure response in equation (14) is determined by the sum of Figure 3 (a) and Figure 3 (b). Thus, the heat transfer at low frequencies can significantly affect the stiffness of the entire air spring, unlike at very high frequencies. More specifically, the heat transfer at low frequencies will result

in a significant reduction in the dynamic properties of the air spring due to the change of volume, and will result a significant change in stiffness; at high frequencies, it only reduces stiffness slightly. The negative pressure in Figure 4 occurs because of the above reasons. When the air spring is compressed, because of the pressure of the compression volume increases, the pressure generated by this increases the stiffness of the air spring in the temperature equation and reduces the dynamics performance in the rate equation. Therefore, when the temperature of the air spring increases, and becomes larger than the pressure in the environment, a negative pressure can be generated due to the reduce of the heat transfer. However, the overall pressure increases because the increase of the pressure due to the volume change is greater than the reduction of pressure due to the heat even when the temperature of air spring is greater than the environment. In addition to the pressure change, the effect of the effective area of the change on stiffness, As described above, the outline of the piston of the air spring is manufactured in order to obtain optimum ride comfort, which generates the change of effective area. Therefore, a large change in the effective area can have a significant effect on the stiffness variation. This study in the air used in this experiment shows that most of the stiffness values of spring represent the change of effect effective area varies in the 40% of entire stiffness.

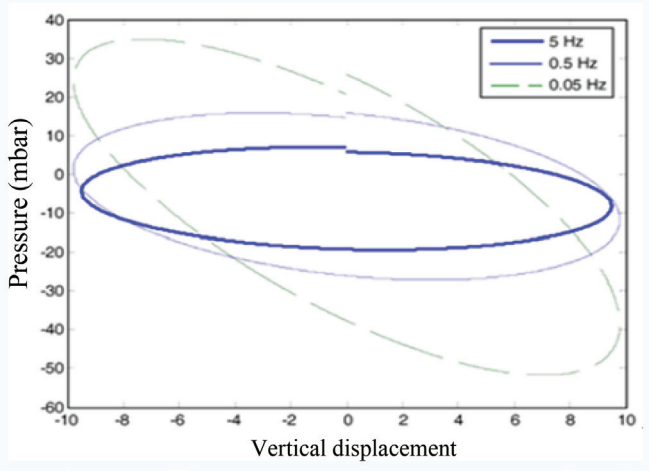


Figure 4 – Simulation results of pressure response

4. Conclusion

Through SIMPACK and MatlabSimulik joint simulation, this study firstly puts forward linear and nonlinear models of the air spring, and analyzes the dynamic performance of the air spring to develop a general air spring model. This model has good stiffness and lag characteristics, which can connect with a design of a pneumatic system; secondly, it adopts the fluid solid coupling method to calculate the dynamic stiffness of air spring, and it uses the SIMPACK and MatlabSimulik joint simulation to simulate the gas flow in the spring to set the optimization ideas, the model simulation results show that the experimental measurement results and the theoretical results are essentially consistent,

the force relative to the displacement and the 0.05Hz, 0.5Hz, and 5Hz pressure excitation verify the validity of the modeling method of air spring and the analysis method of dynamic performance proposed in this study.

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Research on the Behavior Pattern of College Students' Research Trip based on Data Mining Method

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Abstract: Educational data mining is the comprehensive application of mathematical statistics for the processing and analysis of educational data, through the data modeling to predict the future of the learner's learning trends. In this paper, the author analyzes the behavior pattern of college students' research trip based on data mining method. Research trip refers to the students to participate in extracurricular activities, it allows students to learn and exercise in the travel experience, so as to cultivate the skills of life, collective concept, innovative spirit and practical ability. Through the analysis of travel research cloud platform, the author studies the purpose and significance of the research travel, and puts forward the development countermeasures.

Keywords: Data Mining, Behavior Pattern, College Students, Research Trip

1. Introduction

Research study trip, referred to as the study tour to learn, is refers to the student to participate in the collective organization, the purpose of the plan and school visiting experience activities, or is the classroom out of school, through the visit, communication, understanding of nature and society, enhance the cognition in the reading in the local customs and practices. You have to learn to swim in the line of thinking (Borrego, 2007, Ferreira et al., 2015). It has become the development of the tourism industry a new growth point of the new breakthrough and tourism economy, many provinces and cities have been taken to study the scenic tour base model, to create a variety of research projects and a number of brand travel routes, and at the same time, the study tour to learn also needs into an important part of the wisdom of tourism management (Finelli, 2008; Diefes, 2013). After the reform, the cultural exchanges between China and the world is increasing day by day, as a special and meaningful special tourism project, there are three aspects of entry, exit and domestic research and development (Lonner, 2013; Gilbuena, 2015). Study the purpose of the trip is to allow students to contact the society and the nature of learning in the travel experience and exercise, so as to develop life skills, collective ideas, innovative spirit and practical ability, to develop self-reliance, courtesy, encourage and help each other, work hard, hard work and plain living and other good quality and spirit, enhance understanding of the natural and social and understanding, enhance their sense of social responsibility and practical ability (Halim, 2014).

Research study trip is significant to the state, which is to implement the national long-term education reform and development outline of the action plan, is an important carrier for citizens to cultivate and practice the socialist core values, but also an important measure to expand the tourism development space (Moore, 2015; Pereira,2015). From the school level, it is an important way to deepen the curriculum reform of basic education, is to promote the implementation of quality education in an important position, is an important part of the combination of school education and school education. From the perspective of the tourism industry, tourism research is more concerned about the destination of cultural tourism resources, is a high level of cultural tourism to meet the needs of self promotion. Cloud platform is the foundation of wisdom tourism data, it needs to collect data of tourists and scenic spots data and real data and tourism related industries, these large data together into the wisdom of tourism.

2. Research travel big data and cloud platform

2.1. Data mining

In recent years, with the rapid development of Internet, more and more people's behavior in the network, which led directly to the relevant data of human behavior in the Internet is growing explosively, mankind has entered an era of "big data" imperceptibly. The concept of "big data" for us is not strange, Wikipedia big data definition is given: the amount of data is huge to not pass the current mainstream software tool acquisition, management, processing and finishing to help business decision-making becomes, a more positive purpose information (Roselli, 2006). Big data in the field of education has broad and narrow sense, education generally refers to all data derived from the data of human behavior in daily educational activities, it has the characteristics of hierarchy, timing and situational education; and big data in the narrow sense refers to the learner behavior data, it mainly comes from the student management system online learning platform and course management.



Figure 1 – Big data

Educational data mining is the technology and method of combining mathematical statistics, machine learning and data mining, processing and analysis of educational data, through data modeling, correlation between the learning results and learning content, learning resources and teaching behavior and other variables to predict the future trend of learners' learning. By interviewing educational experts in the field of data mining, a list of four target education of data mining: (1) the construction through the integration of knowledge, learning motivation, meta cognition and attitude information with the learner model, predict the future development trend of learners' learning; (2) explore and improve the domain model which contains the best teaching content and teaching order; (3) research on the effectiveness of teaching support provided by various learning software; (4) constructing a data computing model that contains the learner model, the domain model and the teaching strategy of educational software, the effective learning of learners is promoted.



Figure 2 – Education data mining

The researchers mainly use the following five kinds of technical methods: (1) forecast. To build an integration from multiple predictor variables that single predicted variable model, for example, the researchers through the online learning environment for learners in participation, test online discussion, risk prediction of learners in the course of whether there is a failure. (2) clustering. According to the data characteristics, a complete data set is divided into different subsets, for example, learning difficulties, researchers in the online learning environment based on learner interaction mode of learners will be divided into different groups, and for different groups to provide appropriate learning resources and appropriate learning activities. (3) relationship mining. To explore the data correlation between variables, and the relationship as a rule for encoding, for example, the researchers used the relationship between mining, exploration of the relationship between learning and online learning environment in learning activities and learning achievement, and to improve the learning content presentation and sequence, as well as online teaching methods.

2.2. Research on the construction of travel cloud platform

A research study trip to the cloud platform, scenic spots, travel agencies, hotels and other related industries involved in data collection and storage in wisdom tourism cloud platform big data center, the data is completely transparent to the government and the administrative department of tourism, scenic spots, tourism enterprises to realize the convenient query whenever and wherever possible. For each of the students, travel experience are included in the comprehensive practice course content, learning content, learning performance, travel summary as the curriculum evaluation standard, but involves travel routes, scenic spots, transportation, catering, accommodation, shopping, hospitals, emergency and other issues need to access online service system. Travel cloud platform. For each study tour involved in the scenic spots, the need to build is in each base or demonstration area to increase their information center. Scenic spot information exists in the information center of the area, in the free time can be uploaded to the wisdom of these data cloud platform big data center, in order to save traffic and time. So that the data in the scenic area of the local storage, the scenic spots, some of the management decisions to provide data basis, in order to strengthen the government's real time supervision and control of large tourism data.

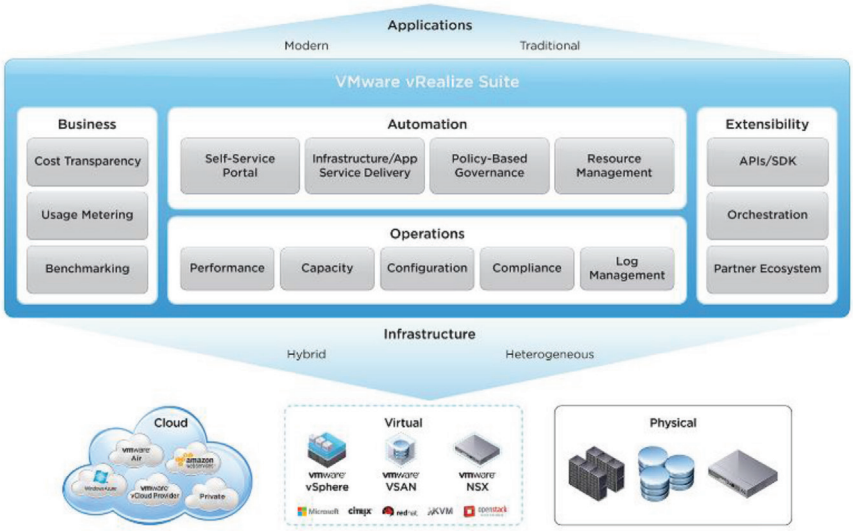


Figure 3 – Cloud platform

Mobile phone intelligent terminal APP through real-time positioning technology, two-dimensional code technology, complete the scenic tours, tour guide, navigation. The following functions can be integrated:

1. ***real-time information:*** research study travel news, traffic information, weather information.
2. ***study tours provide resources:*** study tours, attractions, restaurants, restaurants, shopping and entertainment tourism resources such as thematic

map display; provide location query and map research study tour destination surrounding restaurants, travel agencies, hotels, supermarkets, banks, hospitals and other fixed position to provide all kinds of traffic information, including bus, subway stations, train station, bus station, gas station service area; provide detailed information and recommend research area to study tour Line scan .

3. ***peripheral information:*** GIS data services and GIS services provided on the basis of the government department spatial geospatial framework or commercial map services, providing the resources of the surrounding research;
4. ***scenic tour guide:*** integrated GIS, intelligent search services and complete two-dimensional code technology research study travel scenic self-help guide; travel research led teachers or guides can also according to individual needs, in the electronic map by a simple annotation and drag flexibly to complete a variety of planning tourist routes optimization strategy, customized research study tour cost estimates, research study tour schedule, itinerary planning based on sharing;
5. ***interactive evaluation services:*** combining portals, micro portal, two-dimensional code provides research and evaluation of entrance tour to learn the interaction between teachers and students, and the third party platform through the open interface and mainstream web site visitors can make teachers and students to achieve docking, micro-blog, WeChat, bind the community website account, participate in online interaction and rapid evaluation of the evaluation to the study tour to learn teachers and students to facilitate the timely service of tourism enterprises.



Figure 4 – Tourism mobile APP

Research study travel information platform to scenic main function should include the electronic ticket system, information query and navigation system, traffic statistics system, disaster warning system, scenic intelligent evacuation system etc. Repetitive construction does not have this platform, but must be able to ensure seamless connection of research study travel Cloud Service Center for the public, so that students can master the study tour to learn the travel environment timely before the trip, or, at the time of the disaster, safe, accurate and rapid escape.

3. Study on the purpose and significance of study travel

3.1. Study travel purpose

To develop students' life skills, collective ideas, innovative spirit and practical ability, is an important part of the comprehensive practical activity curriculum in basic education curriculum system ". Research travel is a comprehensive social practice including social investigation, visit, experience, data collection, expert comments, collective activities, peer support, text summary as a whole, is a basic education curriculum system in the curriculum of comprehensive practical activities. Study the purpose of the trip is to allow students to contact the society and the nature of learning in the travel experience and exercise, so as to develop life skills, collective ideas, innovative spirit and practical ability, to develop self-reliance, courtesy, encourage and help each other, work hard, hard work and plain living and other good quality and spirit, enhance understanding of the natural and social and understanding, enhance their sense of social responsibility and practical ability.

The research study trip as an integral part of the school curriculum system of basic education in the task of carrying quality education in elementary education, research study trip will have a tradition of travel for different features, mainly reflected in the following aspects:

- Universal character: The tour is part of the students to participate in research, and travel for all primary and secondary school students in the class as a unit, a grade for the unit, and the collective activities in the school as a unit, the school must create conditions to let every student can enjoy participation in research opportunities to travel.
- Curriculum nature: The school must be based on students of different age characteristics, different regions, different segments of the demand for quality education, develop school, school, term of implementation of the research study travel program, must have specific curriculum goals, curriculum and evaluation of curriculum, the research study trips to avoid blindly "sheep" type of Tourism activities
- Educational nature: Quality education to students is to carry out study tours to the purpose of the research study trip to follow the law of education, focusing on knowledge, science and interest, cultivate humanistic literacy, with particular attention to the education of good habits in the process of tourism, culture generated a civilized tourists. The educational aim and the students' growth direction. Through the study of students, students can not only gain knowledge and happiness, but also improve the cultural quality and self perfection.
- experiential: research study trip is to let the students out of the classroom, to nature, to society, to enable students to increase knowledge in practice and hands-on experience in the implementation of the internalization of humanistic quality, so it is necessary to study tours to carefully design and arrangement, let the students have their opportunities for hands-on opportunities, expression the opportunity to guide the students together, the common experience, mutual discussion, in the process of participation and travel experience to expand their horizons, to understand the society, close to nature, team work ability and social practice ability.

- The public welfare: Research travel is an important part of quality education, which is an important part of quality education. If the cost of research trips should be borne by the students, it can only be appropriate to charge the cost, along with the teacher costs borne by the school. The school cannot be carried out for the purpose of profit of operating income, for poor families to reduce the cost of students. Since it is a public welfare activities, the government administrative departments to coordinate transfer, to carry out research of travel funds, reduce the economic burden of student travel. At the same time, to develop the tourism attractions tickets, business tax related preferential policies, incentives and promote the development of tourism enterprises to study the tourism market, and promote the sustainable development of tourism research.

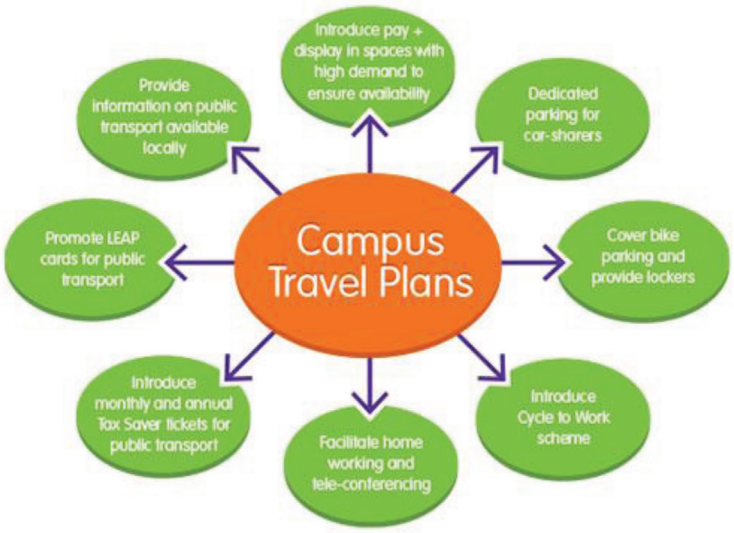


Figure 5 – Studies travel plans

3.2. The significance of research on travel

To carry out the study of travel is significant, it is an important carrier to cultivate and practice the socialist core values, but also an important measure to expand the space of tourism development. From the perspective of the tourism industry, tourism research is more concerned about the destination of cultural tourism resources, is a high level of cultural tourism to meet the needs of self-promotion.

The administrative departments of education and schools must provide students excursion activities escort, to provide all kinds of safeguard measures. First, organizational security: the educational administrative departments to establish a work leading institutions, the development of the relevant system, constantly sum up to promote the school to carry out research activities to provide policy support. Schools to develop specific programs, the establishment of a long-term management system research travel management system. Second, security: the curriculum to develop research programs and travel standards,

the research study trips and curriculum reform combined, curriculum, development, natural history, geography, science, humanities and other research course system of school trip. The students to participate in the study of travel activities results into the credit management system and comprehensive quality evaluation. Third, security: the school to develop detailed contingency plans for security, to carry out safety knowledge and skills training to participate in the activities of teachers and students, to choose a higher quality, better social trust and strong risk management ability of the travel agency as the implementation unit, and strive to achieve the nip in the bud. Schools to develop a scientific and rigorous research and travel operations process. Research to develop plans. Careful planning, to determine the theme, and the relevant travel agencies to develop a scientific research and development of the implementation plan (including security program), and reported to the relevant authorities in charge of education for approval. But also through a variety of ways to inform the parents. According to the number of students and activities, the establishment of a special working group, a clear division of labor, detailed programs and responsibilities, and carefully prepared to do the work. In the research study should strictly implement the plan, emergency treatment, prepare to all kinds of possible problems of scientific judgments, prevent trouble before it happens. After the study to strengthen the follow-up management, to do a good job in the study of the summary of the research work, the transformation of research results. Summarize the exchange experience, and constantly improve the school research and travel course design and program development, improve the scientific level of research and travel activities.

4. Analysis on the development strategy of the research on travel

4.1. Cultivate the spirit of innovation, improve the practical ability

1. Creating themes to enhance students' creative spirit

It is an important way to realize the strategy of "developing the country through science and education" and the strategy of sustainable development to cultivate innovative talents and cultivate students' innovative ability. While today's society is a big advocate of national innovation, but innovation is not a problem we cannot be ignored. Therefore, in the study of students' innovative spirit theme opened to enhance travel, design the special spirit of the theme in the tourism activities popular, give students the spirit of pioneers; carry out the cultural line with science significance in line design, rich cultural knowledge and lay the foundation for the students' innovation ability. Research study trip provides innovative soil for students, imperceptibly implanted seeds of innovation in student thinking, inspire everyone desire to innovate, from training students on the level of innovation consciousness and innovation ability.

2. Creating themes to improve students' practice

Travel beyond the limitations of teaching materials, classroom and school, to the nature, the life of students and the extension and expansion of the social field. The biggest problem that the education is facing is not to combine the classroom teaching with the social practice, which leads to the low enthusiasm and poor practice ability of the majority of students to participate in practical activities. Therefore, in the research study travel

tourism products design DIY, independent design, sculpture in the rural tourism rural picking can improve students' level of practice activities, not only can arouse students' enthusiasm for learning, can enable students to actively enter the situation, consciously participate in practical activities.

3. Creating the theme of improving students' humanities accomplishment

Studying the travel theme of diversity, rich culture research travel is an important pole to attract students parents. The museum site, scenic spots, historical neighborhoods, have culture of ancient cultural heritage and historical allusions, rich history, one can know, person, gains and losses. The survival of the ancient ruins and the story will influence students' humanistic quality and humanistic understanding of history, can help students learn from the wisdom and strength in the history of culture, will travel and carry forward the fine traditional culture and heritage of the combination, so as to improve the students' Humanistic Quality

4.2. Enrich the teaching content, enrich the research travel

1. Strengthen the content of the classroom

The knowledge which is obtained in the book is shallow, and it is difficult for the students to fully understand the nature of knowledge or things, most of them can only understand the world of books ". The classroom research is an extension and expansion of travel, it is the content of the classroom and practice organic fully together, for students to learn knowledge in mind, form their own opinions, into their thinking, to the outside of the form. Art Museum, Museum of natural space base, can combine with the school of fine arts, physics, chemistry and biology courses, while students visit naturally will study to fully grasp helps to strengthen the school classroom content.

2. Supplement the content of the reality

In today's rapidly changing society, new things dizzying, textbook knowledge has more theoretical knowledge of previous experiences, not with the reality of things change rapidly effectively. Therefore, the research of tourism has become an effective means to make up this defect. The research study trip diverse forms of activities, can design a large space, can follow the activities designed to strengthen the development of the times, let the students more diverse channels in many aspects to absorb knowledge in the process of study tour, to supplement the content of the textbooks.

3. Extend the future essential content

The students in the future occupation development, not only need to have a solid professional knowledge, the way of getting along with people and self -management, team cooperation ability is an essential quality. Study of travel provides a chance for students to enhance the ability of students, travel not only to deal with the relationship between teachers and students of the other, and will face a variety of challenges of unexpected events, let students learn the ability of self-control in the face of difficulties, training students and students collaborate with the ability to face difficulties and overcome difficulties. These are aspects of the classroom cannot be touched, research and travel will be the only way to help students in the future comprehensive development.

5. Conclusion

The traditional teaching mode has no longer meet the requirements of the times, teaching forms need to be innovative, and then to interactive teaching, two-way communication, experiential teaching. Research study trip is to create a platform for the exchange of teachers and students, teachers can obtain student feedback in travel in the first time, to give students more initiative, flexibility to adjust the teaching schedule according to the students' learning to accept, in accordance with their aptitude. In the design of research and development of products, to take a variety of forms of teaching will often reach an unexpected effect. The traditional form of visiting the attraction and teaching has been lack of attraction, and the form of research activity should be innovated in different forms, and have a variety of forms. Participate in activities at all times to choose the full use of English, write English travel notes, learn to sing English songs, simulation of English and other activities can be invisible to exercise the students' English application ability.

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Study on the Problems and Countermeasures of College Students' Psychological Education Based on Network Data Mining

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Abstract: With the development of database technology and the popularization of computer application, the data mining technology has been widely used as a data knowledge discovery tool. In this paper, the author study on the problems and countermeasures of college students' psychological education based on network data mining. Mental health education has a very important role in cultivating students' healthy psychology, developing their psychological potential, enhancing their ability to adapt, and improving their personality. By using data analysis, the author finds out the main problems of college students' mental health, and puts forward relevant countermeasures.

Keywords: Network data mining, Psychological education, Information technology, College students

1. Introduction

In today's world in the era of fierce competition, the competition is essentially the competition of talents, education is shouldering the responsibility of cultivating high-quality talents for twenty-first Century (Jin, 2014). Colleges and universities as an important base of training socialist builders and successors, the comprehensive promotion of quality education is the important target, and comprehensively improve the mental health education is an important foundation and conditions the overall quality of students. Improving the mental health level of college students will ensure college students towards modernization, to the world, an important guarantee for the future (Luthans, 2005; Liu, 2008). The mental health education for the cultivation of psychological health of college students, develop their psychological potential and enhance its ability to adapt, plays an important role in improving their personality (Larson, 2006). To strengthen mental health education in Colleges and universities, college students to improve the quality, not only for the overall development period of physical and mental health and aspects of their learning in school Has important significance, but also for their personal development in life and improve the overall quality of the national new generation have a very profound impact (Peterson, 2002). In our country, local education departments and universities have done a lot of work in the

mental health education of college students, some colleges and universities gradually put this work into the work of school moral education system the establishment of mental health education, psychological counseling, specialized agencies or consulting, teaching, scientific research and the education practice (Yang,2015). Many high school health institutions in the development of College Students' psychological health education, psychological counseling and counseling have also done a lot of work.

In recent years, the mental health of college students has aroused widespread concern in the whole society, in-depth research on the mental health of college students and to explore the psychological intervention model is the focus of attention of scholars at home and abroad (Zhao, 2015). The underlying data mining technology in mining laws of data to solve specific problems, other technology can match with the maturity and application of data mining technology continues to expand, many scholars begin to research methods, the application of data mining technology in college teaching and management field, this paper collects and reviews relevant literature data, mining technology for a more in-depth research and Study on data, try to analysis and research the application of data mining technology in the data of College Students' psychological problem.

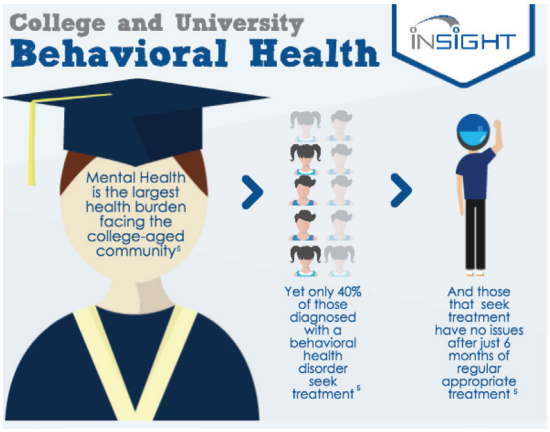


Figure 1 – Mental health of College Students

2. Data mining technology

2.1. Data mining

Data mining is from a large, incomplete, noisy data, found the hidden relationship, in the data model, the extraction has potential value, fuzzy random, credible, novel, effective and can be understood by information and knowledge, it is known that, for the database of knowledge in data analysis, data fusion, decision support and so on. And more general statement is: data mining means in some facts or observations in the collection for mode decision support process. The original data is formed as a source of knowledge, like from ore mining. The original data can be structured, such as the relationship between the

data in the database can also be unstructured, such as text, graphics, image data, or is distributed over a network of heterogeneous data. The method can be found knowledge mathematics, can also be non-mathematical; can be deduced, also can be summed up.

With the popularity of database technology and data applications, accumulated data are growing rapidly at an exponential rate. According to statistics, the amount of global information is doubling every 20 months, show in front of people is the vast sea of information, the data of flood avalanching towards the people, in data behind many important information, people hope to higher level analysis of these data, in order to make better use of these data. The current database system can efficiently realize the data entry, query, statistics and other functions, but cannot find the relationship of data and rules, cannot predict the future development trend according to the existing data the lack of data mining. The hidden knowledge means, resulting in data explosion but lack of knowledge of the phenomenon. In the face of people drowning in data but starving for knowledge from a number of challenges According to the discovery of knowledge and its core technology in the library data mining will emerge as the times require, and be able to flourish, more and more show its strong vitality.

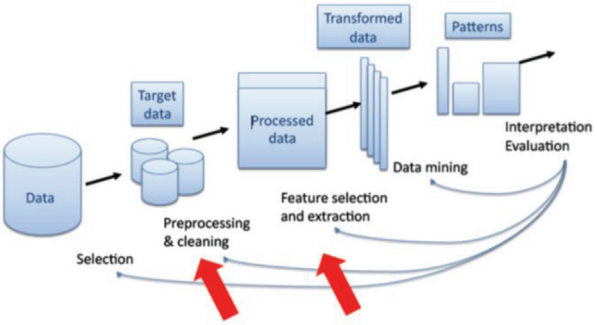


Figure 2 – Knowledge discovery process

Data mining technology from the application of these data, to the micro, meso and macro statistics, analysis, synthesis and reasoning, to solve the actual problems and tried to find the relationship between events, and even the use of existing data to predict future activities. The task of data mining is as follows:

- ***Data summary:*** Objective to summarize the data is concentrated on data, given its compact description. Data mining is mainly concerned with the generalization of the data from the point of view to discuss the summary data. Data generalization is a database of the data from the low level to the high level of abstraction.
- ***Classification:*** The purpose of classification is to establish a classification function or classification model (also called classifier), this model can map data item to a given category one. Example: credit card applicant, classified as low, high risk.

- ***Clustering:*** The purpose of clustering is to belong to the same category of individual distances as small as possible, and the different distance between individuals as large as possible, to a group of individuals with similar classification, namely o cases: some specific symptoms of aggregation may predict a specific disease. S. VDC type is similar to the customer to rent together may suggest that customers belong to different subcultures. The first step is usually gathered as data mining.
- ***Association rules:*** The purpose of association rules is to discover which things will happen together, and that the general form of it is: if A occurs, B is likely to have a C.

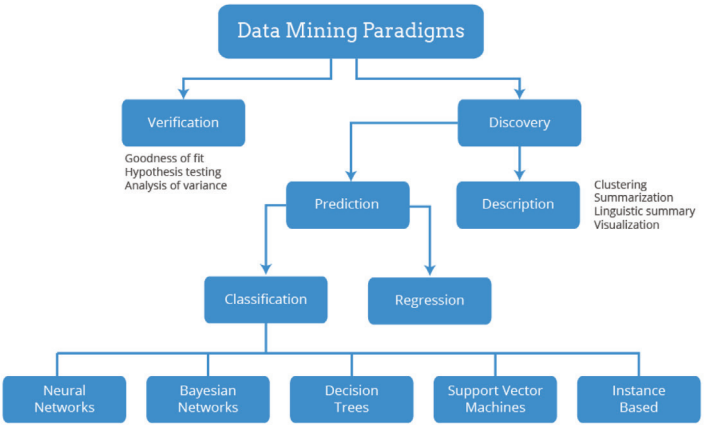


Figure 3 – Classification of data mining

2.2. Data mining process

Data preparation is crucial for the success of data mining application, if there is no data pretreatment, simple data mining will become a blind search process may lead to meaningless or misleading results. Data preparation can be divided into 3 steps:

1. ***Data selection***: Search for internal and external data related to the business object, and select the data suitable for data mining applications.
2. ***Data preprocessing:*** Study the quality of the data, prepare for further analysis, and determine the types of mining operations to be performed.
3. ***Data conversion***: Transforming the data into an analytical model is the key to the success of data mining.

The first stage of data mining is to determine the mining task or purpose, such as data classification, clustering, association rules or sequential pattern discovery. To determine the mining task, you need to decide what kind of choice to realize the mining algorithm. The algorithm has two factors: one is the number of features according to different needs, and so the related algorithms for mining; two is the user or the actual operation of the system requirements, some users may want to access the description, easy to understand knowledge and information, and some users just want to obtain the

prediction accuracy as high as possible. The information and knowledge mining of the converted data were obtained, some important the information and knowledge hidden in the data, for decision makers as an important reference.

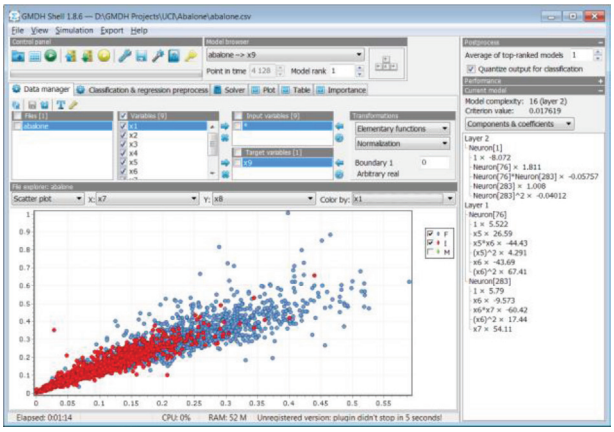


Figure 4 – Data mining analysis

3. The main problems of college students' mental health

3.1. The significance of mental health of college students

College is the nation's future and hope, the comprehensive development of China's socialist construction directly affects the success or failure of the cause, and the mental health of college students is an important content of all-round development, but also an important condition for the all-round development of college student's psychological health education. It is a reliable guarantee for the realization of this goal, has a special status and role in the all-round development of college students.



Figure 5 – Mental health

1. The effective way to improve the comprehensive quality of College Students

Psychological quality is the intrinsic characteristic of the subject is relatively stable in the psychological aspect, including personal spirit, temperament, personality and emotion and other psychological factors, is the basis for the formation and development of other qualities. Students learn and groware essentially a constant mental activity and psychological development process. To a great extent affected by the psychological quality of the students. In the complicated and changeable social environment, maintain good mental adaptation, resist the temptation to withstand setbacks, the key to realize self-adjustment. In this sense, the comprehensive quality of college students is mainly dependent on their psychological qualities depends on school mental health education Success or not.

2. Driving the basic force of the development of College Students' personality

Closely related to mental health education and the educated personality development, and directly affect the development level of the individual personality. On the one hand, students with moral norms, accepted in the mental health education in the process of behavior, environmental information, social expectations to gradually improve their own personality structure; on the other hand, the values of objective existence as the psychological life of their own a measure, evaluation and regulation, but also affect the development of personality, and under certain conditions can be transformed into personality traits, so that personality development up to a new height. At the same time, mental health education is not passively attached to this transformation, but rather a dynamic to guide the educated to adjust the direction in the process of transformation, so that the individual self-control, understanding of the evaluation of their own behavior, so as to achieve the purpose of optimizing the psychological, personality.

3. A reliable way to explore the potential of College Students

One of the purposes of education is to discover the potential of the educated. The good psychological quality and explore the potential is mutual promotion, mutual precondition, create the necessary conditions for the mental health education for the coordinated development of them. Mental health education stimulates the educated self-confidence. In order to realize the role change, enhance the ability to adapt to the environment, the full potential of development.

3.2. Major mental health problems

The mental health of college students in China, from the middle of 1980s began to rise. In more than and 20 years, the psychological health education of college students has gone from a difficult start to the development of the rapid popularization, has made remarkable achievements. Today, the industry is entering the new period of all-round development and improves, but also facing new problems and challenges. On the one hand, higher education in the new era, the development and growth of college students is an urgent need to put forward higher requirements on the psychological health education of college students (Vázquez et al., 2016). On the other hand, some problems and deficiencies in the process of the development of College students' psychological health education is to highlight and become the cause to constraining factor of the

healthy development of the rapid development and obtained. To achieve positive results today in the psychological health education of college students in our country, there are still some problems to restrict their development.

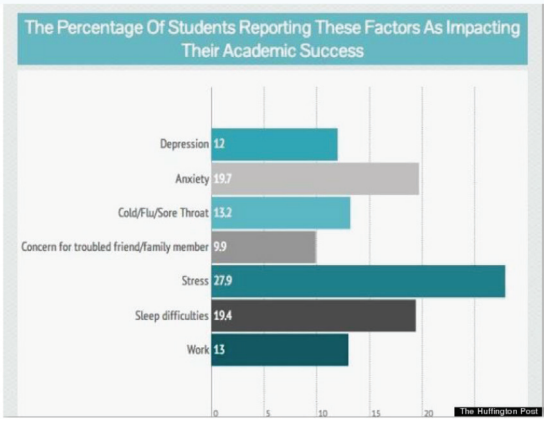


Figure 6 – Mental health problems of College Students

- ***Mental health education becomes a mere formality:*** Although the national Ministry of education has issued the relevant documents required to strengthen the mental health education of college students, experts have called on to carry out this work, most universities have established college mental health education institutions, but did not actually carry out substantive work, just psychological measurement, establishing psychological files, in order to cope with the higher examination fill and exchange report. At present, workers engaged in mental health education of college students in Colleges and universities are halfway decent, backward ideas, to carry out psychological counseling can solve the psychological problems of students, not according to the actual school to make scientific planning
- ***Mental health education content is not systematic:*** Mental health education and moral education work of college students in different but closely related, both the form and the content is not exactly the same. But in the work of higher education practice, some colleges and universities in the mental health education of moral phenomenon, the mental health education and moral education equated. In the process of solving the problem, educators often apply ideas the traditional method of political work, on the psychological problems of students appear in the political, ideological, moral and psychological analysis, from the analysis of less, often to the moral law instead of scientific analysis.
- ***Lack of practicality, teaching quality is not high:*** The psychological health education course is a modern, practical, pertinence and effectiveness of the very strong curriculum, according to a survey of college students is an important way to implement a mental health education of college students, the course is most in need of psychological health education, while at the same time, most students are not satisfied with the course and mental health education

class, many students complain about the school mental health curriculum content is obsolete, serious dull as ditch water, separated from practice.

4. The main countermeasures to strengthen the psychological healthof college students

4.1. Strengthen overall planning and guidance of mental health

In practice we should summarize the experience and lessons, clear the following points. One is the understanding of the psychological health education of college students is not only the knowledge of education, the first is a kind of education idea, is the infiltration of an educational belief and attitude in all educational activities; second is composed of a series of specific educational activities and educational work, so the education methods and means of education. The two is not the same as ordinary college students' psychological health education is not only because the students psychological problems to carry out the work, not only for the minority students have mental disorders, work, and more is for all students, in order to prevent and reach for the purpose of development, maintain and improve the overall mental health level of students work, therefore, psychological health education should take education, supplemented by the treatment mode. Three college students mental health education is a systematic project, not a department or several mental health educators things, common tasks but the school staff and students, mental health education should be included in the whole school education. Colleges and universities should strengthen the mental health education propaganda departments should actively cooperate with the support of all aspects of the psychological health education of school work, ensure that the mental health education has been developing smoothly.

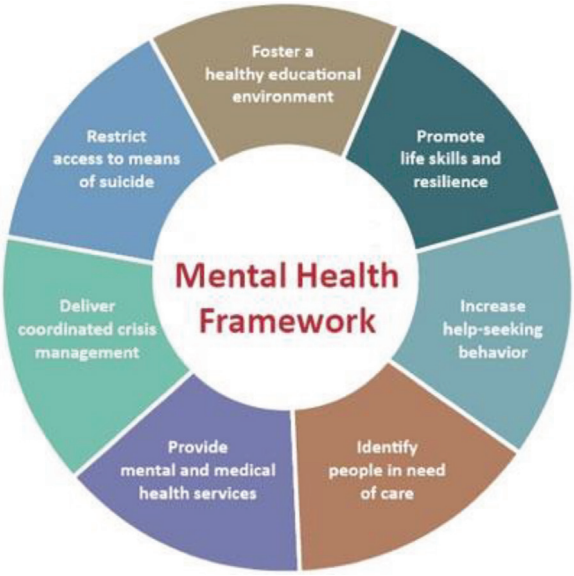


Figure 7 – Mental health education framework

4.2.Teacherschange their ideas; establish a sense of mental health

College Students' psychological health education with the social progress, economic development and educational activities, is a new field to the further development of transformation must rely on the staff and students of ideas. Teachers should further deeply understand the essence of teaching, teacher's responsibility is not only to impart knowledge, more is education. As the higher school educators, not only to do the general sense of the preaching, tuition, answering questions, teach students how to behave, how to live, but to do the heart of wisdom, teach students to a better life. Therefore, the mental health education is the bounden duty of every teacher. At present, most of the teachers the lack of awareness of mental health education, that their teaching task is to impart knowledge, as for the mental health education is the center of mental health education and professional personnel, so most of the teachers in the teaching process did not consider the psychological needs of students, do not pay attention to the students play the main role, still follow the traditional teaching mode of teaching, follow the prescribed order. Lead to students' learning enthusiasm is not high, even the weary. Therefore, some measures should be taken to improve the teachers' awareness of mental health education. All the teachers, the school should strengthen the psychological knowledge propaganda and popularization, strengthen the awareness of mental health education, mental health education professionals just correct the wrong idea, make all the staff establish, mental health education is the new concept of 0, and conscientiously implement the spirit of psychological health education in the educational process. On the other hand, teachers should consciously strengthen the basic knowledge and skills of mental health education study, cultivate their good psychological quality and sound personality, and continuously improve the awareness of mental health education, and gradually master the basic methods of psychological observation, psychological education, and active from the angle of psychology concerned with the healthy growth of College students.

4.3.Strengthen publicity and education; promote students to establish positive mental health awareness

To strengthen the concept of mental health promotion, to enable students to establish positive mental health consciousness, abandon the conservative idea. At present, many students are still the traditional view of health, especially the lack of awareness of mental health, the first reflection on psychological counseling and psychological test is to see if there is a disease, is not normal, they tend to inner conflict, frustration, tension, depression, inferiority as morbid psychology, this kind of understanding is very superficial harmful. At present, some psychological counseling center is not actually neglected, students do not need to, but a large part of the students want to go to go, afraid of stick psychological barrier label, cast a strange fear look, it is still hovering in the hesitation and struggle. Colleges and universities should strive to create a strong atmosphere of mental health education through the propaganda, speech and other ways to let students understand the new concept of health, strengthen the heart Physical health awareness, so that students pay more attention to self-education, take the initiative to mental health education as a way to improve the self, and actively participate in the school's series of mental health education activities.



Figure 8 – Measures to strengthen mental health

4.4.Create a harmonious campus; create a good psychological health education environment

The mental health education environment refers to the campus cultural environment, teaching activities and teacher-student relationship etc. can influence the formation of the campus psychological environment, education function is imperceptible. Excellent campus environment for teachers and students self-education, self-improvement, invisible force of self-restriction, has a great catalytic role to promote the college students' Psychological health. To create a good campus environment, is not only the need for the development of universities, is to cultivate high-quality talents. Colleges and universities should give full play to their respective advantages, and strive to tap the potential of the environment, enrich the connotation of campus culture, improve the quality of campus culture, to create the appropriate conditions for mental health education. The good campus culture environment education bright, especially on College Students' moral personality cultivation and guidance function, is difficult to other forms of education for a generation. People living in a beautiful campus, can make the hearts of pent up in bad mood to release the feelings, to comfort, to drive down the balance of emotion. To enable the college students to have healthy growth and development, we must attach great importance to create a good campus culture environment, especially to focus on the humanization design, providing full self-development and favorable conditions for the students. The campus culture environment includes two meanings: one is the static culture environment; second is a dynamic cultural environment of colleges and universities.

5. Conclusions

The psychological health education of college students is a highly complex foundation engineering, system engineering and engineering innovation. In a sense, it is the examination oriented education before leaving us, today is the rapid development of our society. The psychological health education for university students to be effective, must achieve a fundamental change in many aspects work: goals should be achieved from the emphasis on prevention of psychological disorders to improve mental health level and enhance the psychological quality change; work orientation should be achieved from the focus on obstacles to development, to rectify, product change polarity of mental health education; work team from less training, not standardized to standardization, specialization change; work content should be realized from the simple to carry out mental health education affairs activities to strengthen theoretical research, development

work extension, improve the level of our transformation. It should be a rational analysis of current situation and problems of College Students' mental health education, grasp the scientific development trend of mental health education, and actively guide the full range of fundamental changes in mental health education of college students.

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Preparation and Performance Evaluation of 15% Mesotrione Oil Miscible Flowable Concentrate

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Abstract: Using oil miscible flowable concentrate technology, we successfully prepared 15% mesotrione oil miscible flowable concentrate through formulation selection, and making preliminary studies on the quality and pharmaceutical effect test. The optimized formula (by mass fraction): mesotrione (15%), is persant OF-3472(3%), emulsifiers OF-3468(20%), synergist:6300(3%), stabilizer MF-33(2%), thickener SK04(1.5%), solvent methyl oleate(55.5%). The decomposition rate of preparation of 15%mesotrione oil miscible flowable concentrate after thermal storage is 2.5%(≤5%), the water dispersing performance is good, the suspension percentage is above 90%. The result of pharmacodynamics test shows that it can effectively control broadleaf weeds, such as lamb's-quarters and amaranth, grassy weed, such as Echinochloa crusgalli (L.) Beauv., crabgrass and Setaria viridis.

Keywords: Mesotrione, Oil miscible flowable concentrate, Formula, Pharmaceutical effect

1. Introduction

The dispersible oil suspension agent is a kind of solid pesticide active ingredient which is insoluble in the oil solvent dispersed in the non-aqueous medium and forms a highly dispersed and stable suspension liquid preparation by the surfactant (Dai,2006). Dispersible oil suspension agent is also the country strongly advocated the development of new formulations of pesticides green, especially for efficient stem and leaf herbicides (Ke, 2010; Shao, 2003). As a post-treatment agent for weed stems and leaves of corn field, mesotrione was used as a dispersible oil suspension agent in order to give full play to the herbicidal effect of the active ingredient in use and achieve the synergistic effect t(Cai, 2007).

Mesotrione, also known as: methyl sulcotrione, Swiss company Syngenta is the development of corn buds before budding, post-emergence selective herbicide herbicides. With contact and internal absorption conduction effect, resistant to rain, environmental and post-crop safety (Tong, 2008). Mainly for the control of broad-leaved weeds in corn fields, such as cocklebur, three-leaf ragweed, velvetleaf, quinoa, amaranth, Polygonum, etc., can control part of the corn field weeds.

A large number of efficacy tests showed that the traditional pesticide processing methods into pesticide formulations, in the weed surface permeability and poor wettability, easy to spray from the weeds surface droplets rolled down, cannot enter the weeds in vivo play a role(Zhang, 2006). Dispersible oil suspension agent using oil solvent and a large number of surfactants, can greatly reduce the spray liquid surface tension, thereby enhancing the liquid in the weed surface adhesion and penetration, to ensure that the active ingredient through the weed surface wax layer into Weeds, and thus play a pharmacological effect(Zhu, 2009). In this study, 15% sulcotrione dispersible oil suspending agent was successfully prepared by formula optimization and its performance was evaluated. Its stability and properties were better than those of domestic similar products.

2. Materials and methods

2.1. Instruments and reagents

200mL miniature vertical sand mill (Shenyang Research Institute of chemical industry), BT-9300H laser particle size distribution analyzer (Baxter Dandong instrument company), high performance liquid chromatography (SHIMADZU), electronic balance (Mei Tuosi), DHP-9052 electric incubator (Shanghai Beijing Red), viscometer (Shanghai)

Mesotrione (the content is more than 98.7%, bin Shandong Agricultural Chemical Co. Ltd.); 55% - herbicide mesotrione dispersed oil suspending agent (Geng Jie, Xian Zhengda); dispersing agent: OF-3472 (Nanjing Jingyu chemical), MF-31 (Nanjing Zijin Mountain chemical); emulsifier: OF-3468 (Nanjing Jingyu chemical). VO-5500, VO-5760 (Lantian chemical) (Star Technology), thickening agent: SKO4 (Suzhou Hui material), PT-L88 (Hunan Peng Thai): MF-33 (Jiangsu Haian chemical stabilizer), acetic acid (commercially available), lactic acid (commercially available), synergist: 6300A (Beijing Green time), BH-75 (Guangzhou Lanfeng); solvents: methyl oleate (Suzhou fubang)

2.2. Preparation method

Laboratory selection wet grinding process, process flow chart 1. In accordance with the formula in the specific proportion accurately weighed mesotrione TC, additives and solvents, in a beaker high speed shearing is homogeneous suspension, the liquid into the sand mill, sand grinding 1.5 ~ 2 hours after opening the detection and analysis of grinding machine, preparation of fineness 5 ~ 10 micron, the quality of qualified the index, filtering 15% mesotrione dispersed oil suspending agent.

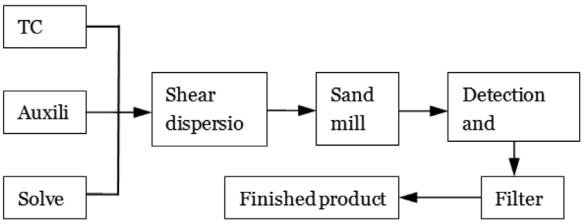


Figure 1 – Wet grinding process

2.3. Determination of quality index of dispersible oil suspending agent

1. Determination of the mass fraction of the active ingredient
   15% mesotrione dispersed oil suspension active ingredient mesotrione with 250 mm * 4.6mm (i.d.) stainless steel column, installed in the ZORBAX SB C18, 5μm filler, ψ(acetonitrile: water (pH=3.0) =50:50) as the mobile phase, with a variable wavelength UV detector wavelength (270nm), as by HPLC determination; and finally calculate the effective components of mesotrione concentration.
2. Determination of pH value: According to GB/T 1601.
3. Determination of suspension rate: According to GB/T 14825 in 4.3
   Take 15% of the grass ketone can be dispersed oil suspension agent 0.5g (accurate to 0.0002g). The remaining 1/10 suspension and sediment transfer to a 100mL volumetric flask, all washed into 100mL volumetric flask with 60mL acetonitrile ammonia solution divided residue 3 25mL, the ultrasonic bath oscillation 5min, return to room temperature, constant volume, shake; with 0.45 m aperture sampling before filtration. Determination of the mass fraction of the content of 4.4, calculate the suspension rate.
4. Persistent foaming property: According to 28137-2011 GB/T.
5. Wet screen test: According to the "wet sieve method" in GB/T 16150.
6. Dispersion stability: According to the prescribed concentration of the preparation of dispersion, respectively, placed in two graduated emulsion tube, standing for a period of time, and then reverse the emulsion tube several times, observe the initial, place a certain time and re dispersion of liquid.
7. Pourability: When the suspending agent sample is placed in a container for a certain period of time, the amount of the sample which is stuck in the container is determined according to the prescribed procedure, and the sample quantity in the container is determined after the container is washed with water.
8. Low temperature stability: According to GB/T 19137.
9. Thermal storage stability test: According to GB/T 19136 in the "liquid preparation".

Project		Index
Mass fraction of mesotrione,%		15±0.9
PH value		3.0～7.0
Floating rate,% ≥		90
Persistent foaming ability (1 minutes after foam)/mL ≤		25
Wet screen test (through 75um test sieve)/% ≥		98
Dispersion stability		qualified
pourability [a]/%	Residue after dumping ≤	5.0
	Residue after washing ≥	0.5
Thermal storage stability test[a]		qualified
Low temperature stability test[a]		qualified

[a] means under normal circumstances, dumping, thermal storage stability test, low temperature stability test at least once every 3 months.

Table 1 – 15% mesotrione dispersible oil suspension agent to achieve the quality indicators

3. The results and analysis

3.1. Screening of 15% sulcotrione dispersible oil suspending agent

1. Screening of dispersing agent

Test design of fixed dispersed oil suspension formulation mesotrione TC (15%), OF-3468 (20%) emulsifier and synergistic agent: 6300 (3%), MF-33 (2%) stabilizer and thickener SK04 (1.5%), a dispersing agent: OF-3472 (Nanjing Jingyu chemical), MF-31 (Nanjing Zijin Mountain chemical) the mass fraction was 1%, 1.5%, 2%, 2.5%, 3%, 3.5%, with a solvent filled to 100% methyl oleate, the measurement of different types and dosage of dispersants on dispersion oil suspension, performance and suspension rate results showed that: the dispersion effects of type and amount of suspension agent was smaller (the suspension rate of 90% ~ 95%); dispersion quality standard for the initial dispersion after cream less than 3mL, more than 5mL precipitation, influence on the dispersion of the results (see Table 2) show that the dispersion effect of OF-3472 is better than MF-31, and when OF-3472 quality When the number is 3%, the performance of the test results is the best, so the choice of the type of dispersant is OF-3472, the dosage is 3%.

Dispersant	**Dispersion property**					
	Dispersant mass fraction					
	1.0	**1.5**	**2.0**	**2.5**	**3.0**	**3.5**
OF-3472	Post dispersion cream 3.8mL, precipitation 5.4ml	Post dispersion cream 2.6mL, precipitation 4.8ml	Post dispersion cream 1.8mL, precipitation 3.6ml	Post dispersion cream 0.9mL, precipitation 2.5ml	Post dispersion cream 0.5mL, precipitation 1.5ml	Post dispersion cream 0.1mL, precipitation 0.5ml
MF-31	Post dispersion cream 4.1mL, precipitation 6.5ml	Post dispersion cream 3.1mL, precipitation 5.5mL	Post dispersion cream 2.8mL, precipitation 4.8ml	Post dispersion cream 2.5mL, precipitation 4.5ml	Post dispersion cream 2.4mL, precipitation 3.8ml	Post dispersion cream 2.1mL, precipitation 3.5ml

Table 2 – Effect of Dispersant on Dispersion Performance of 15% Mesotrione Dispersible Oil Suspension

2. Selection of emulsifier

In order to ensure that the important quality indexes such as dumping, suspension and so on can be used as an important quality index of the dispersant oil suspension preparation, it is the key to solve the problem that the suitable emulsifier is used

in the formulation. Test design of fixed dispersed oil suspension formulation mesotrione TC (15%), OF-3472 (3%) dispersing agent and synergistic agent: 6300 (3%), MF-33 (2%), stabilizer, thickener, emulsifier SK04 (1.5%): OF-3468. (Nanjing Jingyu chemical), VO-5500 (Lantian chemical) (VO-5760, (Star Technology) the mass fraction was 10%, 15%, 20%, 25%, with a solvent filled to 100% methyl oleate, the measurement of different types and dosage of emulsifier on the dispersible dumping influence and the suspension rate of oil suspension, the results (Table 3) found: using dispersant OF-3468 (Nanjing chyntec), chemical VO/01 (Rhodia), VO/02 ((Rhodia) as dispersant, the suspension rate increased with the increasing mass fraction of dosage, suspension rate of quality standard of not less than 90%; according to the influence of other indicators, comprehensive consideration, selection The type of emulsifier is OF-3468, the dosage is 20%.

Emulsifier	Mass fraction (%)	Pourability	Suspension rate (%)
VO-5500	10	After dumping the residue 8.9%; after washing the residue 1.86%	70
	15	After dumping the residue 7.2%; after washing the residue 1.52%	76
	20	After dumping the residue 5.6%; after washing the residue 1.06%	80
	25	After dumping the residue 5%; after washing the residue 0.99%	87
VO-5760	10	After dumping the residue 7.6%; after washing the residue 1.35%	74
	15	After dumping the residue 6.5%; after washing the residue 1.02%	80
	20	After dumping the residue 6%; after washing the residue 0.78%	85
	25	After dumping the residue 5.4%; after washing the residue 0.66%	90
OF-3468	10	After dumping the residue 6.8%; after washing the residue 0.84%	80
	15	After dumping the residue 4.2%; after washing the residue 0.62%	89
	20	After dumping the residue 2.8%; after washing the residue 0.26%	95
	25	After dumping the residue 2%; after washing the residue 0.19%	98

Note: the dispersed oil suspension of the qualified index: after dumping dumping residues is less than 5%; after washing the residue is less than or equal to 0.5%

Table 3 – Emulsifier on the dumping and suspension of 15% mesotrione dispersible oil suspensions

3. Screening of stabilizer

In order to ensure the effective components of hot storage stability of dispersed oil suspension formulation, effective component degradation rate is below 5%, select the suitable stabilizer for the formula is the key to solve the problem. Test design of fixed dispersed oil suspension formulation mesotrione TC (15%), OF-3472 (3%) dispersant and emulsifier OF-3468 (20%): 6300 (3%) synergistic agent, thickening agent SK04 (1.5%), a MF-33 (Jiangsu Haian chemical stabilizer), acetic acid (lactic acid (commercially available). Commercially available) mass fraction were 1%, 2%, 3%, with a solvent filled to 100% methyl oleate, effects of different types and amount of stabilizer on the decomposition ratio of active ingredient dispersed oil suspension agent, the results (Table 4) showed that the MF-33 content is 2%, the decomposition rate reached 5% dispersed oil suspension of the effective component of mesotrione, therefore, the selection of stabilizers for MF-33.

stabilizer	mass fraction(%)	mesotrione		Decomposition rate (%)
		Content of thermal storage(%)	Content of heat storage(%)	
Acetic acid	1	15.63	14.52	7.1
	2	15.11	14.11	6.6
	3	14.98	13.75	8.2
lactic acid	1	15.08	13.58	9.9
	2	15.45	14.12	8.6
	3	14.86	13.64	8.2
MF-33	1	15.63	14.86	4.9
	2	15.55	15.11	2.8
	3	14.99	14.66	2.2
blank	0	15.43	9.87	36.0

Table 4 – Effect of Stabilizer on Decomposition Rate of Effective Components of 15% Mesotrione Dispersible Oil Suspension

4. Screening of thickener

The viscosity of dispersed oil suspending agent is high or low, which is an important index of the storage stability of the product. Suitable viscosity can make the products have good stability. Low viscosity preparation stability is poor, easy precipitation; viscosity is too high, the product is not easy to flow, dumping of substandard. Test design of fixed dispersed oil suspension formulation mesotrione TC (15%), OF-3472 (3%) dispersant and emulsifier OF-3468 (20%): 6300 (3%) synergist and stabilizer MF-33 (2%), a

thickening agent SK04 (Suzhou Hui material), PT-L88 (Hunan Peng Thai) quality the number of points were: 0.5%, 1%, 1.5%, with a solvent filled to 100% methyl oleate, the measurement of different types and amount of thickening agent on the dispersion effect of dumping and stability of the oil suspension agent, the results (Table 5) showed that the SK04 content is 1%, dispersed oil suspension dumping and stability the best. Therefore, the choice of thickening agent for SK04.

Thickening agent	Mass fraction(%)	pour ability	Stability (stratified%)
PT-L88	0.5	After dumping the residue 2.9%; after washing the residue 0.86%	5.8
	1	After dumping the residue 5.9%; after washing the residue 1.36%	3.6
	1.5	After dumping the residue 8.5%; after washing the residue 1.88%	3.0
SK04	0.5	After dumping the residue 1.9%; after washing the residue 0.16%	9.7
	1	After dumping the residue 2.7%; after washing the residue 0.36%	4.6
	1.5	After dumping the residue 4.9%; after washing the residue 0.76%	2.2
blank	0	After dumping the residue 1.5%; after washing the residue 0.13%	28

Table 5 – Effect of Thickening Agent on the Stability of 15% Mesotrione Dispersible Oil Suspension

5. Screening of synergistic agents

Dispersed oil suspension agent, spreading on the plant surface penetration, influence of the number of active ingredients into the plant body, which directly affect the herbicidal effect. The suitable synergistic agent can make the product have good development and permeability. Test design of fixed dispersed oil suspension formulation mesotrione TC (15%), OF-3472 (3%) dispersant and emulsifier OF-3468 (20%), SK04 (1%) thickener, stabilizer MF-33 (2%): 6300, a synergist (Beijing Green time), BH-75 (Guangzhou Lanfeng) quality scores were 1%, 2%, 3%, with a solvent filled to 100% methyl oleate, the measurement of different types and amount of initiator on dispersed oil suspension show effect, the results (Table 6) showed that the amount of 3% to 6300, dispersed oil suspension agent and the best penetration and development; effect the best test results. So the choice of the synergistic agent is 6300.

Synergist	mass fraction(%)	Distribution diameter(mm)	Infiltration time(S)
BH-75	1	47	124
	2	82	84
	3	123	66
6300	1	67	108
	2	136	72
	3	210	48
blank	0	20	—

Table 6 – Effect of Synergist on the Development and Permeability of 15% Mesotrione Dispersible Oil Suspension

6. 15% sulcotrione dispersible oil suspension agent of the best formula

Based on the above factors, to determine the 15% mesotrione dispersed oil suspending agent, the best formula is: mesotrione TC: 15%, dispersant OF-3472:3%, emulsifier OF-3468:20%, synergistic agent: 6300:3%, stabilizer MF-33:2%, thickener SK04:1.5%, solvent methyl oleate was added to 100%.

3.2. Performance of 15% Mesotrione Dispersible Oil Suspensions

1. Thermal storage stability

Results are shown in table 7. The best formula of the sample will be determined according to the standard of 50mL is installed on the transparent bottle, sealed, placed in (54 + 2) in constant temperature incubator, static storage 14d were used to detect the changes of its effective component content and other indexes in the before and after storage.

number	Active ingredients of mesotrione		Suspending rate of mesotrione		Relative decomposition rate(%)
	Thermal storage(%)	After heat storage(%)	Before thermal storage(%)	Thermal storage(%)	
1	15.5	15.2	91	95	1.9
2	14.9	14.5	93	92	3.3
3	15.6	15.4	94	98	1.3
4	14.8	14.3	92	93	3.4
5	15.1	14.8	90	91	2.0

Table 7 – Thermal Stability of 15% Mesotrione Dispersible Oil Suspensions

2. Determination of cold storage stability

Will determine the best formula samples according to the standard installed in the 50mL transparent bottle, sealing, placed in the refrigerator in 0 7d after the removal, determination of dispersion stability and dumping of indicators, the results (Table 8).

batch	pourability	Dispersion property
1	After dumping the residue 2.9%; after washing the residue 0.86%	Post dispersion cream 0.1mL; precipitate 0.5mL
2	After dumping the residue 3.3%; after washing the residue 1.06%	Post dispersion cream 0.3mL; precipitate 1.5mL
3	After dumping the residue 2.5%; after washing the residue 0.88%	Post dispersion cream 0.4mL; precipitate 1.8mL

Table 8 – Cold Storage Stability of 15% Mesotrione Dispersible Oil Suspension

3.3. Determination of drug efficacy

Pharmacodynamic test design The herbicidal effect, mechanism and application technology of 15% sulcotrione dispersible oil suspension on weed control in maize field were studied, and the safety of maize was investigated.

In the Wenzhou Academy of Agricultural Sciences for corn stalk post-treatment efficacy experiments. Mu dose with 75,100,150 ml; control agent: Geng Jie (Syngenta), product efficacy evaluation:

1. corn 4 to 5 leaves after sowing, weeds 2 to 3 leaf stage, stems and leaves treatment medication 1, dosage 100ml / mu, watered 15 ~ 30kg; corn field, Chenopodium album, Solanum nigrum and other broadleaf weeds and young barnyardgrass, crabgrass, green foxtail grass and other grass weeds have good control effect;
2. the amount of acres of 150 ml, the whitening of the sweet corn injury appears, but can be restored, a certain inhibition of corn growth;
3. the same amount of 100 milliliters of acre, and the control agent (for the compound pharmaceutical) compared to herbicidal efficacy of herbicides than the control completely herbicidal.

In order to improve the efficacy and avoid the occurrence of injury, and other corn field herbicides mixed, while considering the use of barrels of auxiliaries.

4. Conclusion

Dispersed oil suspending agent is a high dispersion and stable suspension system which is based on non water system (oil base) as dispersion medium. As the dilution carrier, requirements of oil has good adhesion and ductility, easy adhesion in waxy or smooth leaf,

the dispersed oil suspension agent has good adhesion, the advantages of superwetting and anti rain erosion ability etc.. The main formula raw material, dispersant, emulsifier, stabilizer, thickener and solvent composition, selection of additives with considering the interaction or synergy, requirements of preparation and dispersion of dumping and suspension of the good, but also good cold and hot storage stability and good biological activity. Therefore, as the choice of oil suspension agent formula, consider the above performance indicators, to determine the type and dosage of additives in the formulation.

Carry out quality inspection and through the comparison of different experimental formula, from the angle of economy and environmental protection point of view, the best formula of 15% mesotrione dispersed oil suspension were selected, experiments show that detection and analysis of stability of 15% mesotrione dispersed oil suspension agent and its performance can meet the requirements of him dispersed oil suspension formulation of water diffusion standard, which reached the domestic advanced level. Pharmacodynamic test compared with Gengjie, in effect the maize field weed control annual weeds significantly, but there is a certain gap between thorough weeding, suggestions and other effective components collocation when using and use tank mixtures with speader further improve weed control effect.

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Financial Services, Fiscal Incentives and Agricultural Production Efficiency: an Empirical Analysis based on System GMM method

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Abstract: From the theory of financial services and fiscal incentives affecting agricultural production efficiency, based on 30 areas of China between 2005 and 2013 provincial dynamic panel data, with the help of agricultural production efficiency calculated by the super efficiency DEA, using the system generalized method of moment estimator (GMM), the paper gives an empirical test of financial services and fiscal incentives affecting agricultural production efficiency. Results: Overall, financial services is beneficial to improve the agricultural production efficiency, but compared with the inland areas, the promoting impact of financial services in the coastal areas to agricultural production efficiency are more obvious; Fiscal incentives significantly improve agricultural production efficiency, the promoting impact of fiscal incentives in the inland areas is bigger than the coastal areas; The current agricultural production efficiency is strongly influenced by the previous; such as agricultural specialization level, agricultural disaster control, level of opening to the outside world that have different promoting degree to the agricultural production efficiency.

Keywords: Agricultural production efficiency, Financial services, Fiscal Incentives, Super efficiency DEA, Generalized method of moment (GMM)

1. Introduction

The agricultural production efficiency is the important symbol to measure the levels of agricultural production, so to improve agricultural production efficiency is the inherent requirement of agricultural modernization development. Modern economic growth theory indicates that technological progress and the improvement of production efficiency are at the center position in long-term economic growth, the agricultural economic growth as well. As an important engine of economic growth, the production efficiency is the main power to improve China's agricultural production capacity in the future. Johnson D G (1997) pointed out that developing countries such as China; the improvement of agricultural productivity is the core of the national wealth growth. Sustainable agricultural productivity growth, both for the reconfiguration of agricultural labor force provides a way out, for development of non-agricultural industries offers a wide range of agricultural surplus and growth dividend (Xue-song Li,2015). Since

the reform and opening up, along with the acceleration of rural land system reform, agricultural mechanization and agricultural modernization, our country has greatly improved agricultural production efficiency (Xi-wen Chen,2014), but the problem such as serious efficiency loss, low average level, larger regional differences still exist. The Third Plenary Session of the 18th Central Committee of CPC proposed "to introduce modern agriculture production factors and management modes for agriculture", The Fifth Plenary Session of the 18th Central Committee of CPC further emphasized "to build modern agricultural industry system, production system, management system, and follow an agricultural modernization path characterized by higher productivity, safety production, resource saving and environment friendly", therefore, striving to improve agricultural production efficiency, is of great significance for the development of modern agriculture and the realization of the sustainable agriculture development.

Financial services system has the functions of mobilizing savings, spreading risk, optimizing the resources allocation, promoting the capital accumulation and technological progress, which is seen as the main factors to promote rural economic growth. At present, with steady progress made in a new round of rural financial reform, the rural financial services system has been gradually perfected, the rural financial services innovation has been constantly emerged, the rural financial infrastructure construction has been accelerated, the rural financial services level has been effectively improved(the rural financial services team of the People's Bank of China, 2015), which provides service guarantee to realize the comprehensive promotion of agricultural production efficiency. At the same time, due to the weak natural quality and the strategic industry characteristics of agricultural, if it wants to improve its production efficiency then it cannot leave the government's fiscal incentives policies. the polices of fiscal subsidy and reward play an incentive role, which can relieve the contradiction between supply and demand of agricultural development funds, guide the social capital to flow into agriculture, promote agricultural production specialization, standardization, large-scale, intensification, and improve agricultural technology level and production efficiency. Especially at present stage of our country, under the condition of surplus labor force and capital shortage, increasing government fiscal investment is very effective to promote agricultural production growth (Yu,2007). So an study on the influence mechanism of the financial services and fiscal incentives for agricultural production efficiency, is particularly important, which help us to deepen the understanding of the relationship between financial services, fiscal incentives and agricultural production efficiency, and which has important policy and academic value to further accelerates the rural financial services system construction, improve the fiscal efficiency supporting agriculture and agricultural production efficiency.

In order to more fully and effectively explain the effects of financial services and fiscal incentives on agricultural production efficiency, this article will improve the existing research from the following two aspects: First, using financial services and fiscal incentives as explanatory variables, comprehensively and systematically investigates the influential effect of financial and fiscal support to agriculture on agricultural production efficiency; Second, using the super efficiency DEA model and the system generalized method of moment estimator (GMM), effectively controls endogenous explanatory variable problems to ensure the accuracy of the estimation results. The rest structure

arrangement of this article is as follows: the second part is analysis on the influential mechanism of financial services and fiscal incentives on agricultural production efficiency; The third part is the measurable method and measurement of agricultural production efficiency; The fourth part is the set of econometric model, variable selection and data sources; The fifth part is the empirical test and result analysis; Finally gives the research conclusion and the corresponding policy recommendations.

2. Analysis on the influential mechanism of financial services and fiscal incentives on agricultural production efficiency

Financial services and fiscal incentives are the key drivers to enhance agricultural production efficiency. The financial services of the judgment are mainly referred to the financial products and services provided by rural financial institutions for rural areas. The fiscal incentives are mainly referred to the fiscal capital and preferential policies provided by government for rural areas, both are designed to promote rural economic prosperity, progress of agricultural production and farmers' income growth. In the long run, to make concerted efforts of financial services and fiscal incentives is helpful to improve the level of agricultural scientific & technological innovation, production level of agricultural modernization and dispersion degree of agricultural production risk, which is the main way to promote agricultural production efficiency.

2.1. Analysis on the influential mechanism of financial services on agricultural production efficiency

Through the paths of optimizing the allocation of resources, improving the financing environment, and promoting technological progress, financial services affect the real economic efficiency. Compared with that, the influential mechanism of financial services on the agricultural production efficiency has both commonness and difference. Specifically, the influence of financial services on the agricultural production efficiency is mainly manifested in the following three aspects:

a. Through agricultural technology progress and the science and technology quality of farmer, the financial services affect agricultural production efficiency. At present, because the lack of scientific & technological innovation and their application is an important bottleneck restricting agricultural production and rural development, so agricultural technology advancement is the power source of agricultural production efficiency. With the continuous development of market economy, independent research and development of agricultural technology, the introduction and imitation of agricultural technology and the application and promotion of advanced agricultural technology all require a lot of financial support, so the rural financial system can facilitate financing to carry out the agricultural technology innovation activities. In addition, the agricultural technology progress is closely related to farmers' science and technology quality. The key to raise farmers' scientific & technological quality and application ability is education development, while education development cannot leave assistance of the regional economic and financial development. In general, the government's rural education investment is relatively higher in financial developed areas, the farmers' scientific & technological quality

and application ability as the same, which will help to improve agricultural production efficiency (Xiao, 2012).

b. Through agricultural large-scale production and intensive management, financial services affect agricultural production efficiency. At present, agricultural industrialization, large-scale, intensive management greatly adapt to the new changes in agricultural production, and improve agricultural production efficiency. But the more development agriculture is, the more intense and urgent farmers demand for agricultural development funds. Rural financial institutions which provide diversified and comprehensive financial services, can guarantee agricultural scale production and intensive business, and further promote agricultural production efficiency. On the one hand, the rural financial institutions support agricultural development and rural infrastructure construction through long-term credit, based on meeting the services demand of the large farmer households, support other agricultural scale operators as the key object, who meet the requirements of the scale, specialization, standardization, such as partnerships business, family farms, farmers cooperatives and so on, to give full play to the functions of main peasantry. On the other hand, rural financial institutions actively explore the innovation of agricultural leasing products through agricultural leasing business, in order to provide advanced equipment for agricultural production, to ensure the smooth realization of the scale, intensive agricultural production.

c. Through the collection of investing information and production risk dispersion, financial services affect agricultural production efficiency. Financial intermediaries in the rural financial system, have more advantages in the collection of agricultural investment project information than a single currency owner. Financial intermediaries through the assessment of risk - income, select appropriate agriculture investment projects and give them financial support, which can ensure the allocation efficiency of agricultural capital. In agricultural production, food production is greatly influenced by natural disasters. Series of risk can be spread and transferred in the process of agricultural production by agricultural insurance, which will reduce the efficiency loss and volatility of agricultural output. In addition, under the condition of agricultural production in market-oriented rural financial system, the risk diversification function of financial intermediary is helpful to the implementation of investment projects whose production efficiency is higher than risk. At the same time, the function integrating spread money of financial intermediary, can optimize the flow and illiquid portfolio, to boost the implementation of the investment projects which have smaller liquidity but higher production efficiency, reduce the risk of cash flow, ensure agricultural investment efficiency.

2.2. Analysis on the influential mechanism of fiscal incentives on agricultural production efficiency

Agriculture is the foundation of national economic development, and has the common attributes. Agricultural production can get government's fiscal capital support, which is of great significance to improve agricultural production efficiency and promote agricultural production modernization. Specifically, the influential mechanism of fiscal incentives on agricultural production efficiency is mainly manifested in the following three aspects:

a. Through lowering the market failure and information asymmetry, fiscal incentives affect agricultural production efficiency. Agriculture is a weak industry, has long production cycle, low return on investment, weak fund accumulation ability, double risks of the natural environment and market conditions expand benefit uncertainty of agricultural operators (Songhai Fang, 2009) [25]. As the important tool of national macroeconomic regulation and control, fiscal policy has the function that other investment subject cannot replace in agricultural support and protection system. When agricultural production activity lead to the production cost and transaction cost increase due to market failure or information asymmetry, the state will adopt a proactive fiscal policy to increase investment in agriculture, and incentive or attract other subject investment in agriculture by the positive demonstration effect and multiplier effect, so as to powerfully improve agricultural production efficiency (Zhongzhen Yu, 2007).
b. Through strengthening the agricultural infrastructure construction, fiscal incentives affect agricultural production efficiency. In recent years, although our country agricultural infrastructure condition overall improved, but still weak, severely restricted the improving of agricultural production efficiency. Public finance in the market economy system pursues public interest, is economic activities or distribution activities to meet the demand of the social public. The government should provide public goods according to the social public's collective intend, which the market mechanism cannot effectively provide (Jia Kang, 2011). Countries strengthen agricultural infrastructure construction as a key of public finances, perfect the public finance system, increase fiscal incentives at all levels of government to agricultural infrastructure construction, widely absorb the social capital to participate in agricultural infrastructure construction, reduce the pressure on the funds required for agricultural production construction, provide material for agricultural modernization production, so as to ensure the implementation of agricultural production efficiency.
c. Through agricultural scientific & technological innovation and promotion, fiscal incentives affect agricultural production efficiency. Science and technology is the first productivity, agricultural scientific & technological innovation and promotion is an effective way to improve agricultural production efficiency, promote agricultural development and increase farmers' income. Agricultural science and technology has strong positive externalities, but high investment and high risk of agricultural scientific & technological innovation seriously restrict the innovational main body' participation, therefore government should play a leading role on agricultural science and technology innovation. On the one hand, government guide and coordinate agricultural scientific research institutions, the popularizing institutions, agricultural enterprises and farmers to be actively involved in the agricultural scientific & technological innovation and promotion; On the other hand, government support for agricultural scientific & technological innovation and promotion activities through fiscal incentive subsidies. Government policy of fiscal incentives can help the transformation of agricultural development methods, optimize the structure of agricultural industry, and further improve agricultural production efficiency.

3. The measurement method and result of agricultural production efficiency

3.1. The research method

Data Envelopment Analysis (DEA) method is proposed by scholars Charnes, Cooper and Rhodes et al, is nonparametric estimation method used to measuring the total factor efficiency. The method constructs efficient production frontier by using linear programming, compares the relative efficiency between Decision Making Unit (DMU), then finds input redundancy and output deficiency led to efficiency decrease, so as to provide basis and direction for DMU to improve efficiency. This article measures Chinese provincial agricultural production efficiency based on super efficiency DEA model. The super efficiency DEA model based on the CCR model can be further stated as the following linear programming form:

$$\begin{aligned} &Minimize \quad \theta \\ &subject\ to \quad \sum_{\substack{j=1 \\ j\neq o}}^{n} x_{ij}\lambda_j \le x_{io}, i = 1,2,\ldots,m \\ &\sum_{\substack{j=1 \\ j\neq o}}^{n} y_{rj}\lambda_j \ge y_{ro}, r = 1,2,\ldots,s \\ &\lambda_j \ge 0, j \ne o \end{aligned} \tag{1}$$

3.2. Data processing

It can be seen that applying the above method to calculation agricultural production efficiency, also needs to determine the input and output of agricultural production. Draw lessons from the existing literature (Jun-hua Guo, etc., 2010; Keyan Song etc., 2014; Yin Lei etc., 2014), the specific input and output index selection is shown in table 1. Data mainly comes from past years' China statistical yearbook, China rural statistical yearbook, the new China 60 years agriculture statistical data, the new China 55 years statistical data collection and the Tai'An data platform.

Index Type	Index Name	Index Definition	Index Unit
Output Index	Agricultural Output	Ecological-economic gross output deflated based on 2004	hundred million Yuan
Input Index	Land Input	total sown area of crops	thousand hectares
	Labor Input	the first industry employment in the year end	ten thousand person
	Mechanical Input	agricultural machinery total power	ten thousand kilowatt hours
	Fertilizer Input	Actual usage of fertilizer of this year	ten thousand tons
	Power Input	rural electricity consumption	hundred million kilowatt hours

Table 1 – Agricultural production efficiency index system

3.3. Measurement results

Using DEA - Sover software, agricultural production efficiency is calculated based on provincial panel data during 2005-2013 in china. The dynamic change of agricultural production efficiency is further analyzed from the dimension of time series through the STATA software, so that analysis of the efficiency change trend and regularity can be more comprehensive and accurate. The results are shown in figure 1.

From figure 1, those that is at the frontier of the agricultural production efficiency and the annual average efficiency score is greater than 1 have four provinces, respectively is Beijing, Shanghai, Hainan and Qinghai. As the "best practitioners"to improve agricultural production efficiency, Hainan is the scale of agricultural production level to measure other provinces. Provinces whose agricultural production efficiency is lower than 0.4 are Shanxi, Ningxia, Guizhou, Gansu, Yunnan, and Shaanxi, in the same output with a given case, DMU in the forefront of agricultural production as reference, those provinces' agricultural production is about 60% of input waste, agricultural production efficiency has a larger space. Overall, China's agricultural production efficiency is at low levels; continue to increase investment in agricultural production, improve agricultural production efficiency is urgent.

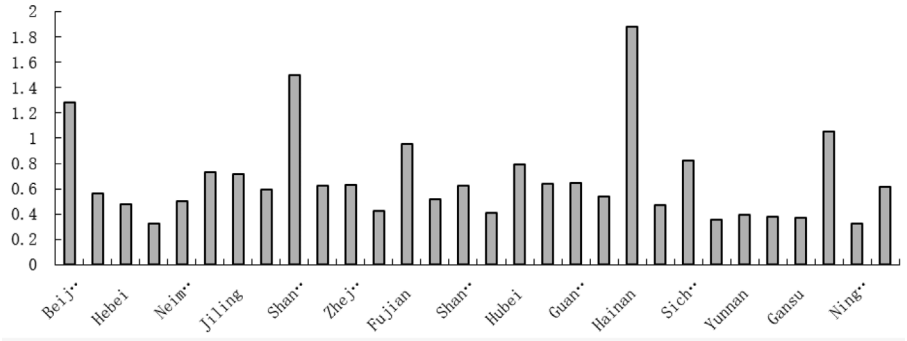


Figure 1 – average of regional agricultural production efficiency

4. Model set, variable selection and data sources

4.1. Model set

Above, we use the super efficiency DEA model to measure Chinese provincial agricultural production efficiency. In order to further analyze the effect of financial services on agricultural production efficiency and fiscal incentives in different provinces, this paper introduces regression analysis for the empirical investigation. Similar research can see Aghion P et al (2005), Yukui Sun (2014). our basic model constructed as follow:

$$Efficiency_{it} = \beta_0 + \beta_1 Finservice_{it} + \beta_2 Fin\sup port_{it} + \beta_3 Control_{it} + \mu_{it} \quad (2)$$

Because production efficiency itself is a dynamic process, its current production status is not only affected by the current production efficiency, may also be related to the factors during the past. In order to reduce endogenous problems of the model, accurately analyze the dynamic effect of financial services and fiscal incentives on agricultural production efficiency, we consider joining the lag term as tool variables, and the model further becomes a dynamic panel model lag one:

$$Efficiency_{it} = \beta_0 + \beta_1 Efficiency_{i,t-1} + \beta_2 Finservice_{it} + \beta_3 Fin\sup port_{it} + \beta_4 Control_{it} + \mu_{it} \quad (3)$$

4.2. Data source

This article selects 30 provinces' panel data of the mainland from 2005 to 2013 as samples (without Tibet, Taiwan, Hong Kong and Macau due to lack of statistical data), the relevant original data mainly comes from past years China statistical yearbook, China rural statistical yearbook, China financial yearbook, China fiscal yearbook, China's regional financial operation report as well as the data platform of Tai'An and China INFOBANK, calculated by author with the related arrangement. Descriptive statistics of specific variables are shown in table-2.

Variable name	sample	average	standard deviation	minimum	maximum
Efficiency	270	0.6685	0.3680	0.2440	2.4048
Efficiency(-1)	240	0.6634	0.3735	0.2440	2.4048
Finsereff	270	2.2148	3.2016	0.2317	20.1766
Finserperm	270	0.9560	0.2829	0.5658	3.2886
Finsupport	270	0.0971	0.0307	0.0213	0.1409
Professional	270	0.1168	0.0596	0.0060	0.3360
Disaster	270	0.2490	0.1489	0.0000	0.9357
Open	270	0.3414	0.4209	0.0357	1.7215

Table 2 – Descriptive statistics of variables

5. Empirical test and analysis results

5.1. Stationary test

In order to avoid spurious regression, unit root test of panel data is needed to test the smoothness of variables. The famous LLC test was proposed in 2002 by Levin, Lin and Chu, through introducing enough high-order differential delay items to eliminate t

statistic deviation in dynamic panel. Seen from the results in table-3, sequence variables have no unit root, and are displayed as stationary series on the 1% significance level.

Variables Name	Test Types(c,t,k)	LLC Test	Conclusion
Efficiency	(c,t,1)	-31.3103***	stationary
Efficiency(-1)	(c,t,1)	-15.2999***	stationary
Finsereff	(c,t,1)	-9.3730***	stationary
Finserperm	(c,t,1)	-5.3137***	stationary
Finsupport	(c,t,1)	-9.1081***	stationary
Professional	(c,t,1)	-10.6007***	stationary
Disaster	(c,t,1)	-14.0385***	stationary
Open	(c,t,1)	-9.7242***	stationary

Note: in the test types, c as constant, t as trend, k as the lag order; * * *, * *, *, respectively through 1%, 5% and 10% levels of significance test.

Table 3 – stationary test of variables

5.2. Empirical test results

The lagging items of variables explained in the model are used as explanatory variables, which can lead to explain variables appear highly correlation, then if using OLS model to estimate, the result of estimation will be a great deviation, economic meaning deduced by it must be distorted. In order to solve this problem, this paper adopts dynamic panel system generalized method of moment (GMM) proposed by Arenano (1998) to estimate the model parameters. This method firstly gets rid of the influence of the fixed effects by the first-order difference, and then uses a set of lagged exploration variables as tool variables, finally obtains consistent estimates. System GMM estimation can be divided into one-step system GMM estimation and two-step system GMM estimates.in the case of limited samples, one-step system GMM estimation can effectively control the endogenous problem with some of the variables, and obtain a more accurate estimate results (Bond, 2002).as a result, we will choose one-step system GMM estimation method.

Based on the above set measurement model and introducing the empirical method, the empirical results of the affection of financial services and fiscal incentives on agricultural production efficiency are shown in table-4. In table-4, in the case of controlling other variables, we respectively introduce financial services and fiscal

incentives as the core explanatory variables. According to the regression results in table-4, analysis as follows:

Variable Name	Model(1)	Model(2)	Model(3)	Model(4)	Model(5)	Model(6)
Efficiency(-1)	0.4901*** (0.000)	0.3478*** (0.000)	0.3695*** (0.000)	0.3931*** (0.000)	0.3695*** (0.000)	0.2940*** (0.000)
Finsereff	0.1435*** (0.002)			0.1548*** （0.001）		0.1575*** (0.000)
Finserperm		0.0545*** (0.000)			0.0468*** （0.001）	0.0500*** (0.000)
Finsupport			2.2131*** (0.000)	2.2603*** (0.000)	2.0016*** (0.000)	2.0426*** (0.000)
Professional	0.0076* （0.091）	0.0174*** (0.000)	0.0190*** (0.000)	0.0187*** (0.000)	0.0260*** (0.000)	0.0262*** (0.000)
Disaster	0.1291** (0.035)	0.1227** (0.034)	0.1093* (0.059)	0.1143** (0.048)	0.1104** (0.047)	0.11147** (0.059)
Open	0.3012*** (0.000)	0.4589*** (0.000)	0.4396*** (0.000)	0.5033*** (0.000)	0.3910*** (0.000)	0.4553*** (0.000)
Cons	-0.0034 (0.966)	-0.0430 (0.571)	-0.1809** (0.041)	-0.3679*** (0.000)	-0.3249*** (0.001)	-0.5263*** (0.000)
Wald Chi2	122.16*** (0.000)	141.64*** (0.000)	150.70*** (0.000)	161.80*** (0.000)	175.55*** (0.000)	190.57*** (0.000)
Obs	270	270	270	270	270	270

Note: for probability value of the parameter estimation in the brackets: * * *, * *, *, respectively through 1%, 5% and 10% levels of significance test.

Table 4 – Financial services, fiscal incentives and agricultural production efficiency

The current agricultural production efficiency is affected by its previous agricultural production conditions in a great extent. In model (1) - (6), regression coefficients of the lagging rural production efficiency are all positive, and all pass the test at 1% significance level, suggesting that the current agricultural production efficiency is significantly affected by the previous, that is consistent with the reality. Promotion of agricultural production efficiency is influenced by economic and social development factors, which is difficult to be effectively improved in the short term. In order to enhance agricultural production efficiency, not only we need to have enough manpower, material and financial resources, also need area to have the corresponding conditions. Across different provinces in China, those that have good foundation in the initial stage and full investment in the late, their overall agricultural production efficiency is higher.

5.3. Regional discussion

Considering that Chinese regions are vast and natural resource endowments are different between regions. Especially regional non-equilibrium development strategy in our country since the reform and opening up, has given priority to the development of coastal areas with different characteristics of agricultural production from other areas. In order to in-depth analyze on the effect of financial services and fiscal incentives on agricultural production efficiency, this article will further divide the data arranged or measured into coastal and inland areas. We make the following analysis according to the regression results of regional test given in table-5:

Variables Name	Coastal Areas			Inland		
	Model(1)	Model(2)	Model(3)	Model(4)	Model(5)	Model(6)
Efficiency(-1)	0.7318*** (0.000)	0.6927*** (0.000)	0.6924*** (0.000)	0.2641*** (0.003)	0.2654*** (0.003)	0.2622*** (0.004)
Finsereff	0.1545*** (0.000)		0.1482*** (0.000)	0.2068** （0.015）		0.1967** (0.023)
Finserperm		0.0223 (0.125)	0.0187 (0.186)		0.0342 （0.289）	0.0181 (0.587)
Finsupport	1.9158*** (0.001)	1.6695*** (0.005)	1.6509*** (0.004)	3.2611*** (0.000)	3.1048*** (0.000)	3.2609*** (0.000)
Professional	0.0083 （0.125）	0.0087 (0.156)	0.0120** (0.045)	0.0230*** (0.000)	0.0287*** (0.000)	0.0243*** (0.000)
Disaster	-0.0002 (0.110)	-0.0002 (0.141)	-0.0002* (0.077)	0.0001 (0.286)	0.0001 (0.342)	0.0001 (0.293)
Open	0.4035*** (0.000)	0.3674*** (0.000)	0.4004*** (0.000)	0.2237 (0.469)	0.4820* (0.090)	0.2211 (0.475)
Cons	-0.3906*** (0.000)	-0.2871** (0.014)	-0.4466*** (0.000)	-0.4899*** (0.001)	-0.4610*** (0.008)	-0.5445*** (0.002)
Wald Chi2	694.40*** (0.000)	647.73*** (0.000)	704.17*** (0.000)	79.48*** (0.000)	76.23*** (0.000)	79.63*** (0.000)
Obs	108	108	108	162	162	162

Note: for probability value of the parameter estimation in the brackets: * * *, * *, *, respectively through 1%, 5% and 10% levels of significance test.

Table 5 – regional differences of financial services and fiscal incentives on agricultural production efficiency

The influential regression coefficients of financial services on agricultural production efficiency are positive, but the significance level is different between regions. From financial services efficiency to see, regression coefficients in the coastal areas are all positive, and all pass through 1% significance level, which shows that financial services efficiency is significant to improve agricultural production efficiency. But these

coefficients inland only pass through 5% significance level, slightly lower than coastal areas. From financial services coverage to see, regression coefficients in all models don't pass through 10% significance level, but it can be seen that the probability value of regression coefficients inland are lower than coastal areas, which suggests that the significance of financial services in coastal area is higher than inland to promote agricultural production efficiency.

6. Conclusion and policy recommendations

Based on theoretical analysis, this paper takes the panel data of Chinese 30 provinces (municipalities and autonomous regions) from 2005-2013as an example, measures the provincial regional agricultural production efficiency by the super efficiency DEA method , adopts the method of dynamic generalized moment estimation, to empirically test the impact of financial services, fiscal incentives on agricultural production efficiency. Found that: overall, the financial services is beneficial to improve agricultural production efficiency, and the impact of financial services in coastal areas is more obvious to promote agricultural production efficiency relatively to the inland; Fiscal incentives significantly improve agricultural production efficiency, the promoting effect of fiscal incentives inland is greater than the coastal areas; Fiscal and financial policies significantly exist regional differences to promote agricultural production efficiency. Also found that the current agricultural production efficiency is strongly influenced by the previous agricultural production efficiency, such as agricultural specialization level, agricultural disaster control, opening to the outside world have different influential degree to promote agricultural production efficiency.

The research conclusions show that policy implications can be summarized from several aspects: First, in order to improve agricultural production efficiency, it is need to improve the level of rural financial services. Second, it is also need to intensify fiscal incentives to improve agricultural production efficiency, to establish and improve the stability growth mechanism of the fiscal agriculture support, ensure the stable growth of fiscal agriculture support budget, provide long-term stability of the fiscal support for agricultural production, promote the modernization of agricultural production. Third, to construct effective coordination mechanisms of financial services and fiscal incentives to promote agricultural production efficiency. Fourth, to promote regional coordinated development of financial services and fiscal incentives, balance the improvement of regional agricultural production efficiency. Fifth, enhance agricultural production efficiency, but also inseparable from the support of agriculture professional development, agricultural disaster control, opening up to the outside world. Agricultural specialization level, agricultural disaster control and the level of opening up to the outside world are important influence factors of rural agricultural production efficiency, to further improve the level of agricultural production specialization, intensify agricultural disaster control, and strive to enhance the level of regional opening up to the outside world, to create conditions for agricultural production efficiency.

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Research on Tourism Forecasting and Service Management Evaluation based on Neural Network

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Abstract: On the basis of the artificial neural network theory, this paper establishes the dynamic combination forecasting model of domestic tourism demand, and provides a new idea and method for the forecast of tourism demand. Tourism demand forecasting can provide reference for the tourism management department in formulating strategic planning. At the same time, the author analyzed the main influence factors of domestic tourism demand, and constructed the evaluation system of tourism service management. The research results can effectively improve the accuracy and stability of the prediction of tourism demand, improve the scientific nature of tourism management and optimize the allocation of tourism resources.

Keywords: Tourism forecasting, Service management, Neural network, Evaluation index

1. Introduction

In recent years, tourism has been developing at a fast speed, and has become one of the most powerful industries in the world. The strong development of tourism has led to the rapid development of economy, more and more countries began to invest heavily in the development of tourism, as a pillar industry in order to promote the development of the whole society (Andrea, 2015). Travel demand forecasting can provide reference basis for national tourism management departments in the development of strategic planning and policy, to provide reference for the reform and development of tourism enterprises, optimize the allocation of resources in China's tourism market guide (Jian, 2014; Degen, 2015). The prediction of tourists has an important role in the development of tourism, tourists can greatly improve the accurate quantization level is conducive to the development of tourism economy, tourism development planning and policy, to solve the existing problems in tourism.

Special tourism product determines the influence of many factors of the tourist demand, so the influencing factors of tourism demand forecasting has become more complex, there is not a good method to deal with the demand forecast of the complex influencing factors (Dina, 2016; Lino et al., 2016). This paper aims to explore a prediction method is more suitable for the tourism complex environment, in order to improve the accuracy of the prediction results of tourism, and explores the law of the development of domestic tourism in our country, in

order to better serve domestic tourism management and tourism decision making service (Rachel, 2007). To develop the tourism development strategy and decision making are dependent on the scientific tourism demand forecast, accurate demand forecasting can avoid the tourism oversupply caused by repeated construction and waste of resources, can be greatly reduced due to low demand exceeds supply caused by tourism service quality and tourism reception overload phenomenon (Song, 2015). Through scientific forecast more accurate, it can be better for the national tourism administration departments to formulate policy, tourism enterprises and related enterprises in the allocation of resources and reasonable development of tourism planning to provide reference, in order to achieve the development of the tourism industry benefits greatly improved.



Figure 1 – China's tourism scenic area distribution

2. BP neural network

2.1. Tourism forecast model

Based on fuzzy theory, grey theory and other related theories, to build a scientific and dynamic combination of domestic tourism demand forecasting model, which provides a new method for the study of tourism demand forecasting, enrich the content of tourism demand forecasting, the research system of tourism demand forecasting, has important theoretical significance (Shengnan, 2015). To develop the tourism development strategy and decision making are dependent on the scientific tourism demand forecast, accurate demand forecasting can avoid the tourism oversupply caused by repeated construction and waste of resources, can be greatly reduced due to low demand exceeds supply caused by tourism service quality and tourism reception overload phenomenon (Thomas, 2012). Through scientific forecast more accurate, it can be better for the national tourism administration departments to formulate policy, tourism enterprises

and related enterprises in the allocation of resources and reasonable development of tourism planning to provide reference, in order to achieve the development of the tourism industry benefits greatly improved.

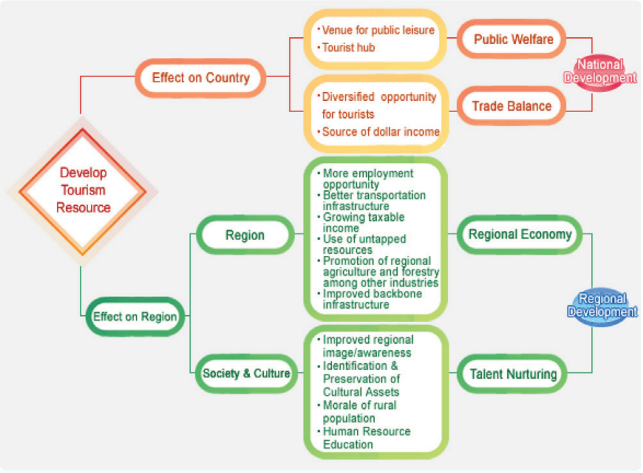


Figure 2 – Tourism planning

2.2. Artificial neural network

As a simple processor, the artificial neural network can be used to carry out the weighted sum of the incoming signals:

$$y = \sum_{i=1}^{n} \omega_1 \chi_i + b \tag{1}$$

B represents a threshold, and Y represents the output of the neuron. BP neural network, the multilayer feed forward back propagation neural network, usually by the input layer, the output layer and the number of hidden layer, each layer is composed of a plurality of nodes, each node represents a neuron, between the upper and lower right connection node by node, node layer and layer between the connection way the Internet, no connection between the nodes in each layer, a typical BP neural network with one hidden layer is the three layer structure of the network.

A neural network is provided with N input neurons, M output neurons and P hidden layer neurons:

$$\chi_i = \sigma\left[\sum_{i=1}^{n} \omega_{ij} \chi_i + b_j\right] \tag{2}$$

Output layer neuron output:

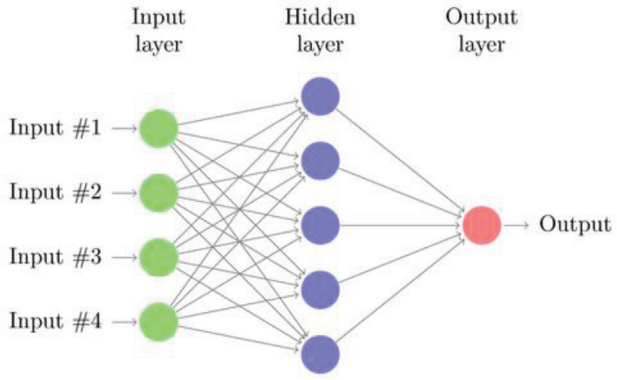


Figure 3 – BP neural network

$$y_k = \sum_{j=1}^{p} \omega_{ij} \chi_j + b_k \tag{3}$$

The excitation function usually uses the S function, such as:

$$\sigma(\chi) = \frac{1}{1 + e^{x/Q}} \tag{4}$$

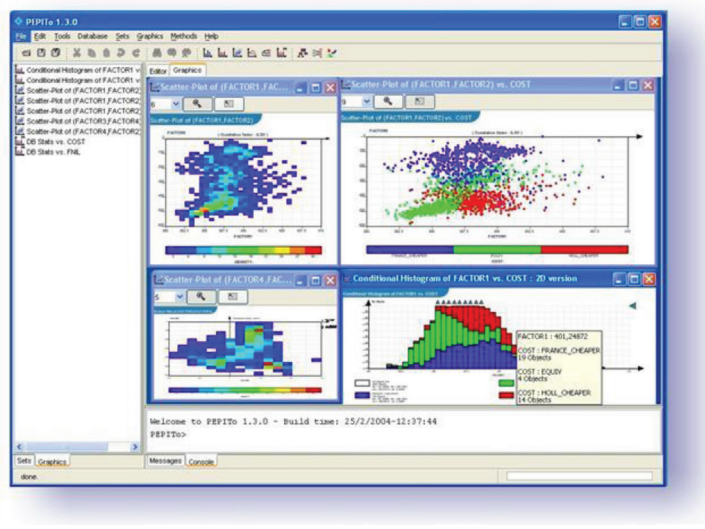


Figure 4 – The neural network data analysis

3. Domestic tourism demand analysis of the main influence factors

3.1. Tourism development strategy

From a macro perspective, tourism demand forecasting can provide the basis for government departments to formulate the strategic plan for the development of tourism management science, provide a reference for the development of tourism economic policies; from the micro perspective, tourism demand forecasting can make tourism enterprises have a reasonable allocation of resources, so as to minimize risks and maximize the benefits at the same time. Can the strategic planning and planning of tourism marketing plan and provide a reference guide for enterprises. Based on the existing domestic and international tourism demand forecast and analysis of research methods, in order to explore a suitable for China's current tourism and economic development level, and the model has high prediction accuracy and stability of the tourism demand forecasting, which can improve the tourism policy science, tourism investment direction accuracy, strategic planning and Tourism rational allocation of tourism resources, the tourism industry of our country is to track and make efforts to become tourism power.

To develop the tourism development strategy and decision making are dependent on the scientific tourism demand forecast, accurate demand forecasting can avoid the tourism oversupply caused by repeated construction and waste of resources, can be greatly reduced due to low demand exceeds supply caused by tourism service quality and tourism reception overload phenomenon. Through scientific forecast more accurate, it can be better for the national tourism administration departments to formulate policy, tourism enterprises and related enterprises in the allocation of resources and reasonable development of tourism planning to provide reference, in order to achieve the development

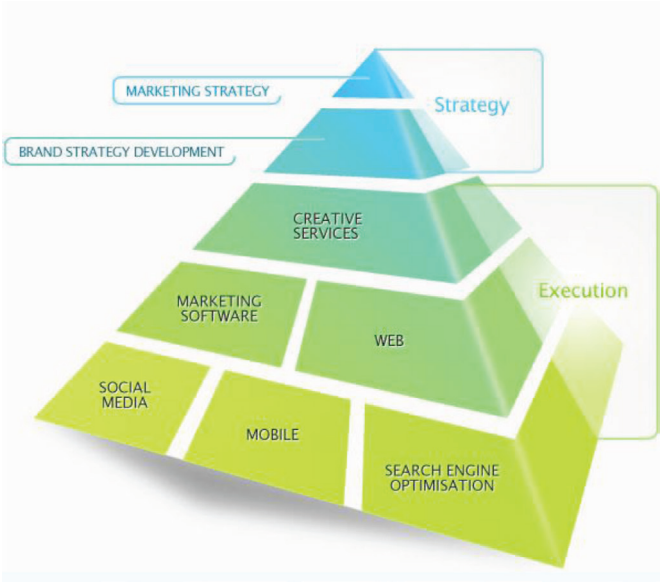


Figure 5 – Tourism development strategy

of the tourism industry benefits greatly improved. Research results and conclusions can effectively solve the problem of low accuracy of domestic tourism demand forecasting and weak applicability, and can effectively improve the domestic tourism demand forecast accuracy and stability, provide a reference direction of development in order to improve the investment policy of China's Tourism Management Department of science, tourism and tourism resource allocation. Provide suggestions for healthy and sustainable development of China's tourism industry, has important practical significance.

3.2. Tourism main factors

Although the domestic tourism residents travel rate and per capita tourism spending is low, but the real development of domestic tourism, but also has a considerable potential. From the demand side, the main factors of the development of domestic tourism include:

- ***Resident income:*** More than 20 years of reform and opening up the income of residents increased, which has long been an indisputable fact. The increase of income of urban residents is mainly reflected in the increase in wages of workers. The steady increase in the income of residents, so that residents meet the basic needs of the consumer, the ability to pay for the development and enjoyment of consumption demand. However, because the income of rural residents is much lower than that of urban residents, their actual consumption is subject to greater restrictions. At present, the large and medium-sized cities and the eastern coastal economically developed areas are the largest and most important source of domestic tourism.
- ***Free time:*** China started working on a Friday day in the national staff and workers, which is an important measure to integrate with the world's developed countries for 40 hours a week. This is only one day off for the original vacation is difficult to achieve in the development of tourism brings an excellent opportunity. It is because of the increase in free time, the domestic emergence of the "weekend" hot. Although the annual tourists did not increase too much, but on holiday, the tourists in the implementation of the long distance travel time that people are likely to go further, stay longer, more tourist attractions, enjoy more tourist experience. This is a new upgrade of the domestic tourism in the condition of the increasing number of residents can freely control time, so that domestic tourism to a new height. In short, the "Golden Week" reflects the increase in the free time of the residents, has played a very good role in the development of China's domestic tourism.
- ***Residents consumption concept:*** In general, the development of domestic tourism is closely related to the development of social economy. The improvement of social productivity level, the strong economic growth brought about the gradual prosperity of the domestic tourism market. The sustained growth of the national macro economy, on the one hand, make the people's income increase; on the other hand, it brings the improvement of the whole social economic living environment, which makes the rapid development of transportation, post and telecommunications, catering and other services. On the other hand, residents choose tourism consumption or not, but also depends on my consumer awareness. Based on the impact of modern international consumer trends, enjoy the natural, enjoy the life of fashion consumption, more and more people to accept the high income.



Figure 6 – Tourism development trend

4. Evaluation index system of tourism service management

Tourism evaluation index system of sound, contribute to reinforcing the positive externality of tourism environment, contribute to the enhancement of the main tourism economic situation of integrity transparency, to strengthen the sense of integrity of tourism enterprises, promote the enterprise to strengthen their credit management, to create a good atmosphere for the healthy development of the tourism industry, contribute to building a harmonious society the. The evaluation index system of evaluation mechanism and evaluation personnel engaged in the work on the basis of evaluation, but also to measure the results are objective and fair ruler, it is directly related to the assessment of the seriousness, authority and scientific evaluation system, is the soul, therefore, to establish the evaluation index system of integrity, must take the correct principle guide, only in this way, in order to ensure the objective and fair evaluation results.

Overall principle: The evaluation index system of the integrity of the content to determine the starting from system theory, system elements reflect the integrity of conditions affecting the tourism service and management, it is necessary to consider the level of evaluation factors, but also to consider the evaluation factors of coverage. In this way, it can not only avoid the repetition of the evaluation indexes, but also can achieve the requirements of the overall good faith evaluation.

Scientific principle: The tourism service and management should be based on the information economics theory and statistics theory, combined with the characteristics of tourism enterprises, using the existing of other domestic industries, advanced regional integrity evaluation index system and general international credit evaluation index system and measurement methods, the proposed method of tourism credit evaluation.

Pertinence principle: Integrity evaluation index system for tourism services and management of the dual characteristics of the design. Selection indicators should also

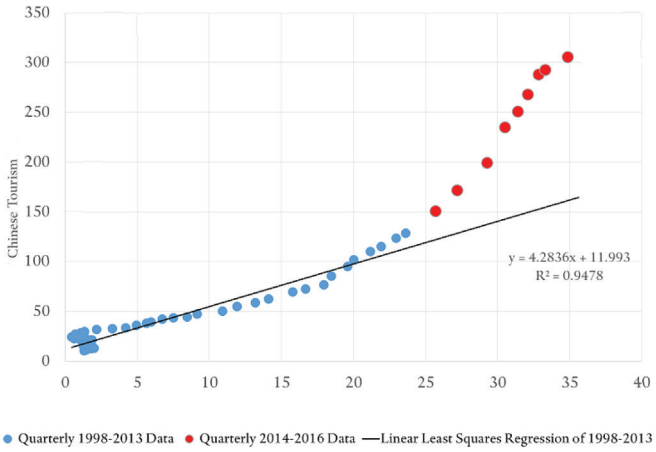


Figure 7 – Tourism data prediction

pay attention to the past, future, future, development and other aspects of the credit evaluation. This is determined by the characteristics of the tourism enterprises.

Operational principle: The establishment of the index system must be applicable, easy to operate, not only have their own characteristics, but also consider the international practice.

From the characteristics of the tourism industry, on the basis of extensive research, combined with the public sector performance evaluation indicators of the "4E": economy, efficiency, effectiveness, justice. Using the expert scoring method combined with the multi-level index system and the multi factor analysis method, finally construct the evaluation index system of tourism service and management integrity (see Table 1).

index	First order index	Second order index
Evaluation index of tourism service management	Function index	Management level
		Economic credit
		Human resource management
		Growth ability
	Mass index	customer satisfaction
		Staff integrity
		Social credit
	Performance index	Economic performance
		Social results
	Environmental index	business environment
		System environment

Table 1 – Tourism service evaluation index

5. Conclusion

Tourism demand forecasting is very important to the role of strategic planning and policy for the development of tourism areas, so the prediction of the number of domestic tourism demand, provide important theoretical support for the healthy development of the domestic tourism industry will be in china. The fuzzy time series model to the field of tourism demand forecasting for the little use of domestic tourism demand forecast analysis, according to the original interval prediction model in the modeling process of the division, the technology of improved clustering algorithm to solve this problem, and made a new fuzzy time series forecasting model, through the empirical results obtained. The improved prediction model can not only reflect the original data in the distribution field, greatly simplifies the calculation, but also improve the stability and accuracy of the forecast results. The factors that affect the survival and development of tourism enterprises in addition to the size, management, talent, the fourth factor is the good faith. The establishment of tourism services in China and the management of credit evaluation index system, based on the evaluation results, the credibility of discipline incentives for trustworthy persons, is the need to regulate the management of the industry and the order of the tourism market, is also an important measure to build tourism power.

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Software Design of Online Learning System based on Hadoop Distributed System

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Abstract: Cloud computing has changed the modern education model. Any educational institutions can share teaching experience through the global online learning resources based on unlimited network resources. By collecting the data generated by the learners in the process of network learning, we construct a learning analysis system based on the distributed Hadoop based on cloud computing technology. Application of cloud computing and big data analysis of online education platform, companies can improve service content, improve the quality of personalized service, while achieving tracking services, precision services, knowledge related services.

Keywords: Software design, Hadoop, Distributed system, Learning system

1. Introduction

With the increasing development of the Internet, people began to "through the information technology and Internet technology for content dissemination and rapid learning", that is, to accept online education (Bhushan, 2014). Moore proposes that online interactive activities through various forms can inspire online learners, effectively reduce the distance between learners and the sense of loneliness (Dong, 2015). Hiltz believes that all kinds of interactive activities are the key factors for students to learn online. Guna believe that learners through interactive media to achieve the level of interaction, a direct impact on the success of online learning. Online instructional interaction hierarchy tower theory model, the data of online education interaction began from the lower to the advanced analysis process. By using the social network analysis method, the interaction model and the structural data of the online teachers and students are analyzed and studied (Essinger,2013). With the help of computer and network technology, the development of online education analysis system, the systematic evaluation of students and teaching resources. Using cloud computing technology to build an online learning support service system, we can see that building a high level of interactive activity system is an important way to promote the development of online education (Fang,2013; Jiménez, 2015). At present the construction of online education interaction analysis system did not involve the analysis of unstructured data, which is currently a key factor restricting the development of online education, so the use of big data technology to realize acquisition, identification, analysis of the data mining and

information value, find hidden aspirations and predict the trend of learning services. In order to guide the improvement of online education services, to achieve the two-way balance between online education services and learners' needs (Huang, 2014; Gonçalves et al., 2015). This paper is based on the demand analysis of the construction of online education, online education interaction model based on big data and cloud computing technology, focuses on the interactive platform, the use of big data technology to dig the interactive data, solve the drawbacks of the current online education interaction, online interaction to achieve the perfect.

Cloud computing has a new generation of online education system of the foundation, it has changed the modern education mode, infinite cyber source based on any educational institutions of learning resources sharing teaching experiences through the global online. Free network open class, the new business model, which attracts the world's attention, many learners are eager to get the world's elite free courses, many learners register or participate in MOOC learning. Through the acquisition of learning data generated in the process of MOOC network computing technology in a Hadoop open source framework to compile and run the application of distributed large-scale data processing to construct a learning analysis system based on cloud, using the system to analyze the status of online learning, help MOOC service providers to improve class rate.

2. Cloud computing and big data

2.1. Big data

The definition of big data is the information and content of unstructured large, from "infinite" activities on the Internet, the general nontraditional sources, such as the web log, click stream, social media, email, sensor, image and video (Ju, 2014). To analyze and make use of the real-time information of large data can provide a great opportunity for related products, and even the political decision-making services. Some online education can benefit from big data, the sentiment analysis, activity analysis, fraud detection can be carried out through data mining, analysis and study of big data binding plays an important role in online education in the future.

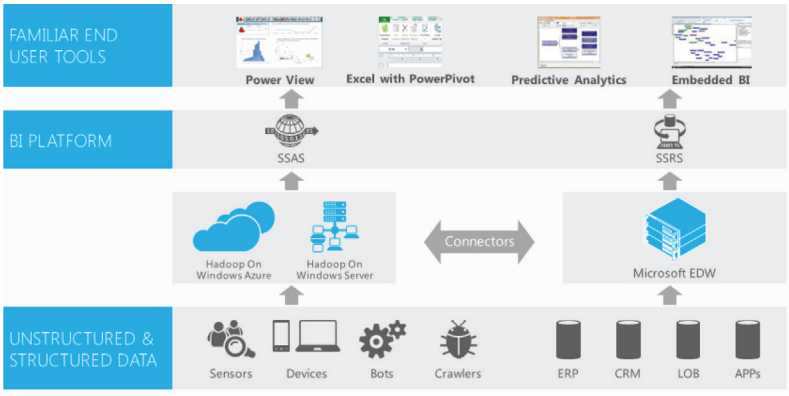


Figure 1 – Hadoop distributed processing

Hadoop can perform distributed processing of massive data; it is the core of HDFS and Reduce Map. A number of data nodes and a node name composed of HDFS, mapping of the relevant documents by the client access management, file or directory management, data block and corresponding data nodes are responsible for the management of the name node, each node as a set of a data node, which is responsible for storage management on the node (Qian, 2014). Map Reduce the task process is divided into Map stage and Reduce stage, Map will change the user input data to key/value pairs form through the user-defined mapping process into a set of intermediate key value pairs set. Reduce is on the middle of the intermediate temporary keys as input for processing, and the results of the final output.

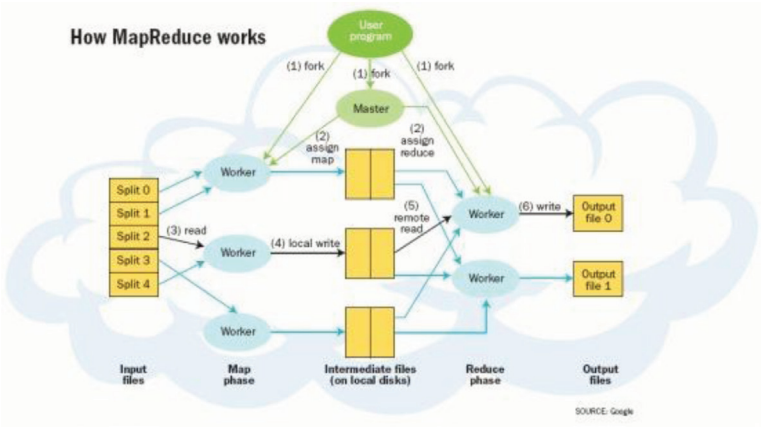


Figure 2 – Map Reduce

2.2. Cloud computing

Cloud computing is the development of distributed processing, parallel processing and grid computing, or the business concepts in computer science. The basic principle of cloud computing is distributed in a large number of distributed computers through the calculation, rather than a local computer or a remote server, enterprise data center operation and the Internet will be more similar. This enterprise can switch resources to need the application, according to demand access to the computer and storage system. This is a revolutionary move, for example, this is from a single generator mode to the old power plant centralized power supply mode (Qiong, 2013). It means that computing power can be used as a commodity circulation, like gas and electricity, convenient use, low cost. The biggest difference is that it is transmitted through the Internet. In the domestic and foreign well-known IT enterprises are to develop and promote cloud computing, such as Google launched Google Apps services, to postpone the Amazon Elastic Compute Cloud (EC2) services, IBM launched the “blue cloud” plan, China launched the Cloud Computing Oriented “sea of clouds” operating system, preliminary cloud computing products have been put into formal the use of cloud computing, but is still in the stage of development, the related technology is not mature enough.

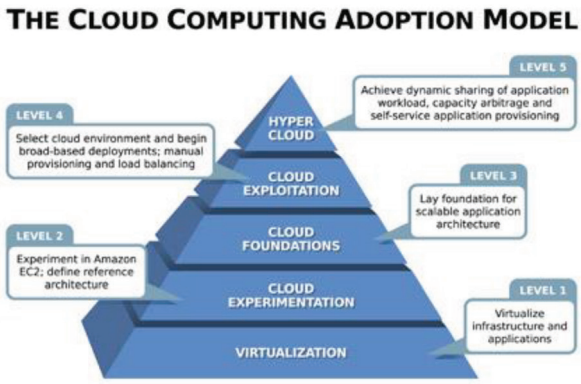


Figure 3 – Cloud computing

Cloud computing needs to process and analyze the distribution and massive data. Therefore, the data management technology must be able to manage a large number of Data. Cloud computing data are massive, heterogeneous, non deterministic characteristics, need to adopt effective data management technology to analyze and process the data and information, build a distributed data storage system is highly available and scalable, the cloud computing system in data management technology is mainly Google GFS, BigTable, MapReduce data management technology and the Amazon Dynam. Cloud computing features in data is mainly manifested in the following aspects:

1. ***Massive nature:*** In recent years, with the rise of the Internet of things applications, the sensor is used to collect data. With the expansion of the scale of this application and applied in more and more fields, the amount of data will show a trend of explosive growth. How to effectively improve the technology and method of existing or proposed new technology and method to efficiently manage and deal with these data will be the key to extract information from the data and further integration, reasoning and decision making.
2. ***Heterogeneous:*** The application of a variety of computing in the cloud, different industries in different areas in the stage of data acquisition equipment, means and methods are different, the data in the data form and data structure is also different. There are different types of sensors, such as carbon dioxide concentration sensor, temperature sensor, humidity sensor, sensor in different categories the capture, transfer the information content and format of information is different. The above factors lead to data access, analysis and treatment of a variety of ways. Multi-source data lead to data with different points, different categories have different data formats, resulting in structured data, semi-structured data and unstructured data coexist.
3. ***Non deterministic:*** The uncertainty of data in cloud computing has obvious characteristics, mainly including the uncertainty of the data itself, uncertainty

and query semantic matching analysis of uncertainty, and so on. In order to obtain accurate information object, so that people more comprehensive expression and reasoning.

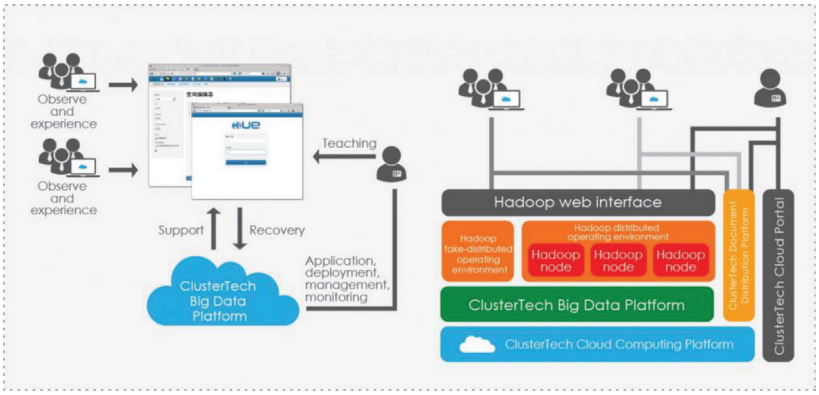


Figure 4 – Cloud computing platform

3. Online education platform based on Cloud Computing

3.1. MOOC online education platform

MOOC is a massive open online courses, namely: Massive, refers to the learning of the course registration and access number; Open refers to the learning needs of learners, can on-line learning; Online refers to the learning time and place is not restricted, open 24 hours, through the network industry, discussion, interaction and evaluation of relevant knowledge; Course, MOOC curriculum design is similar to the university courses, but MOOC courses will be re decomposition, re recycling, so as to adapt to the online education.

MOOC as a new teaching model, it will be the curriculum re decomposition, re - recycling, so that it can adapt to online education. It mainly has the following several aspects of the characteristics.

1. ***The change of teaching idea:*** The "Teacher centered" is the traditional current education philosophy, MOOC is the "student centered", flipping the classroom, the teacher just the tutor, network classroom teacher-student interaction is the communication between places, by providing appropriate teaching materials to guide learners, learners can according to individual needs, learning and rhythm control the way, will work hard, diligent, active and personalized involved, and get the desired knowledge.
2. ***Change of teaching scale:*** The traditional university courses generally only tens to hundreds of learners, and a course Mu hundreds of thousands of people, is a course with a maximum of 240000 students participate in MOOC, completely broke the class size limit, breaking the traditional concept of teaching mode in class.

3. ***Change in learning:*** Traditional learners in accordance with the syllabus of the course to learn, lack of flexibility. MOOC learners can according to their own time, the course of the master of the situation, the use of time to learn, self control of learning progress, the completion of the corresponding curriculum.
4. ***Open change:*** The traditional university is in the classroom, laboratory, library and other places to learn, and the corresponding course between each university is not open to the outside world. MOOC learners with a computer or a mobile terminal, as long as the Internet, you can learn all kinds of high-quality courses, and communicate with learners from around the world, these MOOC curriculum resources are open to all.
5. ***Changes in the way of learning:*** The traditional education in 45 minutes as a unit of classroom teaching, MOOC video course was cut into 5-15 minutes of micro course, learners can use online resources and some additional learning materials, and found in the course of teaching through many small problems, and on the platform directly put forward their own ideas and doubts. There will be teachers and students to discuss or provide answers, learning interest and initiative learning will be greatly improved.

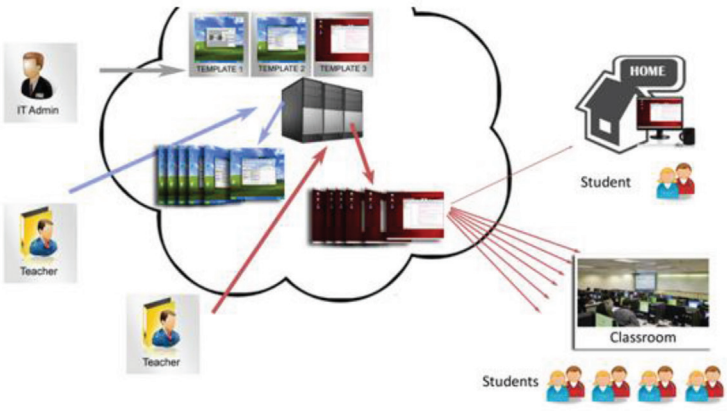


Figure 5 – Cloud computing education platform

3.2. The basic hardware configuration

In this paper, we use a minimal set to illustrate the specific process of cloud environment construction. The Hadoop cluster needs at least 3 servers, each server is configured with 4GB memory, 360GB disk space, and ubuntu12.10 operating system. In HDFS Hadoop environment, the server node is divided into the name node and data node, the name of the node is only one, data nodes can have more than one. For MapReduce cloud computing, server nodes can be divided into JobTracker and TaskTracker JobTracker, which is only one, TaskTracker can have multiple. Among them, 1 servers deployed as a named node and the MapReduce HDFS of the JobTracker; the other 2 servers deployed for the data node and the MapReduce HDFS TaskTracker Java JDKl.60 and above.

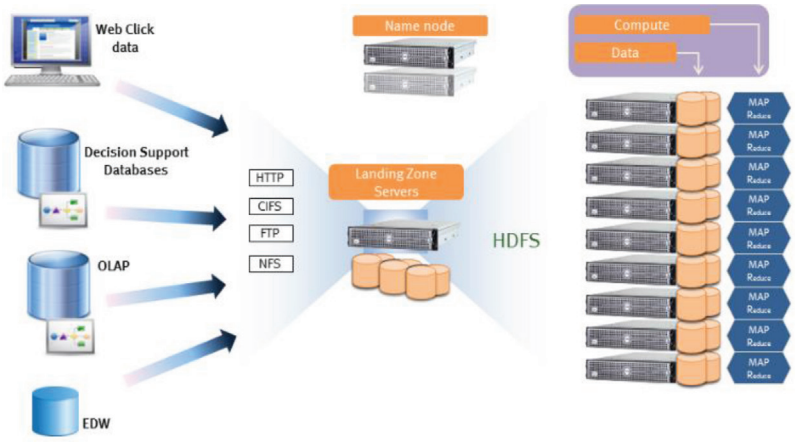


Figure 6 – Hadoop deployments

3.3. Cloud platform environment settings

Hadoop cluster is the name of the node through the SSH (SecureShell) to start and stop the process of the guardian of the node. Configure SSH to use public key authentication without password to use no password authentication of public key, all in the cloud computing no longer need to enter the password to execute commands between nodes, so the SSH authentication configuration of this step is very important.

Hadoop requires that all computing nodes on the deployment directory structure is exactly the same, and there is an account of the same user name. Cloud platform of the 3 machines have a CCEA account, the main directory is / home / ccea.

The configuration defines the required in Hadoop conf / directory Hadoop site.xml, its value will override the default Hadoop value in default.xml, can be completed according to the actual needs of the custom. Cloud cloud education network platform in the Hadoopsite.xml settings are as follows:

< property>
< name > hadoop. tmp. dir < / name >
< value > / root/hadoop/data</ value >
< description >a base for other temporary
Directories < /description >

< property >
< name > fs. Default. name < / name >
< value > HDFS: / / node01:9000< /value >
< description > a base for other temporary
Directories < /description >

4. Online education interactive platform application advantage

The combination of cloud computing and big data plays an important role in the development of online education, not only to promote the development of modern education, but also to enhance the core competitiveness of online education, and to maintain the healthy development of online education.

1. To achieve personalized precision services

Online education platform services to the core of resources to the user as the core of the personalized service change, to provide personalized services for different users. Study on online education platform users of cloud computing and big data applications to strengthen, and based on the analysis results, to improve services, enhance the quality of personalized service, complete tracking service for users, service, knowledge service platform precise association. Analysis of the data source is the same, because of different needs, the results will be different, the services provided are different; the same needs, for different individuals, analysis of different data sources, different results, provide the services are not the same. Try to gain insight into online learners and online instructors in order to drive the development of online education.

2. The trend of educational development and the change of hot spots

Through the big data and cloud computing technology, changes the situation of the passive update teaching resources, according to the needs of online learners to actively update resources, enhance the role of online education platform. Not only to provide online learners with the needs of learning resources, but also for online teachers to provide more quality of teaching resources to provide research basis. Interactive online education platform through collecting and sorting, analysis, mining depth and summary of user data, analysis of the changes of development in the field of education and focus on the macro view, faster to insight into the latest learners' interest, progress and related content, update the online platform for learning resources, and ensure the real-time leading and learning content.

3. Improve the management ability of the interactive platform for online education

Application of cloud computing and big data online education interactive platform for specific application data needs, to achieve rapid, timely and effective response. To adapt to changes in demand and growth, the platform has high performance expansion and expansion stability, efficient processing of various types of data, and on the basis of making full use of their own data value, realize the transformation of data assets from cost center to profit center. Through the integration of data assets, standardization of data assets, the formation of flexible and extensible and easy to update, control, isolation, environmental protection and efficient analysis of data management platform, implementation support standards development, user service, diversified development of a variety of application support mode, form the basis of data and application data are loosely coupled, heterogeneous level two data management level. At the same time, so that online education institutions can control their own data assets, and comprehensively enhance the platform's ability to manage the data information.

5. Conclusion

Information technology can promote the education of revolutionary change, cloud education advocates information architecture and interactive electronic classroom + Mobile Internet terminal + cloud services platform mode, the architecture has been generally recognized by the industry. This paper studies the key technologies of cloud platform and introduces the "cloud education network environment and the system deployment process, the practice and development direction of the application are discussed, in order to promote the practice of education cloud and application demonstration, explore the new mode of digital school. With the rapid promotion of the MOOC project in the world, study and analysis of automatic identification system of Hadoop and Map Reduce applications to the unfinished "learners also can continue to study on the future can be combined with related sites in depth data mining, and through the user interface for MOOC service providers can use the analysis system to adjust teaching strategies, and improve the class rate.

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Internet Penetration and Entrepreneurship in China: An Empirical Analysis Based on the Second Economic Census

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Abstract: The development of information technology represented by the Internet has greatly changed people's lifestyle, and also has a broad impact on economic activities. Based on the 2008 economic census data of China, this paper investigates the impact of Internet penetration on entrepreneurship in service industries. The results show that the popularity of Internet has significantly promoted the firm entry of private companies. Compared to consumer services, the Internet plays a greater role in producer services. We also find a "complementary" relationship between Internet and the institutional environment in facilitating the creation of new firms. In the context of "public entrepreneurship, mass innovation" initiated by the Chinese government, our results have important implications for the policymakers.

Keywords: Internet Penetration, Firm entry, Entrepreneurship, Economic Census Data

1. Introduction

Information technology plays a very important role in promoting productivity (Jorgenson, 2008). The popularity and wide application of the Internet has further expanded the impact of information and communication technologies(ICT)on economic development. Over the past decade, the rapid development of the Internet has profoundly changed people's economic and social life. By June 2016, the number of Chinese netizens has reached 710 million, the Internet penetration rate is 51.7%.[1] People's daily life of China-the biggest developing country, is being gradually changed by the internet.

The impact of the internet on economic activities can be easily felt, but for various reasons, the Internet's contribution to economic development has not been fully discussed. The Internet brought the IT revolution, greatly changed the way of production and the way of market organization. As Schumpeter (1911) argued, entrepreneurship is a key part of the "creative destruction" process, which is very important for the continued dynamism of the modern economy (Schumpeter, 1911). It is also being increasingly recognized that entrepreneurial activities play a vital role for the success of one economy (Djankov, 2006).

[1] Data source : China Internet Network Information Center (CNNIC).

Entrepreneurial activities can affect a country's technological development, the generation of most new technologies is not driven by big companies, but small businesses(Huang, 2011).Entrepreneurial activities can not only promote economic growth (Hause and Du Rietz, 1984), but also make up for the recession (Fritsch and Kritikos et al., 2015).A recent study suggests that the spillovers of knowledge may not be completed automatically, as assumed by endogenous economic growth theory, but require some mechanisms. Entrepreneurial activity is an important channel for accelerating knowledge spillover and commercialization of knowledge (Acs and Audretsch et al., 2012).

The Internet allows high-speed information flows, can expand the scope of the market, improve market transparency, lowered transaction costs can reduce entry barriers and thereby increase the entrepreneurial activities. Litan and Rivlin (2001) believes that the Internet has the potential to increase productivity growth mainly by three ways: reducing transaction costs, increasing management efficiency and increasing competition. According to their estimates, the total cost saving translates into an annual contribution to productivity growth of0.2-0.4 percent. Freund and Weinhold (2004) believes that the Internet reduces the costs of entering new market, through organized exchanges with numerous buyers and sellers, and through powerful search engines which enable buyers and sellers to find each other at a low cost.

Lehr and Osorio et al. (2005) studies the economic effects of broadband using a cross-sectional panel data set of communities across the US. They find that between 1998 to 2002, communities in which broadband was available by1999 experienced more rapid growth in number of businesses. However, this study did not address the endogeneity problem. Cumming and Johan (2010) use the "SuperNet" plan for rural communities in Alberta of Canada in 2000 as a natural experiment, they find that the government–provided Internet spurs entrepreneurial activities in general. Similarly, by using the American ZIP code level data, Kim and Orazem (2014) find that the availability of broadband has a positive impact on the entry of new firms in rural areas, and this effect increases with agglomeration economies.

The above literature all uses the indicator "whether the Internet is available" to measure the impact of the Internet on entrepreneurship, moreover the existing studies are mainly using the data from developed countries. This paper aims at investigating the impact of Internet penetration on China's entrepreneurial activities. In comparison with agriculture and manufacturing industry, the service industry is more information-intensive. And the development of the service industry is an important indicator of the economic development of a modern society. For the above reasons, our paper focuses on the entrepreneurial activities in service industries. Merging the 2008 economic census data of China with city-level data, we conduct an empirical analysis of the impact of internet on the entrepreneurship in service industries. Furthermore, we investigate the heterogeneous impact in different service types and under different institutional environments.

2. Methodology

2.1. Econometric Model

The model is as follows:

$$\text{Entry}_{ij} = \text{constant} + \beta_1 \text{Internet}_i + \beta_2 X_{ij} + \beta_3 \text{Province}_i + \beta_4 \text{Industry}_j + \varepsilon_{ij} \quad (1)$$

Where a subscript i indicates city i, a subscript j indicates industry j, and uppercase coefficients indicate vectors. The dependent variable $Entry_{ij}$ $Entry_{ij}$ is the ratio of new firms to total firms of industry j in city i. The core explanatory variable $Internet_i Internet_i$ indicates the Internet penetration rate of city i. $X_{ij} X_{ij}$ is the vector of covariates, which is used to control the city characteristics. The industry indicators correct for industry-specific effects. Similarly, the province indicators correct for province-specific variables. ε_{ij} ε_{ij} is an error term. Coefficient $\beta_1 \beta_1$ is the estimated effect of the Internet on the entrepreneurial activities, which is our focus.

2.2. Data and Variables

1. Data Source

The firm-level data used in our analysis are from the second economic census of China in 2008, which covered all the 31 provinces, autonomous regions and municipalities of China.[2] The advantage of the economic census data is that all firms are covered regardless of their size, so there is no problem of sample selection. In our paper the dependent variable is firm entry rate, which is the ratio of new firms to the total firms. We define new firms as the ones whose age are from one year to two years. Since the deadline of the second economic census is December 31, 2008, so firms opened in the year of 2007 are defined as the new firms.Because there are many zero values for firm entry rate at the city-industry level, we use a Tobit regression left-censoring at zero.

We exclude transport, storage and postal services, which strongly rely on transport infrastructure, as well as industries of science research, technical services and geological exploration, utility and public sectors. So limit the sample to service corporations, the two-digit codes of which are 60 to 74.[3] That is information transmission, computer services and software industry, wholesale and retail, accommodation and catering, finance, real estate, leasing and business services. In view of the global financial crisis in 2008, firms starting-up in 2008 are removed.

Moreover, we pay special attention to private firms. Here private firms include private-owned enterprises, private partnerships, private limited liability companies and private limited companies. Private firms account for 70.32% of our sample. The data of city-level characteristics are from "China City Statistical Yearbook 2008", including 286 cities at prefecture-level or above.[4] Considering that in China non-agricultural industries are mainly concentrated in municipal districts, the data of city-level characteristics is the data of the municipal districts, correspondingly, only firms located in these districts are retained for our analysis.

2. Variable Definition and Description

The core explanatory variable is Internet penetration rate, which is defined as the number of Internet users per 100 inhabitants. To mitigate endogeneity, Internet penetration rate

[2] To our knowledge, the data of the second economic census it's the only data in China we could use to analyze the entry of firms.
[3] The classification of industry in this paper is based on the <National Economic Industry Classification GB / T4754-2002>made by the national Bureauof statistics of China. There is no corresponding industry for code 64.
[4] The 286 cities include Beijing,Shanghai,Tianjin and Chongqing.

in 2006 is used as the main explanatory variable and other variables are based on data of 2007.

The control variables in the econometric model are mainly divided into two categories, industry characteristics and city characteristics. For the former,we include(1)industry dummy variables, to control the heterogeneity of different industries;(2)industry share, which is the ratio of the revenue of one industry in a city to the total revenue of all firms in a city.

For city characteristics, we control (1) province dummy variable, which is used to capture the difference in geographical environment and policies of the province where the city is located in. (2) GDP per capita, which is used to capture the economic development level of each city. (3) population and (4) population density, they may affect the market size and the demand, also the competition of the markets. The net effect is uncertain, which can be estimated only using the econometric model. The population density is measured by population per square kilometer of the built-up area. (5) Labor force, which is represented by the proportion of employees in total population at the end of a year. (6) Human capital, since there's no perfect indicator, we use the number of full-time middle school teachers per capita as a proxy. (7) Industrial structure, which is captured by the ratio of the value added in tertiary industry to secondary industry. (8) Road area per person, which is used to capture the difference in public infrastructure. (9) Urbanization, since China has a large agricultural population, urbanization is defined as the proportion of non-agricultural population to the total population. The summary statistics are reported in table 1.

Variable	Obs	Mean	Standard deviation	Min	Max
Entry rate(%)	3822	15.41	13.48	0	100
Entry rate of private firms(%)	3822	9.308	10.81	0	100
Internet penetration rate	3768	11.47	11.60	0.823	118.3
Industry share	3822	0.0750	0.124	0	0.816
Industrial structure	3782	0.927	0.526	0.0950	3.681
GDP Per capita(thousand yuan)	3796	30.90	20.50	3.836	135.7
Population(10 thousand)	3809	132.0	163.8	15.30	1526
Population density (10 thousand people per square kilometer)	3809	1.664	1.009	0.243	8.331
Labor force	3809	0.171	0.0970	0.0190	0.919
Human capital	3809	4.325	1.076	2.246	8.576
Road area Per capita (square meters)	3809	9.260	6.225	0.0200	53.49
Urbanization	3809	0.615	0.244	0.131	1

Table 1 – Descriptive Statistics

3. Empirical Results

3.1. Basic Regression

In Table2, we present the basic regression, estimated using a Tobit regression with censoring at zero. As the left part of Table 2 shows, the coefficient is not very significant when the dependent variable is the entry rate of all firms. In the right part of table 2, the coefficient is very significant ,suggesting that the Internet penetration has a positive

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All firms				**Private firms**			
Internet	0.041*	0.071*	0.036	0.028	0.091***	0.101***	0.089***	0.081**
	(0.026)	(0.036)	(0.037)	(0.037)	(0.023)	(0.032)	(0.034)	(0.034)
Industry share	-4.652#	-4.736#	-4.702#	-4.719#	-7.117***	-7.366***	-7.337***	-7.314***
	(2.896)	(2.890)	(2.877)	(2.896)	(2.089)	(2.084)	(2.088)	(2.107)
Industrial structure	0.034	-0.236	-0.520	-0.544	0.172	-0.022	-0.119	-0.144
	(0.618)	(0.647)	(0.647)	(0.646)	(0.599)	(0.627)	(0.627)	(0.624)
GDPPC	0.043***	0.049***	0.023	0.027#	0.070***	0.068***	0.059***	0.063***
	(0.016)	(0.018)	(0.018)	(0.018)	(0.016)	(0.018)	(0.018)	(0.018)
Population		0.006***	0.009***	0.009***		0.007***	0.007***	0.008***
		(0.002)	(0.002)	(0.002)		(0.002)	(0.002)	(0.002)
Population density		-0.584#	-0.334	-0.693#		-0.669**	-0.582*	-0.949**
		(0.360)	(0.364)	(0.428)		(0.333)	(0.338)	(0.388)
Labor force		-10.705**	-12.785***	-9.461*		-7.274*	-8.034*	-4.883
		(4.667)	(4.683)	(4.855)		(4.252)	(4.256)	(4.440)
Human capital		-0.078	-0.322	-0.412		0.046	-0.039	-0.128
		(0.351)	(0.344)	(0.346)		(0.306)	(0.298)	(0.301)
Road			0.290***	0.282***			0.100#	0.093#
			(0.063)	(0.062)			(0.064)	(0.064)
Urbanization				-3.692**				-3.630**
				(1.850)				(1.500)
Province	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	8.133**	6.072#	6.411#	8.099*	0.158	-3.131	-3.010	-1.308
	(3.278)	(4.187)	(4.171)	(4.199)	(2.890)	(3.709)	(3.695)	(3.711)
Observations	3741	3741	3741	3741	3741	3741	3741	3741
pseudo R2	0.021	0.022	0.023	0.023	0.074	0.074	0.075	0.075

Notes. Robust standard errors in parentheses. Significance at the #15% level,* 10% level,**5% level,*** 1% level.The same below.

Table 2 – The Impact of Internet Penetration on Firm Entry

impact on private firms entry ,which is entrepreneurship . Moreover, the coefficient is much larger than that for all firms.

In columns 5-8 of table 2, the coefficient of industry share is negative, and is significant at 1% level, it suggests that the larger the industry share, the lower the entry rate of private firms. Table 2 shows that GDP per capita and population has a positive impact, and is significant at 1% level. In addition, the coefficient of population density is negative and is very significant, this suggests that the negative effect of population is bigger than the positive effect, then the net effect is negative. In general, the econometric model has a stronger explanatory power for the private firm entry. It suggests that the internet penetration has a positive impact on the creation of private firms.

3.2. Instrumental Variable Model

The associations between Internet and entrepreneurship reported before may suffer from different sources of endogeneity bias. One concern is reverse causality, in that new firms may lead to more demand for the Internet. In addition, although we tried to control the various factors that may affect firms entry as possible as we can, but still there may be missing variables, which may cause the estimation results biased.

In order to alleviate the problem of reverse causality and omitted variables, we adopt the method of Czernich and Falck et al.(2011), using the fixed telephone penetration rate in the year before the Internet appear as an instrument.[5] The national backbone network of CHINANET was completed in January 1996, and was officially opened to the public since then.[6] Therefore, this paper uses the fixed telephone penetration rate in 1995 at the city level, as the instrumental variable for Internet penetration. The fixed telephone penetration rate is calculated as the number of fixed telephone users per 100 people. The reasons for using it as the instrument are as follows. First, the most commonly used Internet standards is xDSL, which rely on the copper wire of the voice telephony network as the transmission medium. So there is a correlation between the fixed telephone penetration rate and the Internet penetration rate. Second, the fixed telephone penetration rate in 1995 is a predetermined variable. There is empirical evidence that after 2000 the fixed telephone infrastructure has shown a negative effect on economic growth (Zheng et al., 2014). Therefore, we believe that the fixed telephone penetration rate in 1995 will not affect firm entry in 2007 directly through affecting the fixed telephone penetration rate after 1995.In addition, since the mobile phone and fixed phone are based on different signal propagation media. We argue that fixed-line telephone penetration rate in 1995 will not have an impact on firm entry through affecting the mobile phone penetration rate.[7]

The diffusion of a new technology in city i time t is best described through a logistics curve of the following form:

[5] In fact, Czernich et al. (2011) use the voice telephony penetration rate and the cable TV penetration rate as the instrument variables. However, due to the lack of data of cable TV penetration rate at the city level, we don't use this variable .

[6] Please see http://www.cnnic.cn/hlwfzyj/hlwdsj/201206/t20120612_27415.htm

[7] In fact, take the mobile phone penetration rate as the dependent variable, then use equation (2) to run a non-linear regression, we don't get the convergence , which is to some extent in support of our judgment.

$$Internet_{it} = \frac{\gamma_i}{1+\exp(-\beta(t-\tau))} + \varepsilon_{it} \quad (2)$$

Where $Internet_{it}Internet_{it}$ is the Internet penetration rate of city i at time t. $\gamma_i = \gamma_0 + \alpha_1 telephone.$ β, γ and τ jointly determine the highest level of Internet penetration. $\tau\,\tau$ is the inflection point where the growth rate of the diffusion curve reaches its maximum. $\varepsilon_{it}\varepsilon_{it}$ is the error term.

Based on non-linear least squares estimation, we use the fixed telephone penetration rate in 1995 and Internet penetration rate at city-level from 2001 to 2007 to compute counterfactual values of Internet penetration. In the second-stage, we use the predicted Internet penetration rate of 2006 in regression for firm entry. Thus we can exclude the impact of the demand-side for Internet.

	Internet penetration rate
Constant(γ_0)	2.627#
	(1.812)
Fixed telephone penetration rate (α_1)	0.786***
	(0.156)
Diffusion speed (β)	0.958***
	(0.327)
Inflextion point (τ)	2000.941***
	(0.146)
F-test (fixed telephone penetration rate = 0)	25.51
Observations	1586
adj. R2	0.700

Note. Robust standard errors clustered by city in parentheses.

Table 3 – The Diffusion Curve :First Stage of the Instrument Variable Model

The results of the second stage estimation are shown in Table 4. In order to compare with table 2, we show the results of all firms as well as private firms. The results shown in table 4 are in accordance with that in table 2. For all firms, the coefficient of Internet is not significant, and for private firms the coefficient is still significant, even though the significance level is little lower .It suggests that the Internet penetration has a positive impact on the entry of private firms .

4. Further Discussion

4.1. Heterogeneous Impact on Producer Services and Consumer Services

Service industries can be divided into public service (non-market) and market-based services. Market-based services generally can be divided into productive services and

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All firms				Private firms			
internethat	0.053	0.031	-0.006	-0.005	0.120***	0.078*	0.080*	0.081*
	(0.039)	(0.050)	(0.052)	(0.052)	(0.035)	(0.045)	(0.047)	(0.047)
Industry share	-3.611	-3.663	-3.658	-3.672	-5.782***	-5.984***	-5.985***	-5.945***
	(2.927)	(2.924)	(2.923)	(2.941)	(2.077)	(2.068)	(2.068)	(2.090)
Industrial structure	-0.327	-0.694	-0.843	-0.882	0.316	0.154	0.161	0.117
	(0.661)	(0.679)	(0.683)	(0.680)	(0.629)	(0.647)	(0.651)	(0.648)
GDPPC	0.027*	0.026	0.015	0.019	0.055***	0.043**	0.044**	0.049***
	(0.016)	(0.018)	(0.018)	(0.018)	(0.016)	(0.018)	(0.018)	(0.018)
Population		0.007***	0.009***	0.009***		0.007***	0.007***	0.007***
		(0.002)	(0.002)	(0.002)		(0.002)	(0.002)	(0.002)
Population density		-0.218	-0.058	-0.445		-0.465	-0.473	-0.981**
		(0.399)	(0.403)	(0.490)		(0.335)	(0.341)	(0.399)
Labor force		-1.651	-3.461	-1.434		0.672	0.769	3.254
		(4.020)	(4.089)	(4.084)		(3.604)	(3.694)	(3.725)
Human capital		-0.266	-0.371	-0.459		0.091	0.096	-0.018
		(0.344)	(0.343)	(0.345)		(0.290)	(0.292)	(0.295)
Road			0.194***	0.184***			-0.010	-0.022
			(0.064)	(0.064)			(0.061)	(0.059)
Urbanization				-3.303*				-4.249***
Province	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	10.700***	5.975#	5.885#	7.824*	1.527	-4.035	-4.032	-1.504
	(3.262)	(3.979)	(3.976)	(4.077)	(2.817)	(3.502)	(3.502)	(3.585)
Observations	3596	3596	3596	3596	3596	3596	3596	3596
pseudo R2	0.022	0.022	0.022	0.023	0.077	0.077	0.077	0.078

Table 4 – The Effect of Internet on Firm Entry: Second Stage of the Instrumental Variable Model

consumer services. As we focus on the profit-seeking firms, and has removed the public sector from our analysis. In this section, we attempt to examine whether Internet penetration has a different impact on producer services and consumer services.

In our data, the producer services include information transmission, computer services and software, finance, real estate, leasing and business services; consumer services

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Producer services				Consumer services		
Internet	0.123***	0.150***	0.145***	0.134***	0.060***	0.042#	0.012	0.006
	(0.035)	(0.050)	(0.051)	(0.052)	(0.022)	(0.029)	(0.036)	(0.037)
Industry share	-38.458***	-37.180***	-37.549***	-38.536***	1.408	1.589	2.280	2.463
	(9.577)	(9.460)	(9.534)	(9.624)	(1.854)	(1.867)	(1.902)	(1.924)
Industrial structure	0.457	-0.006	-0.041	-0.073	-0.160	0.041	-0.196	-0.216
	(0.939)	(0.989)	(0.995)	(0.990)	(0.521)	(0.544)	(0.491)	(0.490)
GDPPC	0.091***	0.094***	0.091***	0.096***	0.035*	0.023	-0.000	0.003
	(0.023)	(0.027)	(0.027)	(0.027)	(0.019)	(0.020)	(0.016)	(0.016)
Population		0.009***	0.009***	0.010***		0.003#	0.005**	0.005***
		(0.003)	(0.003)	(0.003)		(0.002)	(0.002)	(0.002)
Population density		-0.603	-0.570	-1.034*		-0.777***	-0.569*	-0.838**
		(0.517)	(0.525)	(0.597)		(0.291)	(0.302)	(0.371)
Labor force		-10.199#	-10.509#	-6.685		-2.748	-4.381	-1.934
		(6.699)	(6.710)	(7.056)		(3.466)	(3.578)	(3.592)
Human capital		-0.171	-0.204	-0.318		0.397	0.218	0.154
		(0.458)	(0.462)	(0.470)		(0.374)	(0.307)	(0.302)
Road			0.037	0.029			0.245**	0.240**
			(0.078)	(0.077)			(0.117)	(0.117)
Urbanization				-4.470*				-2.777*
				(2.337)				(1.523)
Province	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.229	-4.094	-4.002	-1.796	8.964***	6.779**	6.973**	8.263***
	(4.457)	(5.675)	(5.675)	(5.726)	(1.979)	(3.184)	(3.068)	(3.071)
Observations	2622	2622	2622	2622	1119	1119	1119	1119
pseudo R2	0.086	0.087	0.087	0.087	0.025	0.027	0.031	0.031

Table 5 – The Heterogeneous Impact on Producer Services and Consumer Services

include wholesale and retail, accommodation and catering industry.[8] Because the previous results show that the Internet penetration has a positive effect only for the

[8] Under the "National Economic Industry Classification GB / T4754-2002"madein 2002 by the National Bureau of Statistics of China , the producer services includes transportation, storage and postal industry, finance, real estate, information technology, computer services and software industry, leasing and business services, scientific research, technical services and geological exploration.

creation of private firms, in this section we will only show the regression results for private firms. As Table 5 shows, the Internet penetration has a positive effect on the creation of private firms in producer services, the coefficient is significant at 1% level. For the consumer services the coefficient of Internet penetration is positive but not significant, and it's smaller than that of the producer services.

It suggests that the Internet plays a bigger role in facilitating the creation of private firms in producer services than in the consumer services. The results imply that the producer services benefit more from the bonus brought by the Internet, such as improved productivity, lowered transaction costs, and accelerated information flows.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Regions with good institutional environment				Regions with bad institutional environment			
Internet	0.090***	0.136***	0.130***	0.126***	0.051	-0.031	-0.025	0.019
	(0.019)	(0.033)	(0.034)	(0.034)	(0.090)	(0.099)	(0.098)	(0.098)
Industry share	-8.304***	-8.900***	-8.901***	-8.897***	-3.840	-4.072	-4.068	-4.062
	(2.652)	(2.633)	(2.638)	(2.650)	(3.347)	(3.398)	(3.442)	(3.506)
Industrial structure	-0.026	-0.659	-0.751	-0.794	0.170	0.258	0.014	-0.097
	(0.590)	(0.650)	(0.668)	(0.668)	(1.030)	(1.041)	(1.034)	(1.028)
GDPPC	0.069***	0.075***	0.072***	0.074***	0.060	0.046	0.006	0.007
	(0.012)	(0.015)	(0.015)	(0.015)	(0.050)	(0.057)	(0.059)	(0.059)
Population		0.005**	0.005**	0.005**		0.011**	0.012***	0.012***
		(0.002)	(0.002)	(0.002)		(0.004)	(0.005)	(0.005)
Population density		-0.648**	-0.611**	-0.768**		-0.704	-0.397	-0.859
		(0.290)	(0.295)	(0.340)		(0.793)	(0.824)	(0.902)
Labor force		-9.626**	-9.941**	-8.836**		-1.073	-1.617	9.941
		(4.419)	(4.401)	(4.443)		(9.378)	(9.422)	(11.188)
Human capital		-0.596*	-0.669*	-0.753**		0.532	0.439	0.367
		(0.355)	(0.354)	(0.364)		(0.476)	(0.457)	(0.456)
Road			0.047	0.044			0.220*	0.218*
			(0.059)	(0.058)			(0.131)	(0.130)
Urbanization				-1.636				-7.374**
				(1.632)				(3.725)
Province	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	2.603	4.594	4.871	6.159#	-2.252	-3.535	-3.560	-1.411
	(2.563)	(3.585)	(3.582)	(3.770)	(4.082)	(4.921)	(4.816)	(5.081)
Observations	2228	2228	2228	2228	1513	1513	1513	1513
pseudo R2	0.089	0.090	0.090	0.090	0.068	0.069	0.069	0.069

Table 6 – The Heterogeneous Effect under Different Institutional Environments

4.2. Impact of Internet under Different Institutional Environments

According to the report by Global Entrepreneurship Monitor(GEM), China's entrepreneurial environment has seen slow improvement in the past decade.[9] In contrast to the developed countries, institutional environment is an important factor affecting the entrepreneurial activities in China.Too much administrative interventions, the imperfect legal system, and the discriminatory financial system, seriously hampered the entrepreneurial activities in China.

Inside China, the institutional environments are different across different provinces. In this section, we try to figure out whether the impact of the Internet will vary with the change in the institutional environment.<Business Environment Index for China's Provinces > by Wang et al. (2013) gives business environment index from 2006 to 2012 for 29 provinces, autonomous regions and municipalities in China. The index includes eight aspects "the government administration, legal environment, tax burden,[10] financial services, supply of human resources, infrastructure, intermediary organizations and technology services,and social environment".2013).This index enables us to analyze the effect of the Internet under different institutional environments.

We divide the provinces into two groups by using the index. If the ranking of one province's index is in the top half, then the province belongs to the "regions with good institutional environment", or it belongs to the "regions with bad institutional environment". Table 6 shows the regression results for the two groups respectively. Similar to the earlier section, here we only report the regression results for private firms.

The results of table 6 show that the Internet penetration plays a positive role in promoting the creation of private firms in regions with good institutional environment, the coefficient is significant at 1% level. But the impact is not significant in regions with bad institutional environment. In columns 6 and 7, the coefficient is even negative, though they are not significant at 15% level. The above results suggest that the Internet and the institutional environment show a "complementary" relationship in facilitating entrepreneurial activities. The better is the institutional environment, the larger the effect of the Internet on entrepreneurship.

Since the index includes eight aspects, we further analyze which aspect is relatively more important. Here we focus on three aspects "government administration, legal environment, financial services". Similarly, we divide the provinces into two groups respectively according to their ranking in the three aspects. The results for regions with good performance in the three aspects are shown in table 7.

As table 7 shows the coefficient of Internet penetration rate in regions with good government administration,[11] is bigger than that in regions with good legal environment and good financial services. The results show that among three aspects, the government administration is relatively more important in facilitating entrepreneurial activities.

[9] Please see http://www.gemconsortium.org/country-profile/51
[10] There isn't the "Tax burden"sub-index until the year of 2012.
[11] In <Business Environment Index for China's Provinces > by Wang et al.(2013), the government administration index includes 4 sub-indices :"Open, fair and just", "government effectiveness", "Reduce unnecessary interventions", and "clean government".

In regions with good government administration, the Internet can play a better role in promoting the creation of private firms. Our results are consistent with recent studies about entrepreneurship in China (Ni and Lu, 2016).

4.3. Robustness Check

To ensure the reliability of our results, we use the Internet penetration rate of 2002 to replicate the previous regressions. Results are shown in Table 8. In view of limited

	(1)	(2)	(3)	(4)	(5)	(6)
	Regions with good government administration		Regions with good legal environment		Regions with good financial services	
Internet	0.156***	0.151***	0.086**	0.078**	0.099***	0.094**
	(0.037)	(0.038)	(0.038)	(0.039)	(0.037)	(0.040)
Industry share	-8.112***	-8.113***	-7.640***	-7.613***	-7.743***	-7.727***
	(2.623)	(2.629)	(2.616)	(2.630)	(2.730)	(2.741)
Industrial structure	-1.369*	-1.393**	-0.800	-0.749	-0.117	-0.108
	(0.710)	(0.709)	(0.729)	(0.730)	(0.890)	(0.891)
GDPPC	0.068***	0.070***	0.074***	0.078***	0.053***	0.055***
	(0.015)	(0.015)	(0.018)	(0.018)	(0.019)	(0.019)
Population	0.004*	0.004*	0.004*	0.005**	0.003	0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Population density	-0.521*	-0.666*	-0.407	-0.602*	-0.614*	-0.734*
	(0.301)	(0.344)	(0.306)	(0.347)	(0.367)	(0.404)
Labor force	-12.040***	-10.788**	-10.604**	-9.069*	-5.878	-4.671
	(4.653)	(4.765)	(4.605)	(4.690)	(4.693)	(5.067)
Human capital	-0.675*	-0.754*	-0.639*	-0.697*	0.051	0.000
	(0.378)	(0.387)	(0.354)	(0.359)	(0.389)	(0.401)
Road	0.045	0.043	0.174***	0.169**	-0.006	-0.007
	(0.058)	(0.058)	(0.067)	(0.066)	(0.062)	(0.062)
Urbanization		-1.621		-2.161		-1.314
		(1.700)		(1.709)		(1.815)
Province	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Constant	8.524**	9.640**	6.784*	7.939**	11.329***	12.113***
	(3.818)	(3.933)	(3.836)	(3.927)	(2.571)	(2.827)
Observations	2030	2030	1973	1973	2197	2197
pseudo R2	0.091	0.091	0.090	0.090	0.080	0.080

Table 7 – The Different Effect under Three Dimensions of the Institutional Environment

	(1)	(2)	(3)	(4)	(5)	(6)
	Private firms		Producer services		Regions with good institutional environment	
internet2002	0.076***	0.067**	0.091**	0.078*	0.104***	0.099***
	(0.026)	(0.027)	(0.041)	(0.042)	(0.025)	(0.025)
Industry share	-6.181***	-6.170***	-28.836***	-29.721***	-7.841***	-7.833***
	(2.069)	(2.082)	(8.929)	(8.986)	(2.618)	(2.632)
Industrial structure	-0.202	-0.245	0.087	0.026	-0.815	-0.863
	(0.632)	(0.629)	(1.003)	(0.996)	(0.673)	(0.673)
GDPPC	0.052***	0.055***	0.079***	0.084***	0.064***	0.066***
	(0.018)	(0.018)	(0.027)	(0.027)	(0.015)	(0.015)
Population	0.008***	0.009***	0.011***	0.012***	0.007***	0.007***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)
Population density	-0.359	-0.683*	-0.361	-0.848	-0.685**	-0.884***
	(0.350)	(0.397)	(0.541)	(0.608)	(0.296)	(0.339)
Labor force	-3.743	-1.101	-2.174	1.782	-5.219	-3.732
	(3.978)	(4.183)	(6.258)	(6.594)	(4.016)	(4.066)
Human capital	0.057	-0.031	0.022	-0.116	-0.614*	-0.726**
	(0.299)	(0.304)	(0.468)	(0.477)	(0.357)	(0.366)
Road	0.085	0.080	0.011	0.004	0.033	0.030
	(0.061)	(0.061)	(0.077)	(0.076)	(0.060)	(0.059)
Urbanization		-3.038**		-4.555*		-2.101
		(1.508)		(2.343)		(1.642)
Province	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-4.553	-2.936	-8.364#	-5.844	2.693	4.374
	(3.577)	(3.621)	(5.562)	(5.642)	(3.466)	(3.649)
Observations	3606	3606	2531	2531	2243	2243
pseudo R2	0.077	0.077	0.089	0.089	0.090	0.090

Table 8 – Robustness Check

space, we only list part of the results.[12] Columns 1 and 2 show the results for private firms, we can see that the coefficient of Internet penetration is positive, and is significant at the 1% level .Columns 3 and 4 show the regression results for producer services is still positive and significant. Columns 5 and 6 show that in regions with good institutional environment the Internet has a positive effect on creation of private firms. All the results in table 8 suggest that our results are robust.

[12] Detailed results are available upon request.

5. Conclusion

With the rapid development of information technology, the Internet has penetrated into almost every aspect of human beings' life, which has profoundly changed people's economic and social life. How does the Internet affect people's economic behavior? For various reasons, however, debates about this question are insufficient This article focuses on the impact of Internet penetration on entrepreneurial activities in China. Entrepreneurship is an indicator of the economic vitality of one country, and also plays an essential role in promoting employment and enhancing innovation capability Currently China's economy is seeing a downward trend, entrepreneurship can make up for the recession and mitigate the negative impact of fluctuations in one economy.

In this paper, we use the 2008 economic census data merging with city characteristics, to investigate the impact of the Internet penetration on the entrepreneurial activities in service industries. We find that the popularity of the Internet has a positive effect on the creation of private firms. The effect is heterogeneous between producer services and consumer services, which is bigger in producer services. Since the institutional environment is different among China's provinces, we further investigate whether the impact of the Internet will vary with the change in institutional environment. We find that Internet plays a bigger role in regions with better institutional environment. To put it another way, there is a "complementary" relationship between Internet and the institutional environment in facilitating entrepreneurial activities. This study can enrich the literature on the economic impact of the Internet and can also supplement empirical studies about developing countries.

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Driver Lane Keeping and Vision Behavior in Fog based on Dynamic Clustering Method

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Abstract: In this study, a field test was undertaken to investigate the visual behavior of a person and their lane-keeping performance when driving in fog. The driver's fixation area in fog was determined from the position of his or her fixation point. We then applied a newly developed method for calculating the visual coefficient and the expected probability of lane keeping. Finally, we analyzed the driver's visual behavior characteristics as they relate to lane keeping. Our results show that, as the visibility reduces, the focus of a driver's gaze gradually shifts from a far point to a point closer to him or her. The range of the retention coefficient is 2.10 to 8.83, which is higher than that in clear weather (0.63 to 1.30), indicating that the driver is concentrated on lane keeping when in fog. The driver's lane-keeping behavior indicates minimal variation and a short period under the conditions of low visibility. This can provide a theoretical basis for driving guidance and the linear design of expressways in fog-prone areas.

Keywords: Traffic engineering, Lane keeping, Test on-board, Driver vision

1. Introduction

Fog reduces the range of a driver's vision and greatly increases danger on the road. It is one of the most common reasons for major accidents. In fog, the task of driving centers mainly on lane keeping and visual search for the way (Chen, 2013). Research on a driver's visual characteristics as they relate to lane keeping in fog is of great significance for expressway safety management and the design of highways in areas that are prone to fog.

Driver lane keeping is divided into two types, namely, visual keeping and visual deviation, with a driver's visual deviation from the road significantly affecting the standard deviation of the driving position (Peng, 2013). Studies of the driver's lane-changing process and the intention window have revealed differences in the curve radius and speed, allowing a driver's intention window time model and lane offset decision model to be constructed (Junyung, 2014). Panos et al. used simulation to study a driver's visual search for different degrees of visibility. Their results showed that the visibility directly affects the effectiveness of the driver's visual search and the distribution of the driver's gaze (Panos, 2010). The lane-changing intent can typically be detected from a driver's eye and head movements before a lane change (Lethaus and Rataj, 2007). Other researchers have

investigated the general environment affecting lane change intention recognition, lane keeping, and distracted drivers' visual behavior, and have addressed the visual behavior in normal weather (Yuan et al., 2013; Ma et al., 2015; Peng et al., 2015; Ji et al., 2014; Chen et al., 2015). Regarding the effect of fog on a driver's visual behavior, studies have addressed a driver's estimation of the distance to the vehicle in front, as well as the target recognition distance, with field tests in fog (Gai, 2014). A driving simulation experiment was conducted to examine the effect of fog when negotiating an S-curve, taking the effect of a driver's experience and gender on their driving behavior into account (Li, 2015).

According to the results of previous research, the lane-keeping dynamic process followed by a driver is "lane keeping - lane offset - lane adjustment - lane keeping." Because a driver performs this lane-keeping process subconsciously, the driving merely regards this as being the lane-keeping phase. Therefore, from the driver's viewpoint, the process of dynamic lane keeping can be assumed to be "lane keeping - lane adjustment - lane keeping" (Peng, 2013).

In addition, a questionnaire survey was conducted with 50 drivers, with the reliability of the questionnaire being verified by a reliability test. The investigation items included driver fog suitability, driving intention, and the target acquisition method. The results showed that, for a driver in fog when the visual suitability is poor, the driving intention is mainly lane keeping. Target acquisition mainly depends on the driver's looking ahead and performing a visual search for lane keeping. Therefore, in a follow-up to the design of an eye movement test program, an effort was made to acquire the visual fixation parameters and scanning parameters of a driver performing lane keeping.

This study involved a theoretical analysis and experiment addressing the visual behavior of a driver performing lane keeping. The results of this study can provide a theoretical basis and reference for driving guidance, autonomous vehicle lane departure warning, and lane keeping.

2. Experiment

The range of visibility was divided into five parts: $VI<50m$, $50m<VI<100m$, $100m<VI\leqslant 200m$, $200m<VI\leqslant 500m$ (Gai, 2014). This was expressed as VI, in units of meters. hrough observation and field monitoring, a statistical analysis of driver's lane choice for truck and car was performed for different degrees of visibility. Given that the statistical standard is 50 m, the visibility values for truck and car were 234 and 782, respectively. The results of the analysis are listed in Table 1:

	Truck			Car		
VI/m	1	2	3	1	2	3
<50	0	137	97	211	474	97
50 to 100	0	109	125	269	404	109
100 to 200	0	81	153	304	360	118
200 to 500	0	61	173	341	318	123

Table 1 – Lane choice for different degrees of visibility

In this table, 1, 2, 3 represent the left side, the middle, and the right side, respectively as China is a "drive on the right" country. We can see from Table 1 that, when the visibility is less than 100 m, both the small and large vehicles are mainly distributed in the middle of the road. As the visibility increases, a greater proportion of the large vehicles had moved to the right side of the road, while a larger proportion of the small vehicles were in the left lane. To maintain lane keeping in a different lane, the driver's visual characteristics affect the driver's decisions and control of the vehicle. Therefore, further research is needed regarding the effect of fog on the visual characteristics of a driver in a lane-keeping test.

To determine the visual characteristics related to a driver's lane keeping in fog, drivers' eye movements were monitored using a Smart Eye 5.7 eye tracker. This is a non-contact eye tracker, with a sampling frequency of 60 Hz.The G5013, G50S, and Qijiang-Wansheng Expressway were used for this research. The lane width of these roads is 3.75 m. We recruited 10 drivers of truck, and another 10 of car. These were normal drivers, with no noticeably bad driving habits. In all the tests, the drivers were free to drive as they pleased, with no outside interference.The eye tracker was linked to a video recording function. The vehicle center line acted as a reference point for the driver's desired trajectory, relative to the center of the driving lane. The distance between them is used to judge the driver's lane keeping and degree of deviation.

In addition, a difference analysis was performed for the attention areas of different drivers, and a Kaiser-Meyer-Olkin test was performed to determine the data validity. The Kaiser-Meyer-Olkin less than 0.5 data removed and the last difference analysis results show that there is a certain driver's attention to regional correlation. In the data analysis, the parameters for the gaze and scan of the 10 drivers were normalized, and subsequent data processing in the follow-up analysis was performed with the normalized results.

3. Research into driver's visual behavior when lane keeping in fog

3.1. Behavioral characteristics of driver's lane keeping in fog

1. Fixation point position analysis

We performed a statistical analysis when the drivers' visibility was less than 500 m. The distribution of the drivers' fixation area in fog, obtained from the test video, is shown in Figs. 1.

Figures 1 shows that the car and truck drivers always be focus on far and close points in fog. This area is the driver's basic gaze area, which is used to complete the driving (Yuan et al., 2013). As the visibility increases, the driver's attention area gradually moves forward from the area immediately in front of the vehicle, and the fixation area becomes more discrete.

2. Fixation region cluster analysis

To better classify the behaviors of the drivers in fog, a dynamic clustering method was introduced to analyze the driver's fixation area. Because of the large sample size used to obtain the cluster index, this research used the k-means dynamic clustering method.

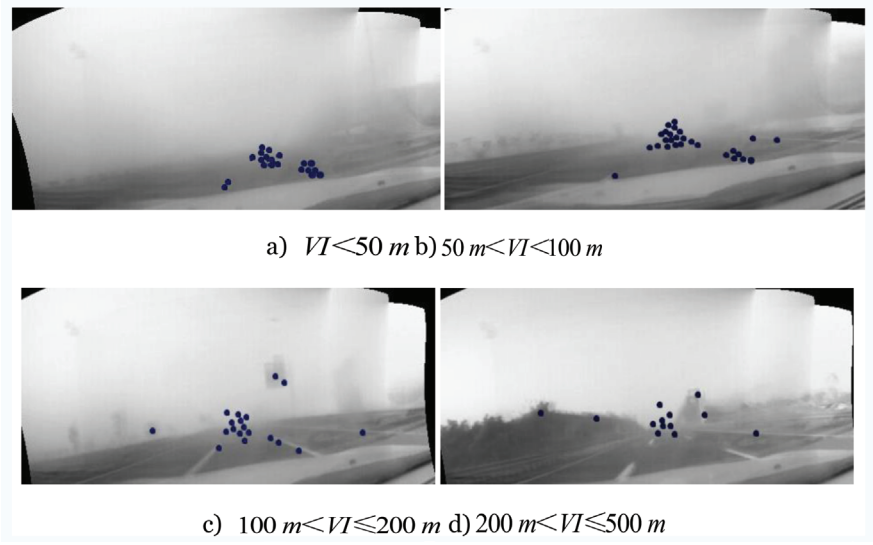


Figure 1 – Fixation positions of drivers of car in fog

The clustering results for k = 6, which is the most commonly used driver's attention area, are listed in Table 2.

Cluster	Initial clustering results		Final clustering results		Amount
	Horizontal displacement	Vertical displacement	Horizontal displacement	Vertical displacement	
1	0.8745	0.3643	0.2024	0.1925	1928
2	-0.3239	0.4794	-0.0024	0.2247	9050
3	0.2314	-0.0351	0.0481	0.1014	18615
4	-0.9433	-0.1222	-0.2959	0.162	2036
5	-0.3102	-0.5684	-0.0699	-0.3447	845
6	0.8856	-0.4254	0.4414	-0.3542	4543

Table 2 – Cluster results for driver's fixation region

From the results of clustering and the position of the driver's fixation point for different degrees of visibility, the distribution of the driver's fixation area is different in the six different visibility groups. As the visibility decreases, the area of the driver's attention is reduced and the limit of fixation becomes obvious.

3. Visual fixation region division

Based on the driver's attention point clustering results and the video recording obtained under conditions of low visibility, the external fixation plane was divided into five regions during the test. The specific region division is shown in Fig. 2.

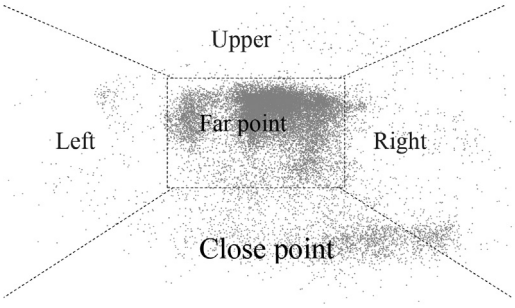


Figure 2 – Driver's fixation area in fog

4. Driver's lane-keeping gaze behavioral expectations

Based on the results of the field tests results, the eye movement data for the small-vehicle drivers in fog was analyzed. The driver fixation duration, fixation frequency, percentage of fixation, and fixation area are as listed in Table 3:

VI/m	Fixation duration/s	Frequency	Percentage of fixation	Fixation area	VI/m	Fixation duration/s	Frequency	Percentage of fixation	Fixation area
<50	18.6	204	45.64%	Far point	200–500	30.4	446	39.12%	Far point
	17.4	178	39.82%	Close point		20.4	292	25.61%	Close point
	1.4	4	0.89%	Upper		15.8	104	9.12%	Upper
	2.6	33	7.38%	Right		17.4	156	13.68%	Right
	2.4	28	6.26%	Left		12.3	142	12.46%	Left
50–100	22.9	464	44.49%	Far point	Normal weather	40.6	650	37.27%	Far point
	18.6	350	33.56%	Close point		29	318	18.23%	Close point
	6.8	75	3.45%	Upper		16.6	216	12.39%	Upper
	7.2	118	11.31%	Right		24.4	312	17.89%	Right
	2.4	36	7.19%	Left		17.8	248	14.22%	Left
100–200	22.8	342	42.86%	Far point					
	15	268	33.58%	Close point					
	6.6	63	7.89%	Upper					
	6.8	68	8.52%	Right					
	5.4	57	7.14%	Left					

Table 3 – Distribution of viewpoints in test section for different degrees of visibility

A regression analysis of the relationship between the driver's gaze and the visibility was carried out, with the results being given by formula (1):

$$\begin{cases} k_1 = -0.04\ln(VI) + 0.6176 & R^2 = 0.9024 \\ k_2 = -0.0951\ln(VI) + 0.7787 & R^2 = 0.9426 \\ k_3 = 0.0525\ln(VI) - 0.1953 & R^2 = 0.9535 \\ k_4 = 0.038\ln(VI) - 0.0956 & R^2 = 0.7993 \\ k_5 = 0.0445\ln(VI) - 0.1053 & R^2 = 0.8087 \\ \sum_{j=1}^{5} k_j = 1 \end{cases} \quad (1)$$

In the formula, k_1 to k_5 are the percentages for the far distance, near distance, upper, left and right fixation areas, respectively.

From Table 1 and Formula (1), it can be seen that the driver's lane retention behavior varies depending on the visibility, with the driver's fixation on far and close points obviously exhibiting a negative logarithmic distribution. As the visibility reduces, the driver's gaze area concentrates toward the near distance. The results of the questionnaire and tests revealed that the goal of drivers in the fog is to keep their vehicle in the target lane. A Monte Carlo simulation (Wang et al., 2014) was introduced with the driver lane maintenance reliability index being taken as the expected lane-keeping probability:

$$L_{\text{keep}} = \frac{1}{T}\sum_{i=1}^{n}(F_{\text{keep}}(x_i)\cdot d_i) \quad (2)$$

Where L_{keep} is the desired lane hold probability, T is the total fixation time, F_{keep} is the lane to be maintained, with the definition of the basic fixation area being 1 or 0, d_i is the time for the x_i area, n is the total number of state times, according to the eye region, where n is 5.

Therefore, Eq. (2) can be understood as the gaze probability of the driver to the basic gaze area when the visibility is poor due to fog, which is $k_1 + k_2$. Combining this with the driver lane maintenance reliability index defines the ratio of the basic lane of the target lane to the gaze frequency of the auxiliary gaze area, thus giving the driver's lane-keeping visual coefficient, K . A higher value of indicates that the driver exhibits a greater forward fixation frequency, greater attention, and a higher driver's lane expectation.

Combining equations (1) and (2), the driver's lane keeping visual coefficient can be expressed as:

$$K = \frac{k_1 + k_2}{1-(k_1 + k_2)} = \frac{L_{keep}}{1 - L_{keep}} \quad (3)$$

It can be concluded that, when the visibility is low (30 m to 200 m), the visibility coefficient of the driver's lane continues to increase as the visibility decreases. The range of the coefficient is from 2.10 to 8.83, which is higher than that for normal weather (500

m to 2000 m) under the conditions of 0.63 to 1.30. Indicating that low-visibility drivers driving expectations for the lane to maintain expectations.

3.2. Visual search behavior in lane keeping

In the present study, the drivers' intention windows were divided into 5 s, 3 s, and 2 s, according to the driver's cautious, normal, and aggressive personality traits (Junyung, 2014; Avinoam, 2016; Kiefer, 2008). In the test with actual vehicles in fog, most of the drivers were more cautious, so the intention window for a driver was adjusted to 5 s, and select the lane before and after migration 5 s dynamic data for the object analysis.

The saccade amplitude represents the difficulty faced by the driver in acquiring information, with the lower the breadth of the search, the narrower the driver's field of view (Yuan, 2013). The saccade amplitude of the driver lane under different visibility is shown in Fig.3. The speed of the driver's fixation point reflects the speed of information processing in the previous fixation and the speed at which the subject searches for the next target. The higher the driver's speed of saccade, the greater the search demands. The speed of saccade in the dynamic process of lane keeping is shown in Fig. 4.

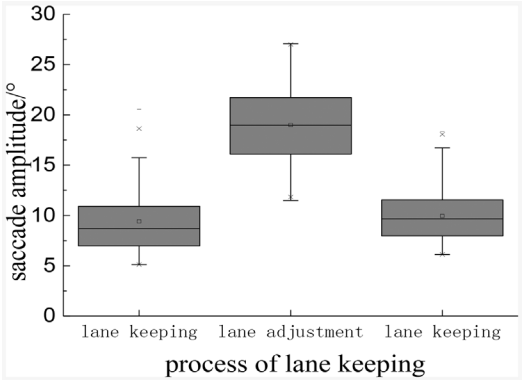


Figure 3 – Saccade amplitude in dynamic process of lane-keeping

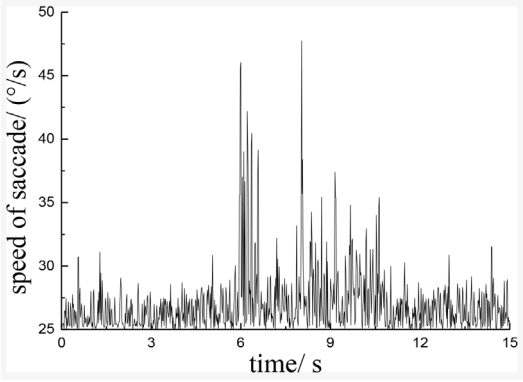


Figure 4 – Speed of saccade in dynamic process of lane keeping

It can be seen from Fig. 4 that the mean saccade amplitude of the lane adjustment process is 19.0° while that of lane keeping is only 9.4°. This indicates that the driver is performing the obvious target search process, recognizing the overall road alignment, and driving in such a way as to maintain his/her lane position. Figure 5 shows the dynamic process performed by the driver to maintain his/her lane, the normal lane to keep the driver glance speed is low. There is a large fluctuation in the driver's saccade speed, with the average glance speed being high during the lane adjustment process. The range of driver fixation points during the lane adjustment is larger and the discrepancy is higher, which also points to the driver's visual search width. In addition, the transfer rate of $27.0\,°/s$ when the driver's visibility is low is significantly lower than that in good weather ($52.0\,°/s$), indirectly indicating that, in low visibility, the driver will continue to search for a lower width, be particularly careful, but be less concerned about both sides of road information.

4. Discussion and conclusion

Aiming at the present situation of driving guidance and lane keeping on an expressway in fog, this study set out to examine the visual behavior of drivers in fog, leading on to a theoretical analysis. We found that, as the visibility decreases, the center of gravity of the driver's gaze gradually shifts from a far point to a close point. His or her focus is to maintain their expectations for the lane. In the follow-up road-line design, fog-day security and induction studies should be combined with lane to maintain visual characteristics of the analysis and design.

The findings of this study can provide a theoretical basis for road design, linear induction, and lane keeping, and provide a reference for autonomous vehicle lane maintenance and lane departure warning systems. They can also be applied to the driver training process as a means of correcting a driver's bad gaze behavior.

Acknowledgments

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Research on Spatial Distribution of Tourist Attractions and Service Facilities Scale Planning based on GIS

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Abstract: With the rapid development of tourism, the reasonable planning of tourist area has become a hot issue in the research area. In this paper, the author research on spatial distribution of tourist attractions and service facilities scale planning based on GIS. Through the rational allocation of resources in the scale of tourist attractions, it can improve the operational efficiency of the service facilities of tourist attractions. In this paper, by constructing a GIS based integrated services platform for the tourism design, GIS technology has been applied in digital tourism, scenic services and management, and other aspects. In conclusion, through the use of computer technology, we can provide intelligent support for the management of tourism scenic spots.

Keywords: Spatial distribution, Tourist attractions, Service facilities, GIS

1. Introduction

With the rapid development of tourism, the reasonable planning of tourist area has become a hot issue in the research area (Abhishek, 2016). On the one hand, the need for planning a reasonable space layout of compound tourism region attractions, attractions to each distinctive and interdependent and restrict each spot traffic transportation, on the other hand to the scenic area service facilities scale reasonable allocation of resources, improve the operational efficiency of tourism service facilities (Jian, 2014; Degen,2015). Therefore, the spatial distribution of tourist area and service facilities resources allocation is the key to ensure the rational planning of tourism area. At present, China's tourism industry is in rapid development, the continuous expansion of the scale, scenic spots face more severe challenges (Rachel, 2007; Song, 2015). To strengthen the comprehensive management, to enhance tourism scenic tourist attractions to realize digital construction, service level, is the key way to solve the problem of the tourist attractions. The geographic information system with its unique advantages are to be recognized and accepted by more and more people, has gradually become an important tourism and media management. However, the digital construction of domestic tourism scenic area is still in its infancy, most software systems can only provide a single scenic navigation function (Shengnan, 2015). This paper presents the design of Tourist Scenic Area Comprehensive service platform based on GIS technology in the digital tourism,

scenic area service and management of scenic spots, emergency, traffic control and other aspects have been applied, and strive to through the use of computers (Dina, 2016). Technology to provide the perfect support for tourism scenic spot management.

Geographic information system is sometimes called a geo information system or resource and environment information system. Information publishing and data sharing WEB GIS based on the Internet platform (Yi, 2015). The client application software using WWW protocol, realize the online inquiry and business GIS information processing and other functions. Geographical information system on the Internet that is to expand and improve a new technology of G IS using Internet technology, its core is embedded in the GIS HTTP and TCP/IP standard application system, to realize spatial information management under the environment of Internet. WEB GIS by multi host, multi database and multi terminal through Internet, Intranet connected with client and server (C/S) structure, the server provides information and services to the client, the client has access to a variety of spatial information and application functions.

2. Integrated service platform of Tourist Attractions Based on GIS

2.1. GIS platform

The implementation of the platform needs the support of the hardware system and software system, the software system is composed of operating system, database management system or other data management software, GIS software platform, G IS application software and network system platform (Thomas, 2012). Platform is the kernel of operating system, the outer layer is a database management system or other data management software, the next layer is GIS platform software, integrated application software and network system platform.

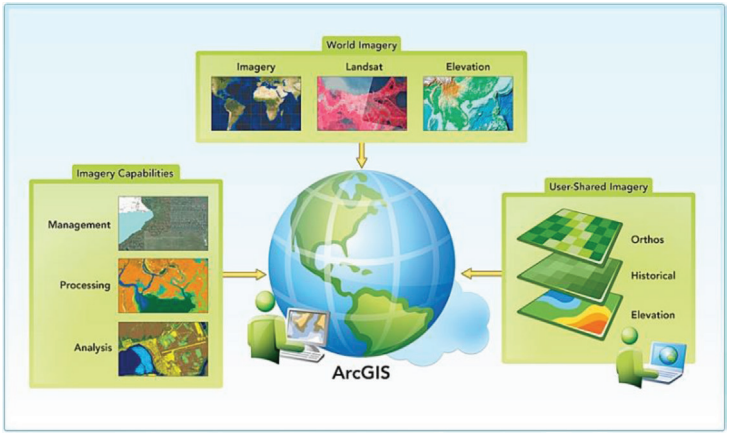


Figure 1 – GIS platform

Because of the complexity and diversity of information management platform, some local geographical location determines the network infrastructure is weak, based on this, this system uses the stand-alone mode, the client/server (C/S) model, browser/server

(B/S) design patterns are combined, according to the different location and needs of different architecture the stand-alone mode for scenic area. The computer network does not reach the place, the model for scenic spot information data on a single computer for visitors run independently, provide services for tourists, the tourists can quickly location and route choice. The client/ server model for computer network information area the management center and scenic area can reach the place.

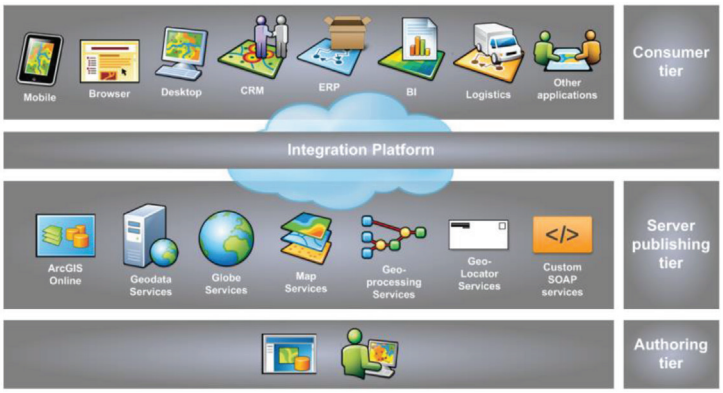


Figure 2 – Tourism management information platform

2.2. Functional analysis

The platform is based on geographic information system and application system for the comprehensive management of the scenic, scenic information service aims to provide

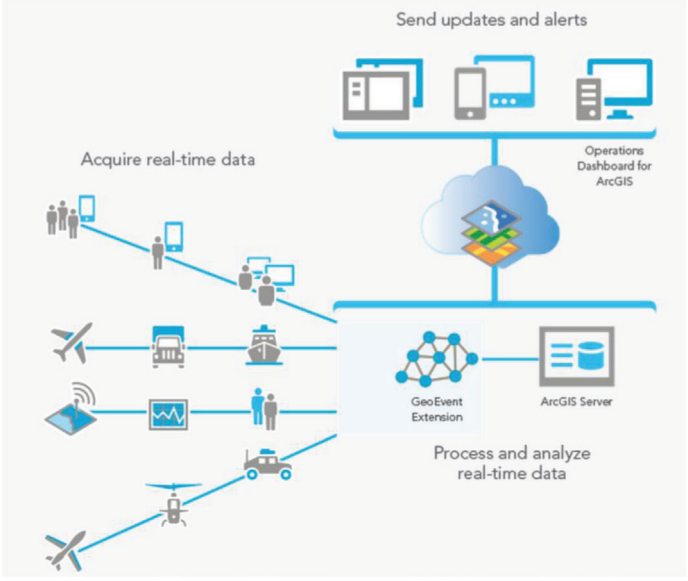


Figure 3 – Comprehensive management of the scenic spot

convenient and quick for tourists to provide decision support for the management of scenic areas, scenic areas, will be presented to the country and the ball through the Internet, enhance the visibility of scenic spots. The users of the platform are for tourists, scenic area management users, Internet users in 3 classes.

According to the function and user analysis platform, the system is mainly composed of GIS platform software and GIS application software. The GIS software platform includes the basic functions of general G IS system: spatial analysis function and data output function basic data information collection and maintenance, data preprocessing, distance and area measurement, basic information query, map shape editing, visualization, path analysis, buffer analysis. G IS application software platform with the scenic tour function, emergency treatment function, decision-making function.

3. Spatial structure planning of tourist attractions

3.1. Space intelligent integration method

Web GIS is an open space analysis of the main tool to evaluate the system, but in the analysis, simulation and reasoning function is weak, the lack of intelligent reasoning function in solving the problems of complex spatial evaluation, it is necessary to further integrated intelligent evaluation model or tool. Intelligent GIS is the analysis function of the traditional GIS or integrated mining spatial intelligence, is also the research hotspot in the field of integrated development of GIS in recent years, but mostly used in stand-alone environment, it is necessary to combine the Web platform to further expand its service space. Web GIS spatial intelligent evaluation system development including data collection, data analysis and modeling, expert intelligent reasoning system and the output results and feedback, the space intelligent integration method can be further subdivided into new technology integrated evaluation mathematical model, knowledge engineering, artificial intelligence, software engineering, spatial information processing or spatial theory etc.. The evaluation system of tourism scenic spot is adopted in the Web GIS, which is used to evaluate the application model, and combine with the expert

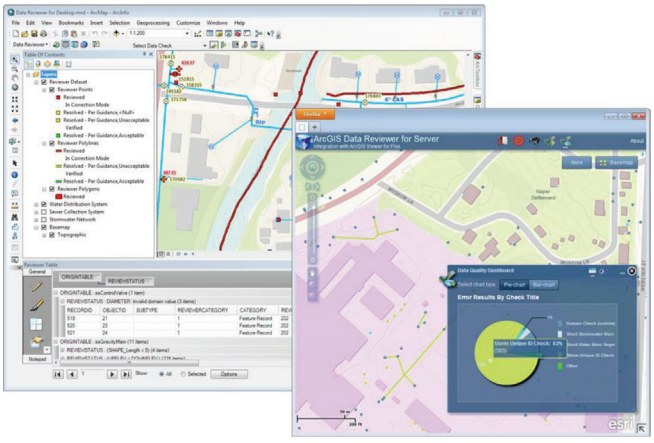


Figure 4 – Tourism scenic spot planning

knowledge evaluation system, to enhance the intelligent reasoning function of the system, so as to realize the intelligent evaluation of the semi structure problem.

The spatial intelligent evaluation system of tourist attractions is designed to provide intelligent decision support for the planning and management of the tourist attractions. The influence of scenic spot management on the attitude of tourists, local residents, planning experts, developers and other stakeholder groups. Open Web GIS is an effective way to collect the information of the evaluation of scenic spots. The tourism spatial intelligent evaluation system are the focus for tourists, the corresponding design of space structure, induction, motivation preference evaluation, tour evaluation, environmental monitoring, environmental assessment, traffic monitoring, traffic distribution, tourism organization, passenger flow simulation of 10 functional modules, and from the two aspects of the overall structure and focus on analyzing and solving the scenic quality of two representative intelligent evaluation target fuzzy comprehensive evaluation and flow behavior of space structure .

3.2. Functional design

GIS based integrated service platform for tourism scenic spot is composed of system management, information maintenance management, scenic guide, portal site, emergency management, assistant decision-making system.

- Information maintenance and management: Maintenance information management subsystem is a platform for the foundation, unified management of the scenic spot information data, to achieve a variety of basic attribute information data entry, modify, delete operation on a variety of data has been stored, and print output information. Maintenance of the information data subsystem including scenic attractions map, spatial data and attribute data, spatial data and attribute data services. Combined with emergency management can also maintain spot safety monitoring information, the platform can also provide custom maintenance information.

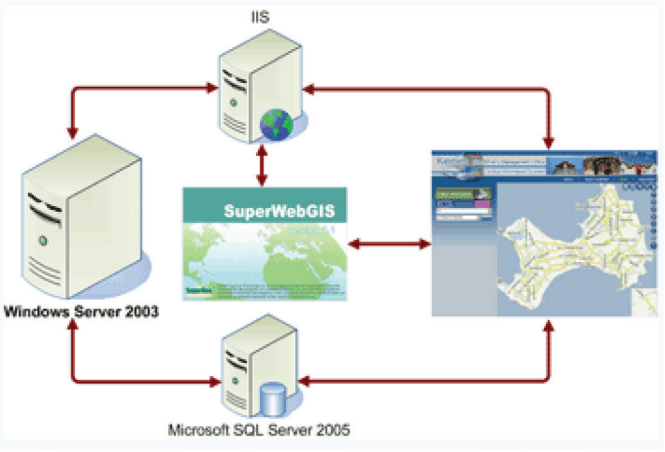


Figure 5 – Tourism information maintenance

- ***Scenic tour guide:*** High quality service is the main means to attract tourists to the scenic area, within the area for information service, ordinary paper tourism map has not been able to meet the multi-level needs of users, and information service directly determines the quality of the scenic area service. The information including scenic location, profile, 2D or 3D display, the surrounding landscape, service facilities etc. other information. Due to the above 90% scenic information have geography attribute, using the GIS technology can be included in the management, and provide convenient and quick query.
- ***Portal site:*** Portal site is a scenic area of the display and publicity platform to provide the news, scenic spots, scenic forums, users upload and other optional columns, can be customized according to the characteristics of the development of scenic spots.
- ***Contingency management:*** Emergency management by mitigation, preparation, response and recovery of 4 cycle stages in G IS, they will be merged into mitigation, preparedness and response and recovery of 3 stages. In the remission stage, through the analysis of the function of G IS, the spatial distribution and development trend of event analysis, develop the program; in the preparation and the response phase, to achieve comprehensive and analysis of spatial information by GIS, so as to help clarify and implement emergency response plan; recovery stage can use G IS to assess the damage, tracing the restoration and reconstruction work.
- ***Assistant decision:*** Before, most scenic spots in China is extensive management, lack of scientific data to support the decision, blind construction and redundant construction, resulting in a variety of serious waste of resources, it is difficult to achieve sustainable development. Through the use of G IS, to fundamentally change this situation, the spatial analysis function of GIS can play a significant role in the scenic area management and development planning. Using the overlay function of GIS, the environment (topography, geology, climate, transportation etc.) and scenic resource evaluation map overlay, to give priority to the development of regional analysis.



Figure 6 – Tourism scenic spot planning

4. Tourism service facilities planning

The development of the tourism industry can not only bring economic benefits, but ignore the negative impact of tourism development to the environment, which brings to the society, the development of the tourism industry at the same time, also destroyed the tourism industry for the survival and development of the environment. In scenic spots, tourist attractions can not only the immediate interests, the construction of hotels, shops, to unified planning, and establish reasonable operating conditions, attach importance to the protection of tourism scenic spots around the center view, pay attention to construction projects, shall not damage style of tourist attractions. Good management and excellent environment is the guarantee of the attraction of tourist attractions. In order to make the tourists safe, safe and pleasant to visit the scenic area, the construction planning staff should pay attention to the tourist shops, hotels, restaurants to determine the corresponding location, area, land and style. Planning stage management is the construction of new projects in the original scenic spot, to conduct a feasibility study carefully, to avoid immediate benefits, blind development behavior, from the long-term perspective, consider the sustainable development of the scenic spot. Reasonable tourism business services facilities planning arrangements, is conducive to optimizing the product, to protect the visual image of the local environment, and reflect the aesthetic characteristics of natural and cultural landscape. Therefore, all kinds of functions of the tourism service facilities, must be strictly followed and coordinated with the landscape, and not damage and weaken the beauty of tourist attractions.

Tourism shopping store in the new plan in order to ensure the tourism scenic environment, tourist attractions and commercial shops in the building layout to achieve unified planning and layout, become a distinctive tourist commercial street, the best of these tourist shops unified planning, careful design, a suitable location, reasonable quantity. Scenic tourist attractions in the shops tend to dissolve, and the scenery

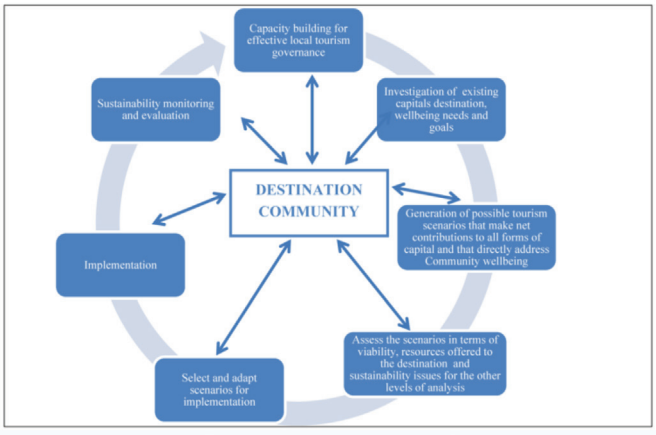


Figure 7 – Tourism service facilities planning

together, thus allowing each shop with different style and at the same time, must ensure the consistency of the shops and tourist attractions and harmonious scenery. Through the construction of the shop to add flowers to the scenic spots, increase the charm of the tourist attractions, and can not damage the scenery of the tourist attractions. Cultural relics in the tourist area should be carefully protected, the cultural relics in the tourist area should be carefully protected, to maintain its historical characteristics, to maintain its original appearance, shall not be arbitrarily converted, demolition. The buildings and other facilities that are not allowed to build height, volume, color and style are not allowed to build the cultural relics and classical gardens.

5. Conclusion

Aiming at the shortage in the open, intelligent reasoning the scenic spot information system based on Web GIS platform, through the integration of scenic evaluation application model and expert knowledge inference system, constructs the theory prototype of tourism spatial evaluation system with semi structured intelligent reasoning function. The Web server and GIS management system for information processing core services through the integrated evaluation model, database and expert system reasoning, spatial database, attribute database, enhanced semi structured intelligent reasoning function; through the integration of tourism online survey system, enhance the level of intelligent data collection. The overall operation of the system is good, the evaluation results can reflect the actual scenic spots, and can reveal the problems in the deep structure, which is helpful to the management and decision-making of the scenic spots. But the scenic evaluation system content is complex, and the system prototype only choose two representative targets, the content of the evaluation system still needs to be further improved; in addition, the application of intelligent man-machine interface and other new technology tools or software still need to be further strengthened.

Acknowledgments

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Theoretical Frontier and Applied Innovation of Macro Stress Testing Method based on Internet and Big Data

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Abstract: In recent years, with the rapid development of the Internet, the information society has entered the era of big data. It's always a problem to identify and prevent systemic risk for the government and the banking financial institutions. The development and application of the macro stress testing method makes it possible for governments to identify the structural vulnerability and risk exposure of the whole financial system. Therefore, studying the macro stress testing method has great practical significance. This paper reviews the existing literature, in order to explore and improve the implementation of macro stress testing based on the theoretical research and the practice of the banking industry of previous scholars.

Keywords: Network data, Macro stress test, Financial stability, Literature review, Information service

1. Introduction

Since the end of the twentieth Century, along with the trend of financial globalization, financial derivatives have sprung up, financial industry transnational management gradually become the norm, the risk from a single institution can easily spread to a number of agencies, and even a national and international financial institutions. Especially after the subprime mortgage crisis in 2008, the financial stability has become the focus of attention in the theoretical and practical fields. Macro stress testing in the last century in 90s is considered to simulate the reaction in the financial system under the impact of extreme events, the International Monetary Fund, the World Bank and policy authorities conducted a lot of research and its application in the monitoring system of financial fragility in the practice of operation.

Financial data, refers to the use of big data to carry out financial services, namely for huge amounts of data, through the Internet, cloud computing and other information processing, the combination of traditional financial services, capital financing and financial service innovation. Big data finance through the platform finance and supply chain finance two models, the traditional financial model of mortgage loans to credit loans. This not only improves the financial efficiency, innovation of the financial model of the traditional financial industry, and the most important is to reconstruct the financial

system, and promote cross-border integration of other industries. In more and more industries, dominated or enduring enterprises are often those who really can have big data, big data enterprise financial control.

At present, the financial institutions in many countries and government authorities have used the macro stress testing for risk assessment, but had not sorted and summarized systematically, which is not conducive to the understanding and study of macro stress testing, is not conducive to China's financial institutions to use the macro stress test monitoring risk. Therefore, it is necessary to systematically review and summarize the existing research in the past. The main contents of this paper are: (1) what is the concept of macro stress testing? What is the background? (2) what is the basic framework of macro stress testing? (3) the macro stress testing methods have what kind of practice and effect from the production to the present, and whether there are some development and improvement in practice? (4) what is the need to pay attention to the implementation of macro stress testing in our country? The above issues have always been the focus of the discussion of the scholars. This paper starts from the interpretation of the concept of macro stress testing method, introduces its background and development process, and discusses its theoretical framework, the research and practice of comparison, finally put forward the need to pay attention to China's macro stress testing problem.

2. Network big data and pressure test

2.1. Big data in the financial industry

Financial data refers to the massive collection of unstructured data, through big data, the Internet, cloud computing and other information, real-time analysis of customer consumption data, can provide customers a full range of information for financial enterprises, by analyzing and mining customer transactions and consumer

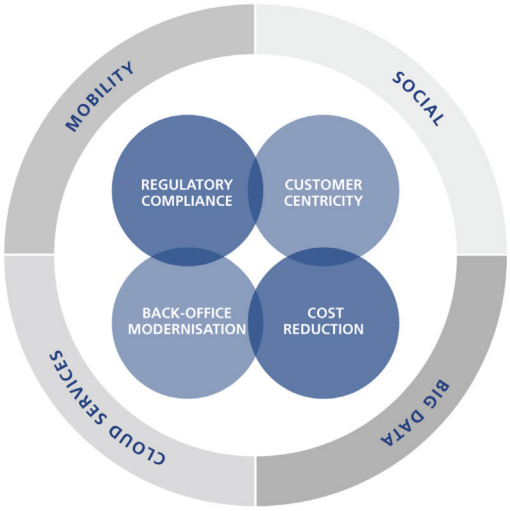


Figure 1 – Big data in the financial industry

information to grasp customer consumption habits, and predict customer behavior improve the financial service platform of new efficiency and reduce credit risk. Big data finance has the advantage of traditional financial difficult to compare, it can help enterprises closer to the customer, understanding customer needs, to achieve the non standardized exquisite service, increase customer stickiness. In the big data financial help, financial enterprises can also improve the credit system, to realize the innovation of credit management, reduce the rate of bad debts, to expand the scope of services, increase the proportion of the financing of Small and micro businesses, reduce the operating cost and service cost, so as to achieve economies of scale.

Through the big data mining, the financial services industry can use all the customer information to establish new relationships, dependence and correlation, thereby enhancing market competition ability, increase profits and income. Big data as a resource and tools, through in-depth mining will bring changes to the business model of the financial sector, providing the possibility of direct answers from other perspectives. At the same time, it may be possible to find new business opportunities and new business models. The so-called cloud computing is based on the increase of Internet related services, the use and delivery model, usually involving the Internet to provide dynamic and easy to expand and often virtual resources. Cloud computing for the importance of big data is reflected in the following aspects: massive data can be stored in the cloud server, according to the actual needs, in real time to expand or reduce the computing resources, etc. In short, the continuous development of cloud computing technology will reduce the cost of innovation in the big data mining industry.

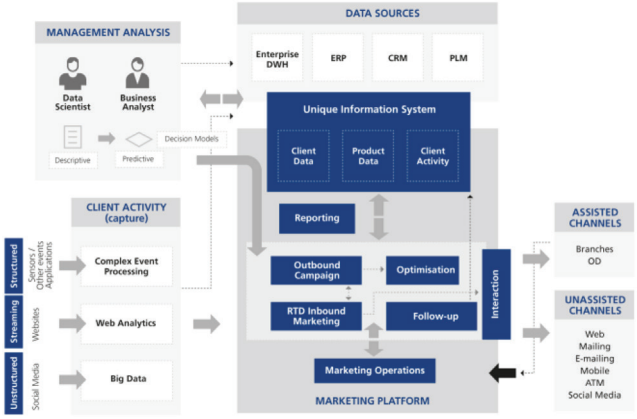


Figure 2 – Financial analysis in data mining

The relationship between big data and Internet banking, on the one hand, the Internet banking as a new data source data; on the other hand, as a large data resources and tools that can be used for risk assessment and marketing of Internet banking, and even can be used for the Internet financial regulation. Different forms of Internet finance will produce large amounts of complex data, big data mining technology for Internet banking is an important tool, according to the Internet financial operation mode, from

marketing, credit risk management to personalized financial services and other areas, big data mining technology can provide powerful support.

2.2. Stress test

Stress testing is a general term for all the techniques used by financial institutions to estimate the impact of extreme events on their robustness against some anomalies. Pressure testing applications in the micro field, there are two main roles. One is the Financial Soundness Indicators (such as CAMELS) to complement the risk measurement tool VaR, to assess the impact of some small probability events might cause banks or their own interbank assets portfolio; the two is to help the supervision of individual financial institutions risk of default. Therefore, after the Basel new capital agreement was announced, many developed countries regulatory authorities are required or encouraged by the bank to follow its recommendations to carry out the work of stress testing. Today, micro pressure test is widely regarded as a very important tool in risk management for the financial institutions of the banking industry in developed countries.

With the development of the financial environment, the periodic monitoring of a series of macro Prudential indicators is not enough to meet the needs of macro Prudential Management, and the development of quantitative tools for financial stability analysis has become an objective need. Macro stress testing is a major part of these quantitative tools.

Former world bank expert Sorge (2006) defined the system's stress test as an estimate of the risk exposure to financial institutions' special but reasonable stress situation. With different goals and micro pressure test on the personal portfolio of macro stress testing, the main purpose is to help the government identify the entire financial system may lead to systemic problems in the structure of vulnerabilities and exposures. With the outbreak of the financial crisis and crisis recovery in 2008 after the advance of macro stress testing is widely regarded as a new tool of effective management and solve the

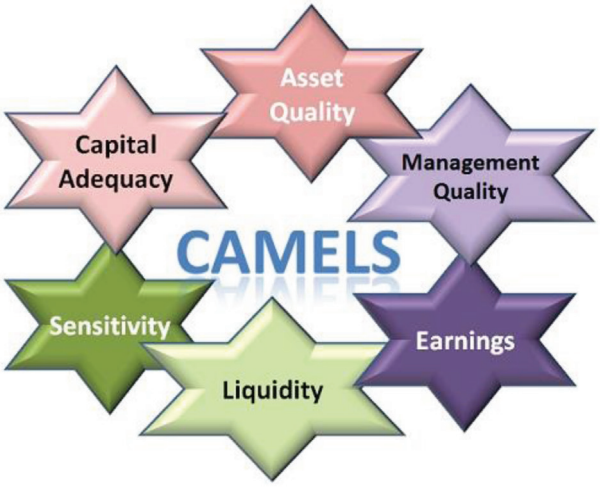


Figure 3 – CAMEL rating system

crisis, to guide bank restructuring, promote the recovery in confidence in the financial system role.

3. Development of financial stress tests

In the past twenty years, financial instability events occur frequently, had a huge impact, also attracted scholars and international financial institutions (such as the International Monetary Fund, the world bank and the Basel Committee) and the national regulatory authorities for the financial system (especially bank system) the stability of attention. Stress testing is an important and feasible method to measure the instability and vulnerability. Under the recommendation of the framework of the new Basel accord capital adequacy ratio, many large multinational banks in order to improve the internal control mechanism began a stress test. However, the risk of the entire financial system will be considered in the next few years by adding macro factors to the stress test.

In 1999, the International Monetary Fund (IMF) and the World Bank (Bank World) launched the financial sector assessment program (FSAP), stress testing for the first time as an important tool to measure financial vulnerability. In 2000, CGFS (Committee on the Global Financial System) to discuss the general pressure test (aggregate stress test) the potential use and interpretation of the concept of overall stress testing, stress testing is a general method of risk measurement of a group of financial institutions in the face of a specific scenario when exposed to [2].

Subsequently, the scholars will credit risk and market risk integration measurement, in the risk measurement to join the macroeconomic factors. D Worrell (2004) constructed a model of integrated macro stress testing, early warning system (warning system early) and financial vulnerability index. Allen (2004) put forward the credit risk measurement model to join the macroeconomic variables.



Figure 4 – Stress testing framework

Since the financial crisis of 2008, the FSAP stress test has been focused on the stability of the financial system. After constant revision and improvement, the FSAP stress test has become a true macro Prudential stress test. With the help of FSAP, member

countries and regions have developed a pressure test system, there are more typical of the National Bank of Sweden DSGE development model, the development of the TD system, the Bank of England, the European Central Bank to establish the LGBGs model of the SRM system and the Central Bank of Austria. These systems are gradually added to the macro economic factors in the practice and testing of the system [5]. According to Cihak (2006) statistics, as of the end of 25 there are more than 2005 countries or regions, the financial stability report released in the report relates to the content of the macro stress testing. In July 2007, the International Monetary Fund and the European Union and the European Central Bank experts and officials of the exchange in the "macro stress testing and Simulation of the financial crisis" meeting, they are all macro stress testing experience, put forward their own problems and discussed. As of 2015, the FSAP stress test was highly valued and widely welcomed by the 149 member countries and regions. At present, many countries and regions will be the FSAP pressure test as a necessary part of maintaining financial stability and promote financial development.

From the beginning of 2016, the International Monetary Fund (IMF) and World Bank (World Bank) of China, Germany, Britain, Russia, Sweden, Ireland, Finland, Belarus and other twenty countries to carry out a new round of financial sector two-year assessment program (FSAP) stress test.

4. The basic process of macro stress testing

According to whether the impact of the confined object is a single macro factor, the macro stress testing can be divided into two categories: sensitivity analysis and scenario analysis. The sensitivity analysis method is also called the single factor analysis method, is controlling for other macroeconomic factors (risk factor), a single impact of macroeconomic factors changes on bank asset portfolio and bearing capacity. The scenario analysis, also called the multi factor analysis, is to assume that a number of macroeconomic factors change the impact on bank assets or the entire financial system.

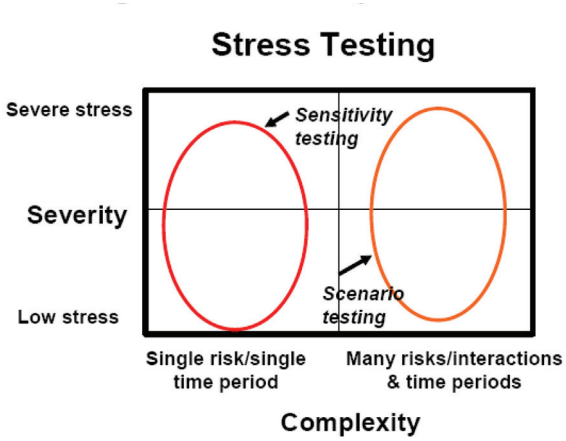


Figure 5 – sensitivity analysis and scenario analysis

In comparison, the single factor analysis method is more simple, but there are many limitations in practice. One major advantage of this method is that the conduction process of various stress scenarios in the scenario analysis is relatively clear, which can allow multiple factors and changes in the same time.

1. The overall framework

According to the European Central Bank on 2013 issued Bank Solvency macro stress testing framework capability analysis (macro stress-testing framework for bank solvency analysis), the European Central Bank's macro stress testing framework is mainly composed of the design of macro financial situation, segmentation model analysis and evaluation of bank balance sheet changes and research feedback and contagion effects consist of four pillars .

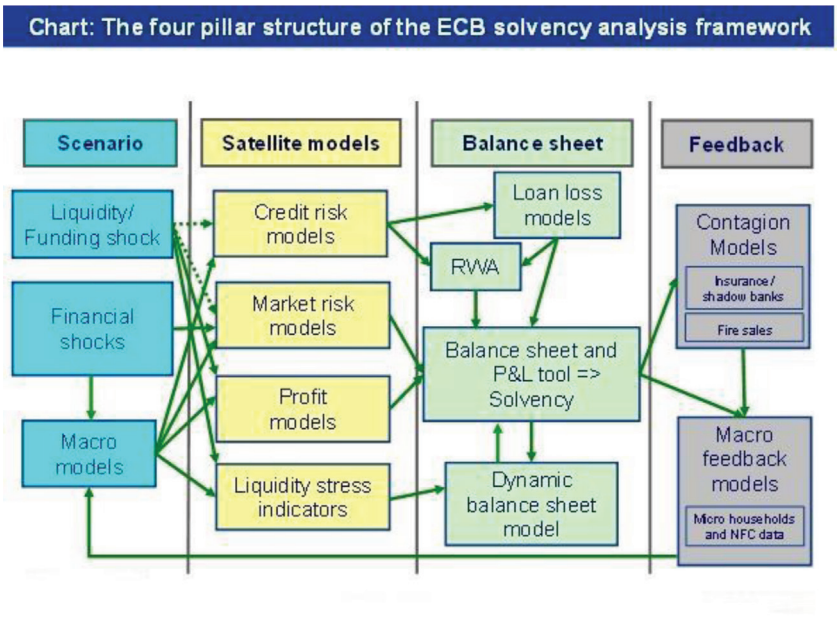


Figure 6 – Macro stress testing framework

The design of macro financial situation mainly carries on the design to make some of the banking system under pressure the impact of macro financial situation such as financing, the impact of macroeconomic shocks; pillar two (subdivision model analysis) will be a pillar of the scene into a reflection of the financial market and the impact of changes in bank balance sheet variables, and the establishment of credit risk and the interest rate risk, market risk, exchange rate risk and other different models; three pillars (assessment of balance sheet changes) is used after the breakdown of the model estimation, calculation of the profit and loss of assets and liabilities of banks, and the solvency of banks, and dynamic adjustment; four pillar from the scope of the entire financial system and real economy system. The banks and financial institutions after two

times the effect of feedback and the contagion effect of solvency in the first time after impact Change.

2. analysis of macro stress testing process

The macro pressure of national regulatory authorities and the banking industry testing process are similar, summed up can be seen, the key process of macro stress testing include: set the macro pressure and carry out risk stress testing, capital adequacy rate changes associated with the default response, the feedback effect of four modules

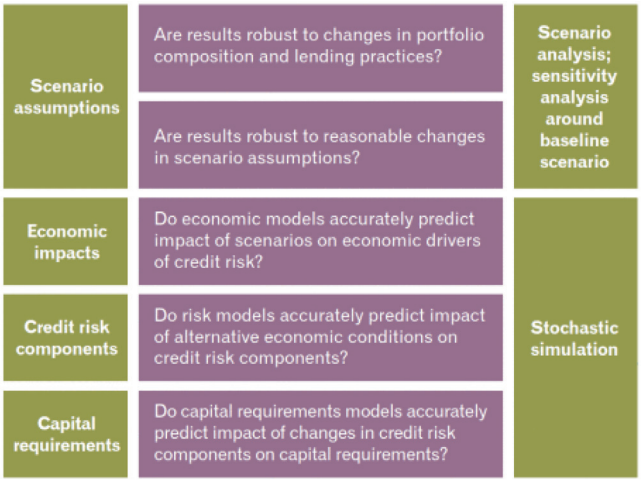


Figure 7 – Macro pressure test implementation process

- ***Macro pressure scenario:*** Design macroeconomic scenarios generally have two steps: first, according to the stress test of the period, to identify the main systemic risk (such as exchange rate, price, etc.). Subsequently, the systemic risk factors into stress scenarios. The second step, using relevant models quantify these systemic risk factors the influence of the impact of financial institutions. Generally speaking, we can use the special event as the benchmark and model measurement as the basis of the two ways, the degree of variation of the risk factors, to achieve accurate and true reflection of the degree of risk factors by the macro pressure. After calibration, you can put the variables into the relevant dynamic macroeconomic model.
- ***Single risk stress test:*** That is, through the subdivision of the model, the assumption of pressure scenarios into independent risk variables, the use of specialized models to analyze the impact of different risks, the main risk of credit risk, interest rate risk and other market risks.
- ***Single agency test results summary:*** Through the balance sheet model, dynamic analysis method is used to simulate the changes of the bank balance sheet and the estimation of the solvency of the bank is obtained. The calculation of the profit and loss of the bank under compression includes four parts: the net interest income, the loan loss, the re evaluation of the market risk and the final

calculation of the profit and loss of the bank. The solvency of the bank capital adequacy ratio index is usually used to measure, the final loss under the bank will increase, this part of the loss by bank capital to offset, in extreme adverse circumstances, risk weighted assets will increase.

- ***Correlation and feedback effects of institutional default:*** With the traditional "bottom-up" pressure test, macro stress testing framework of the impact on the real economy of the bank to adjust its liabilities, and to measure the two impacts of bank assets and capital adequacy ratio of the deterioration in the real economy, namely the feedback effect. At the same time, the macro stress tests will be conducted for the financial institution's default correlation analysis.

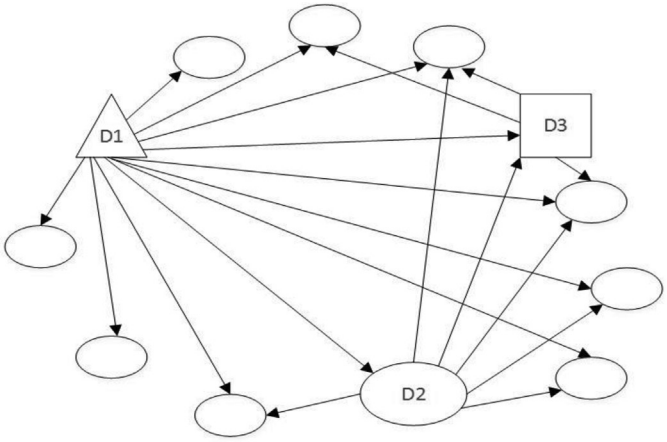


Figure 8 – The network model of the default of the macro pressure testing mechanism

In infectious analysis, assuming that the financial institutions D1 default, then through to hold D1 risk assets (such as stored in the D1 deposit, interbank lending, financial bonds, long trading positions, reverse repurchase assets etc.) financial institutions (D2, D3) survey, estimates will lead to D2, D3... And other financial institutions, the capital adequacy ratio fell below the regulatory limit. In addition to the balance sheet items, but also pay attention to bank acceptance bills of exchange, security class business, financial derivatives trading and other tables outside the business.

5. Research and practice of Macro stress testing

The theoretical research of macro stress testing mainly focuses on the construction of the framework. Sorge (2004) compared the basic principles and methods of bank stress testing. Stolz (2008) introduces the difference and connection between micro pressure test and macro stress testing, and introduces the framework and process of the International Monetary Fund's macro stress testing. A large number of scholars have summed up their respective countries (regions) to construct the macro stress testing framework, such as Ross (2006), Ryan (2007), Lind (2007), Krimminger (2008), Wong (2009), Rongjie (2011), Catalin Ruja (2014). Since 2007, the inter-bank market feedback effect (Effects Feedback), Effectsor Domino (Contagion Effects) research gradually increased.

The empirical field of macro stress testing is mainly focused on finding the probability of default macro decision variables and the degree of the influence, find the relationship and law of risk indicators and macroeconomic shocks among the variables, in order to achieve the purpose of measuring the risk of macro stress testing. Blaschke (2001) pointed out that the selection of a number of banks to analyze the interbank market system risk. Boss (2007) in the credit model to join the macroeconomic variables, the design of the pressure scenario of the Australian banking system, through the calculation of the probability of default of a single industry, plus the overall probability of default. Boss using data from the Australian banking industry, the results show that the gross industrial product, inflation, stock index and oil prices have a significant impact on the probability of default four. Goodhart (20042007), Tsatsaronis (2007) and Summer (2007) are concerned with the problem of endogenous risk and nonlinear effect in the derivatives market. Miroslav and David (2008) pointed out that the impact of extreme situation, the linear measurement equation can accurately quantify the macroeconomic fluctuation, unable to accurately measure the financial risk, on this basis, Miroslav and David to construct high order nonlinear measurement equation based on the interpretation of variables, and achieve a good effect. Et al. Huang (2009) in order to spread the bank in order to spread the risk of insurance premiums as a risk indicator, in the design of the pressure scenario to consider the probability of default and the correlation between bank assets. Credit default swap (CDS) market and stock market data are used to calculate the probability of default and the risk of bank assets. Havrylchyk (2010) using the logit model of loan loss reserve and macroeconomic variables to establish contact, starting from the pressure setting, studied under the impact of macroeconomic variables, how banking loan losses will change. Coffinet and Lin (2010) through the establishment of the French bank's profitability (ROA) and the French macroeconomic indicators, simulation when the macroeconomic downturn, the changes in the profitability of each bank. Ali (2010) by using the rate of bad loans as a risk index, designed the same pressure shock scenario, in this case the calculation of the United States and Australia non-performing loan ratio, the conclusion is under the same macroeconomic variables, the performance in Australia is better than the United States.

In the field of practice, this article describes the FSAP pressure test system, based on the FSAP pressure test system, and then introduces the more mature TD and SRM system:

1. FSAP pressure test system

Since the end of the Asian financial crisis in 90s, the International Monetary Fund and the world bank have summed up the experience and lessons of the crisis. In May 1999, IMF and World Bank jointly launched the "financial sector assessment program" (Financial Sector Assessment Program, FSAP), to member countries and the economies of other banks and the entire financial system of comprehensive assessment and monitoring. Over the past twenty years, through continuous development and improvement, FSAP as a financial stability assessment of the commonly used framework has been widely accepted in the world. Under the framework of the financial sector assessment framework for financial stability assessment, usually there are financial stability indicators, stress tests and standards and guidelines for evaluation of three commonly used analytical tools. After the financial crisis in 2008, FSAP further considered the impact of macroeconomic factors on the stability of the entire financial system, built a sound macro Prudential stress testing system.

FSAP pressure testing system has become the basic framework for national development pressure test system, which mainly includes six modules: credit risk, interest rate risk, exchange rate risk, liquidity risk, operational risk and risk contagion. Risk scenarios, the impact of indicators of the design are based on each country's macroeconomic policy, the environment, whether the data can be a problem, and some differences. In general, in most countries the use of non-performing loan ratio (NPL) analysis of credit risk, the complexity of some of the selected default probability (PDs) or default loss rate (LGDs). But some countries choose foreign currency loans (such as Armenia), some countries have chosen cross-border lending (such as Austria), and the country chose to use the loan concentration (such as Russia) to measure credit risk. The measure of exchange rate risk, some countries choose to use the net position of some countries (such as Sweden), the capital at risk (such as France and Germany); contagion among banks choose unsecured loans, property, payment system and other positions to measure risk.

Today's FSAP pay more attention to macroeconomic factors in the design of scene, and they were testing countries (or regions) close cooperation policy authorities and the bank, the micro pressure test from the bottom to the top of macro stress tests and from top to bottom combined to expand the scope of non banks, interbank contagion effect considered and in the test.

2. TD pressure test system of Bank of England

In 2006 the England bank issued a financial stability report (FSR, 2006) before the British financial system mainly adopts pressure test single factor analysis method of stability, without considering the interaction between banks, contagion effect, also do not consider the macroeconomic and financial institutions between the feedback effect, enterprises and financial institutions in the financial accelerator effect etc.. In 2006, the Bank of England began to use the new pressure test system to assess the risk of financial stability. In the financial policy committee (FPC) on the advice and cooperation, in October 2013, the Bank of England issued a draft regular pressure test on the UK banking system, and the stress testing framework to the relevant parties for comments. Subsequently, the parties to listen to the feedback on the basis of the Bank of England in 2014, 2015 conducted a two stress test.

Unlike other stress testing systems, the Bank of England's TD stress testing system, in addition to the usual risk studies, is also taking into account the liquidity risk. TD system stressed from top to bottom, the vulnerability of the financial system at the core of the financial sector and the real economy, the risk of infection between the channels of the channel has been the focus of attention. The system of the default rate causes the bank credit rating downgrade, endogeneity, rising financing costs and other risks of the contagion effect, inter agency interaction and the risk of financial institutions and macroeconomic feedback effects etc.. The pressure test also draws on the concept of system dynamics, taking into account the amplification mechanism and the spillover effect.

3. The SRM system of the Central Bank of Austria

In 2002, Oesterreichische Nationalbank, the financial market authority (Austrian Financial Market Authority, FMA) and some scholars jointly formulated the system of risk monitoring system (Systemic Risk Monistor, SRM). This system is mainly based on

the Boss (2002) and Elsinger (2006) of the interbank network model, using the interbank market to reflect the relationship between bank lending positions. The model is divided into two parts, on the one hand, the use of a single bank's assets and liabilities, to predict the future may face the market risk and credit risk and loss distribution; on the other hand, the mutual position survey of interbank positions, to build the bank network model according to the situation, assess the market risk of default. Using the macro-economic history data, the joint distribution of various risks, such as credit risk, interest rate risk, exchange rate risk, and so on, is constructed. Based on the Monte Carlo simulation, the joint distribution of the macro economic variables is obtained. To a certain extent, the model considers the transmission mechanism, but the feedback effect is not considered.

6. Conclusion and suggestion

China is gradually joining the global economy, the trend of financial globalization has made China face a complex and volatile international financial environment. Our country is deepening financial reform crucial stage and the deep water, because of the particularity of our country economy, political system, social stage, building and construction, many of the implementation of the system and improvement of many policy measures have no experience can learn. Therefore, we need to use macro stress testing to predict the macroeconomic changes in the macroeconomic policy changes, will affect the stability of the financial system, so as to improve our financial policy, reduce risk.

With the slowdown in global economic growth, China's economic soft landing, banks and the entire financial system will have a drastic change. The macro stress tests have a key role in identifying, preventing and dissolving the risk of banking and the whole financial system. However, in the practice of our country, the application of macro stress testing methods to assess the level of the stability of the banking system, there are still many challenges. For example, how to optimize the test flow, how to break the limitations of the data, whether the scope of the test should be extended, how to apply the results of the macro stress tests, etc.

Through summarizing the research literature and drawing lessons from practical experience, this paper believes that the future of China's macro stress testing needs to pay attention to the following three aspects.

1. First, the design of effective macro stress testing objectives, to improve the accuracy of the pressure test. On the one hand, the introduction of a single financial institutions in general equilibrium. On the other hand, pay attention to the whole system of financial flexibility test. FSAP embedded in the financial stability framework, will be a combination of macro Prudential stress testing and micro Prudential stress testing, while carrying out the bottom-up and top-down stress tests.
2. Second, to expand the impact coverage, considering the risk of cross-border contagion and other financial institutions, the impact of the real economy sector on macroeconomic variables. To consider the impact of other institutions in the

financial markets, such as the impact on the initial period and the impact of the impact of the shadow banking, as well as trust companies, money market funds, P2P platform, private finance companies, etc.. With cross-border business has become the norm, international trade, global economic integration, a country affected by macroeconomic shocks will rapidly spread to other countries or regions.

3. Third, build and improve the index system, improve the level of early warning. Establish and gradually improve the Financial Soundness Indicators and early risk warning system. Secondly, select a reasonable indicator system. Through the practice of the countries and scholars of the theoretical study of the review, it can be seen that the choice of reasonable indicators is particularly important. Can refer to foreign experience, select the macro economic indicators with Chinese characteristics to improve the risk impact index system, such as the entrepreneur confidence index, the national housing boom index.

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Data Mining Algorithm Application in Influencing Factors Analysis of College Students' Physical Health

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Abstract: The core of large data is the organic combination of application, algorithm, data and platform, In this paper, the authors analyze the data mining algorithm application in influencing factors analysis of college students' physical health. Physical health of college students is facing a severe situation. Through the study on the influencing factors of College Students' physical health, the result shows that College students physical health factors are mainly as Genetic and life behavior factors, Social environmental factors, Physical quality factor, Medical service level factor, Physiological function factor, Sport ability factor and Psychological quality factor, cumulative contribution rate as 87.868%.

Keywords: Data mining, Hadoop algorithm, Physical health, College student

1. Introduction

The advent of big data era makes data size and complexity are explosive growth, prompting different application areas of data analysts using data mining technology to analyze data. Therefore, in the era of big data mining data mining is a priority to develop and build computing platforms and tools to support the application of data analysts can effectively perform data analysis tasks (Arrighetti, 2013; Guan, 2014). Fitness is the quality of human body, and is the basis of congenital and acquired activities on the stability characteristics in many aspects shows human body quality, morphological structure, physiological function, athletic ability and mentality development (Chen, 2014). Health is a person in the physical, psychological, social environment, ethics and other aspects are in perfect condition.

In recent years, college students' physical health decline quickly, facing a grim situation, the specific performance: positive changes of College Students' physical health and enthusiasm basically no change is at a relatively low level in the state of slightly better, it is difficult to maintain upward momentum; overweight and obesity and poor eyesight in a constant speed rise (Asamani, 2013). The physical health of college students is affected by many factors, including genetic factors, environmental factors and acquired exercise, different factors have different influence on College Students' physical health, role and effect are different, analyze and research the factors based on the influence of College

Students' physical health of the 40 indexes, seven large impact factors, the research can provide some help and insights for the relevant departments.

2. Data mining algorithm and its application

Existing data mining tools provide a user-friendly interface for user analysis. However, these tools are not suitable for large-scale data analysis. While using these tools, it is difficult for users to add new algorithm programs (Li, 2015). Popular data mining algorithm library provides a large number of data mining algorithms (Zhang, 2014; Gonçalves et al., 2015). However, these algorithms require high-level programming skills to perform task allocation and algorithm integration in a specific data mining task. Recently, some integrated data mining products, by providing a friendly user interface to quickly configure the data mining tasks (Panikhina, 2012). However, these products are based on the Hadoop framework; support for non Hadoop algorithm program is very limited. Moreover, these products do not explicitly address resource allocation problems in multiuser and multi tasking scenarios. In order to solve the limitation of existing tools and products in data mining, the development of a new platform, is a user friendly and support efficient computation and fast integrated data mining system in a distributed environment, the platform supports data analysis quickly and effectively for data mining tasks.

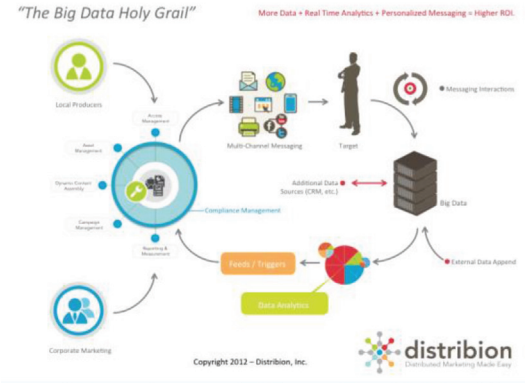


Figure 1 – Big data platform

Compared with the existing data mining platform, Miner provides a new set of functions, can help data analysts to facilitate and effectively carry out various complex data mining tasks. Specifically, Miner has the following outstanding advantages.

1. User friendly, user-friendly, fast data mining task configuration: Based on the "software as a service" model, hidden with data analysis tasks unrelated to the low-end details (Wang, 2013). Through the humanized user interface provided by Miner, users can easily complete a task configuration of complex data mining problems by assembling existing algorithms directly into workflow, without making any code.

2. Flexible multi language program integration: it allows users to the most advanced data mining algorithms directly into the system algorithm library, in order to expand the analysis toolset and management. At the same time, because FIU can correctly assign tasks to computing nodes with suitable runtime environment, there is no language restriction for these imported algorithms.
3. Efficient resource management in heterogeneous environments: FIU-Miner supports running data mining tasks in heterogeneous computing environments (including graphics workstations, single computers, and servers). Miner considers various factors (including algorithm implementation, server load balancing and data location) to optimize the utilization of computing resources.

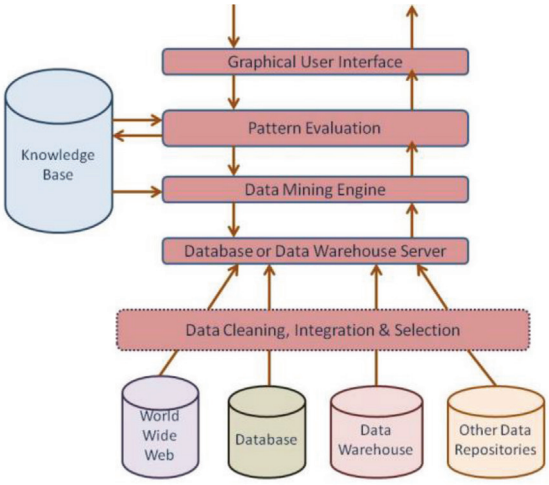


Figure 2 – Data mining platform

3. Research objects and methods

3.1. Research objects

1. Interviewers research object

We find physical health experts in Jiangxi Province as 16 interviews. The results are shown in Table 1. The results showed that the basic characteristics of the interviewers were gender male (number= 11; percentage = 68.75%), female (number =5; percentage = 31.25%), age 41-50 years (Number = 3; percentage = 18.75%), 35 years of age (number = 2; percentage = 12.50%), 36-40 years (number = 5; percentage = 31.25%). Education in turn: graduate students (number =11; percentage =68.75%),Undergraduate (number =4; percentage =25.00%),Junior College (number =2; percentage =6.25%);Titles are: Associate Professor (number =8; percentage =50.00%),Lecturer (number =4; percentage =25.00%),Professor (number =3; percentage =18.75%),Others (number =1; percentage =6.25%);Schools in turn: Jinggangshan University (number =5; percentage =31.25%),Jiangxi Normal University (number =3; percentage =18.75%), Gannan Teachers

College (the number of =3; the percentage of =18.75%), Ganzhou Normal University (number =3; percentage =18.75%), Yichun University (number =2; percentage =12.50%).

Index	Classification	The number	Proportion
Gender	Male	11	68.75
	Female	5	31.25
Age	Under 35 years of age	2	12.50
	36-40 years old	5	31.25
	41-50 years old	6	37.50
	Over 51 years of age	3	18.75
Education	Graduate student	11	68.75
	Undergraduate	4	25.00
	Junior college	1	6.25
Title	Professor	3	18.75
	Associate professor	8	50.00
	Lecturer	4	25.00
	Other	1	6.25
School	Jinggangshan University	5	31.25
	Jiangxi Normal University	3	18.75
	Gannan Normal College	3	18.75
	Ganzhou Normal University	3	18.75
	Yichun university	2	12.50

Table 1 – Basic characteristics information of special interview personnel (n=16)

2. Questionnaire research object

Randomly selected some college students in Jiangxi Province, a total of 869 college students to investigate, test and comparative analysis. Table 2 results show that the basic characteristics of the questionnaire information.

Index	Classification	The number	Proportion
Gender	Male	501	57.65
	Female	368	42.35
Age	18	368	42.35
	19	377	43.38
	20	102	11.74
	21	22	2.53
Grade	Freshman	355	40.85
	Sophomore	343	39.47
	Junior	133	15.30
	Senior	38	4.38
Household register	Countryside	479	55.12
	Non rural	390	44.88
Nation	Han	728	83.77
	Ethnic minority	141	16.23

Table 2 – Basic information of questionnaire (n=869)

3.2. The main method

1. **Literature data method:** Collect health management literature, books and other literature, literature, there are 3 main ways, library paper documents, electronic literature and bookstores to buy books.
2. **Expert interview method:** According to the characteristics of students, and our sports workers, medical workers, health experts and psychological experts of different forms of interview, questionnaire content validity and structural validity of the expert examination, recognition rate of 96%.
3. **Questionnaire survey method:** Two college students issued a questionnaire survey of 1000 influencing factors, recycling of 955 copies, the recovery rate of 95.5%, excluding invalid questionnaires, valid questionnaires of 869, the effective rate of up to 90.99%. According to the purpose and content of this study, referring to the same type of questionnaire, the students' physical health questionnaire was initially developed. By consulting experts, scholars, the initial questionnaire to modify, supplement, finally identified as a formal

questionnaire. The internal consistency coefficient of each dimension was between 0.8 - 0.9. Questionnaire using 5 grade evaluation, very affected by the 10 points, compared with the impact of the score of 8, generally affected by the score of 6 points, less affected by a score of 4, did not affect the score of 2 points, the higher the score, the greater the impact.

4. **Mathematical statistics method:** This research mainly uses the EXCEL data, the average S±D standard deviation records were analyzed with SPSS15.0 statistical software, including descriptive statistics, between groups using variance analysis, exploratory factor analysis and structural equation model.

4. Results and analysis

4.1. Factor analysis on the cause of the problem of the training of physical education teachers in Colleges

Influencing factors of College Students' physical health are many and complex, in order to study this issue, to two university students issued questionnaire were 1000 copies, 955 were recovered, the recovery rate of 95.5%, excluding 86 invalid questionnaires, 869 valid questionnaires, the effective rate was 90.99%. Exploratory factor analysis of the pre-test questionnaire was conducted with SPSS16.0. The common factor was extracted by principal component method, and the criterion of the common factor was extracted with the characteristic value greater than 1. In the "college students physical health factors" 40 related indicators of the project, table 3 results show that: the total variance of the total of the 7 common factors explained was 87.868%, of which. For the convenience of study, table 4 shows: 1 factors named influence the college students' physical health factors "genetic and behavioral factors, the main factor", "age", "sex", "race", "height", "weight", "examination results", "smoke" and "drinking" and "movement", "diet", "sleep" and "health" of the 12 indicators; factor 2 was named influence the college students' physical health factors of the "social environment factor", including "nature" and "living conditions", "economic income" and "family", "interpersonal relationship" and "public opinion" and other 6 indicators; factor 3 was named the influence college students' physical health factors "health factors", including the "speed", "power", "Resistance" and "sensitive" and "coordination" and "flexible" 6 indicators; factor 4 was named the college students' physical health influencing factors of medical service level factors, including "social security system", "personal health consciousness", "medical investment" and "the level of medical technology" 4 indicators; factor 5 was named the college students' physical health factors, the function of "factors", including "nutrition", "The new supersedes the old." and "organ efficiency" and "effectiveness" of 4 indicators; factor 6 was named the college students' physical health factors "movement the ability of factors", including "run", "jump", "investment" and "Climbing" 4 indicators; factor 7 was named the college students' physical health factors influence "Psychological quality factor", including "personality", "will", "perceived ability" and "environmental adaptability" 7 indicators. Visible, constitute "college students physical health factors" have seven common factors.

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	13.491	34.593	34.593	11.803	30.265	30.265
2	7.188	18.431	53.025	7.094	18.189	48.454
3	4.896	12.554	65.579	3.773	9.675	58.129
4	3.301	8.464	74.042	3.645	9.346	67.475
5	2.159	5.536	79.578	3.103	7.957	75.432
6	1.870	4.796	84.374	2.425	6.219	81.651
7	1.363	3.494	87.868	1.866	4.785	86.435

Table 3 – Total Variance Explained(n=869)

4.2. Physical health effects of element

Table 5 shows: the index of the "age" of the load =0.920, SD=1.62, and the mean =5.74, T=15.682, P=0.000, were statistically significant indicators of "gender"; the load of =0.703, SD=1.21, and the mean =8.11, T=29.947, P=0.000, have statistical significance often significant in the group index; "race" loads =0.724, SD=1.75, and the mean =5.72, T=14.565, P=0.000, were statistically significant in the index; the "height" of the load =0.877, SD=0.94, and the mean =7.46, T=35.194, P=0.000,. Visible, genetic and lifestyle behavior is the basic factors of physical health.

Table 6 shows: the index of the nature of work load was =0.814, average =6.80, SD=1.99, and T=15.286, P=0.000 group, statistically significant indicators of "living conditions"; the load of =-0.826, SD=2.12, and the mean =7.01, T=15.519, P=0.000, "economic income" load =0.904. The mean of =7.27, SD=1.01, and T=31.104, P=0.000, were statistically significant. The visible social environment caused by key factors on physical health. Table 7 shows: the index of "speed" load =0.794, SD=1.23, and the mean =7.61, T=27.606, P=0.000; "force" of the load =-0.878, SD=1.31, and the mean =6.64, T=22.465, P=0.000, endurance in the load =0.790, SD=7.58 and T, mean =8.72, =5.401, P=0.000 group. There are very significant statistical significance.

index	Common factor						
	1	2	3	4	5	6	7
12 age	-0.920						
13 gender	-0.703						
18 race	0.724						
19 height	0.877						
20 weight	0.880						
21 physical examination	0.814						
22 smoking	0.862						
23 drinking	0.916						
26 movement	0.938						
27 diet	0.875						
28 sleep	0.843						
29 health	0.892						
4 working property		0.814					
6 living conditions		-0.826					
10 economic income		0.904					
24 family relations		0.789					
30 interpersonal relationships		-0.795					
38 direction of public opinion		-0.815					
1 speed			0.794				
9 power			-0.878				
15 endurance			0.790				
31 sensitive			0.652				
36 coordination			-0.681				
37 flexible			-0.751				
5 social security system				-0.929			
11 health awareness				0.601			
14 medical investment				0.829			
17 medical technology level				0.573			
7 nutritional status					0.696		
8 metabolism					0.670		
35 organ efficiency					0.621		
39 system efficiency					-0.600		
2 run						0.644	
3 jump						0.774	
16 shots						0.663	
25 climbing						0.787	
32 personality							0.705
33 will							0.916
34 perception ability							0.606
40 environmental adaptability							0.616

Table 4 – Rotated Component Matrix(n=869)

index	Load capacity	M	SD	T	P
12 age	0.920	5.74	1.62	15.682	0.000
13 gender	0.703	8.11	1.21	29.947	0.000
18 race	0.724	5.72	1.75	14.565	0.000
19 height	0.877	7.46	0.94	35.194	0.000
20 weight	0.880	7.05	1.65	18.923	0.000
21 physical examination results	0.814	7.15	1.02	31.104	0.000
22 smoking	0.862	6.63	1.31	22.465	0.000
23 drinking	0.916	5.88	1.57	16.457	0.000
26 movement	0.938	6.73	1.62	18.434	0.000
27 diet	0.875	7.22	1.98	16.185	0.000
28 sleep	0.843	5.22	1.20	19.436	0.000
29 health	0.892	6.19	1.43	19.304	0.000

Table 5 – Genetic and life behavior factors

index	Load capacity	M	SD	T	P
4 working property	0.814	6.80	1.99	15.286	0.000
6 living conditions	-0.826	7.01	2.12	15.519	0.000
10 economic income	0.904	7.27	1.01	32.031	0.000
24 family relations	0.789	7.13	1.02	31.104	0.000
30 interpersonal relationships	-0.795	6.33	0.73	38.453	0.000
38 direction of public opinion	-0.815	4.78	1.98	10.790	0.000

Table 6 – Social environment factors

index	Load capacity	M	SD	T	P
1 speed	0.794	7.61	1.23	27.606	0.000
9 power	-0.878	6.64	1.31	22.465	0.000
15 endurance	0.790	8.72	7.58	5.401	0.000
31 sensitive	0.652	7.51	1.71	19.714	0.000
36 coordination	-0.681	5.24	1.99	11.689	0.000
37 flexible	-0.751	4.53	2.03	9.869	0.000

Table 7 – Physical quality factors

Table 8 shows that the level of medical service factor in the load =-0.929, SD=2.28, and the mean =6.82, T=13.309, P=0.000, personal health consciousness the load of =0.601, SD=1.82, and the mean =8.52, T=20.876, P=0.000, medical investment load of =0.829, SD=0.88 and T=32.716, mean =6.51. The P=0.000 group had statistical significance was significant; visible, factors affecting the security level of medical services for physical health. Table 9 shows: "nutrition" loads =0.696, SD=1.66, and the mean =6.43, T=17.169, P=0.000, were statistically significant in nature; "organ effectiveness" of the load =0.621, the mean =7.71. SD=1.17, P=0.000, and T=29.325, were statistically significant. The influence factors to visible, physiological function of physical health.

index	Load capacity	M	SD	T	P
5 social security system	-0.929	6.82	2.28	13.309	0.000
11 health awareness	0.601	8.52	1.82	20.876	0.000
14 medical investment	0.829	6.51	0.88	32.716	0.000
17 medical technology level	0.573	6.28	1.70	16.267	0.000

Table 8 – The medical service level

index	Load capacity	M	SD	T	P
7 nutritional status	0.696	6.43	1.66	17.169	0.000
8 metabolism	0.668	7.63	0.82	41.410	0.000
35 organ efficiency	0.621	7.71	1.17	29.325	0.000
39 system efficiency	-0.600	4.63	1.31	15.657	0.000

Table 9 – Physiological function factor

Table 10 shows: the index of "running" the load of =0.644, SD=0.82, and the mean =6.42, T=34.871, P=0.000, were statistically significant in the index; "jump" loads of =0.774, SD=1.49, and the mean =7.29, T=21.906, P=0.000; index "vote" load weight =0.663, mean =6.61, SD=1.47, and T=20.142, P=0.000 index; "climb" the load of =0.787, SD=1.43, and the mean =6.19, T=19.304, P=0.000, were statistically significant. so, exercise ability to physical health influence factors. Table 11 shows: the "personality" of the load of =0.705, SD=1.27, and the mean =7.51, T=26.259, P=0.000, were statistically significant in nature; "will" load =0.916, mean =7.39, SD=0.94, and T=35.194, P=0.000; "perception" of the load of =0.606, average =6.32, SD=0.73 and, T=38.453, P=0.000, were statistically significant. So, Psychological quality affects the physical health of the power factor.

index	Load capacity	M	SD	T	P
2 run	0.644	6.42	0.82	34.871	0.000
3 jump	0.774	7.29	1.49	21.906	0.000
16 shots	0.663	6.61	1.47	20.142	0.000
25 climbing	0.787	6.19	1.43	19.304	0.000

Table 10 – Exercise capacity factor

index	Load capacity	M	SD	T	P
32 personality	0.705	7.51	1.27	26.259	0.000
33 will	0.916	7.39	0.94	35.194	0.000
34 perception ability	0.606	6.32	0.73	38.453	0.000
40 environmental adaptability	0.616	6.23	0.87	18.225	0.000

Table 11 – Psychological quality factors

5. Conclusion

Influence of College Students' physical health factors: genetic and behavioral factors, factors and social environment factors, physical factors, medical service level factor, physiological function factor, sports ability factors, psychological quality factor. The basic factors affecting the university students' genetic and life behavior on the physical health of the key factors that influence the social environment on the health effects of physical quality, physical health promoting factors, factors affecting the security level of medical services for physical health, factors to affect the physiological function of physical health, influencing factors on the movement ability of physical health effects and the dynamic factors influencing the psychological quality of physical health.

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Research on the Mathematical Model of Corona Current based on the Curve Fitting of Neural Network

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Abstract: This paper aims to achieve work as solving the mathematical model of the corona current, neural network structure design of 2 layer structure combined with neural network. The author analyzes the process of curve fitting and neural network curve fitting, the mathematical model of neural network that the corona current curve fitting under certain working principle, discusses the fitting process of corona current waveform from the angle of the double exponential function model and Gauss model, while achieving high precision fitting different types of corona current, the extraction of network weights and current analytical expressions to determine, achieve a unified and effective structure, and a mathematical model of corona current.

Keywords: Neural network; Curve fitting; Corona current; Mathematical model; Solution

1. Introduction

Now, the application of the mathematical model of the corona current can effectively avoid the loss of the power of the corona, radio interference, and protect the insulation performance of high voltage equipment. In the research of corona discharge, more and more attention is focused on the study of the electromagnetic field of transmission line (Ding, 2013; Gao, 2014). The electromagnetic radiation characteristics of corona discharge need to be managed by the current mathematical model to realize the simulation and calculation. The research on the mathematical model of corona current is to determine the structure of the mathematical model with the help of a variety of functions, and determine the current double exponential function model (He, 2013). Based on the double exponential function model, the radiation field of the transmission line is calculated, the partial discharge corona current is determined, and the shape of the current pulse is analyzed (Sheng, 2011). Artificial neural network is also referred to as artificial neural network (NNs) or (Connection, Model) connected model it is a kind of neural network to imitate animal behavior characteristics of the distributed parallel algorithm for information processing model. This network relies on the complexity of the system, through the adjustment of the internal relationship between a large number of nodes, so as to achieve the purpose of processing information (Wu, 2012). Artificial

neural network is a mathematical model of information processing, which is similar to the structure of synaptic connections in the brain. In engineering and academic circles, it is often referred to as “neural network” or neural network (Zhang, 2014; Lino et al., 2016). Based on the research of network model and algorithm, the practical application system of artificial neural network is used. For example, the completion of a signal processing or pattern recognition function, the structure of the expert system, made of robots, complex system control, etc. Throughout the history of the development of modern science and technology, human beings in the process of conquering the space of the universe, the basic particle, the origin of life and so on, have gone through rough road. We will also see that the study of human brain function and neural network will be accompanied by many difficulties to overcome and change with each passing day.

2. Curve fitting and artificial neural network

2.1. Curve fitting

Curve fitting process, mainly by means of the basic principle of the least square method, and then determine the function of the fitting process. Through the given data points, denoted by （xi,yi）, including （i=1,2,...,N）, to determine the function value which is set to f（x）, function φ, which is f（xi）-yi（i=0,1，...，N）square and has a minimum value as

$$\sum_{i=0}^{N}[f(x_i)-y_i]^2$$

Fitting process, mainly to determine the fitting interval, that is, -1:0.2:1, combined with the least square method to effectively fit the curve.

2.2. Artificial neural network

For the construction of neural network, the specific simulation application of casting process, to determine the accuracy of the simulation and the speed of operation, combined with the basic model of the two-layer neural network. A variety of models to determine the neuron, combined with sigmoid type transfer function, the output layer of the determination, there are 6 neurons, mainly combined with Pureline type transfer function model. Initialization of the neural network, not only to determine the initial weight, but also to determine the threshold, the vector P input. In determining the number of neurons and the function and application of MATLAB software tool, we initialize application network, at the same time the application function model of initiff neural network, not only the weight matrix W1, and determine the weight matrix W2 in the MATLAB call process, i.e.:

[W1,b1,W2,b2]=initiff（p,6,’tansing’,6, ’pureline’）

When learning the neural network, combined with the basic principle of the algorithm, the application of the initial matrix measurement point position, the realization of the matrix of the effective operation of processing, and determine the corresponding specific temperature value. Based on the measurement process of the temperature valuewhile

combining the specific error values for calculation and analysis as well as the form of weight matrix, this paper determines the specific performance of neural network simulation. About the trainbp application form, it is as shown below:

[W1,b1,W2,b2，epochs,tr]=trainbp（W1,b1,'F1',W2,b2'F2',P,T,tp）

The training error is expressed by TR, the simulation precision is improved, and the control parameters are set, the maximum number of training steps is determined, and the error index is determined. For F, the combination of the function of the neuron transfer type, determine the convergence accuracy and the actual search step, for complex calculations, with the help of computer to complete the complex calculation.

3. The principle of mathematical model of corona current based on neural network curve fitting

On artificial neural network, it has a wide range of applications. It is not only widely used in the field of automatic control and computer science, but also has a wide range of applications in information processing and artificial intelligence. Artificial neural network model structure, combined with the BPNN form to achieve linear transmission efficiency, but also combined with the process of electrostatic discharge. The effective fitting of the current is determined, and the number of neurons in the hidden layer of the network is determined by N. On the ideal spot discharge process, combined with the discharge current curve of the effective fitting process, and determine the N order of the column vector, using W1. In order to determine the N of neurons in the hidden layer threshold vector based on B1, the output layer neuron weights to determine the vector with W2 said, B2 said the neuronal threshold F1 hidden layer transfer function, the output layer transfer function f2. In the actual operation process, the mathematical model structure and the steps are determined by the fitting process of the network corona current waveform. In the t time series of the input vector with T, combined with the time corresponding to the current intensity, using I (T), said the output vector with I. A neural network based on the state of the current waveform fitting, as shown in figure 1.

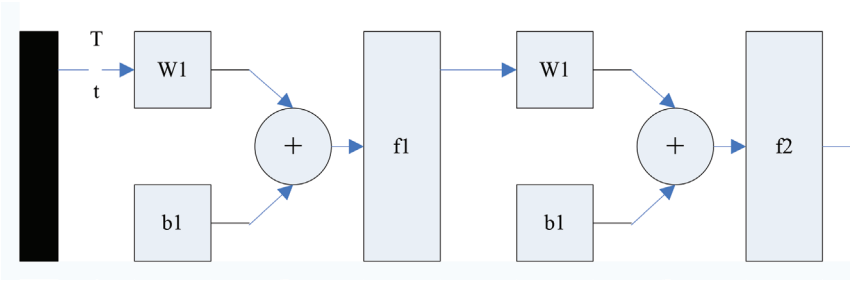


Figure 1 – Neural networks in the state of the current waveform fitting

After the network related parameters are set up, it is required to determine the size of the transfer function and the training function, as well as the target value of the target error and the error performance. After the end of the network training, combined

with the network operation rule, determine the current intensity and the relevant mathematical relations, and in a timely manner to establish the mathematical model of the current. The network training process, combined with the smaller size of the network parameter settings, to determine the basic training rate of the LM algorithm. At the same time to determine the error performance function, with the help of the Hessian matrix calculation.

$$H=JTJ$$

When calculating the gradient, the expression is as follows:

$$g=JTe$$

The first derivative of the network error function is expressed by J, and the network error vector is represented by e. In the feed forward network technology, the calculation process, combined with the effectiveness of the matrix analysis, is modified:

$$X(k+1)=x(k)-(JTJ+\mu I0)-1JTe$$

X (k) is used to represent the discrete data sequence, and the unit matrix is expressed by I0.

On the corresponding S type F1 function, and linear transfer function F2 different.

$$\begin{cases} f_1(x)=\dfrac{1}{1+\exp(-x)} \\ f_2(x)=x \end{cases}$$

Based on the network structure of the operation process, combined with the specific input analysis, and then determine the functional relationship, that is, the:

$$I=f2(f1(T\bullet W1+b1)+b2)$$

i (t) and time t are used to express the simple current intensity:

$$i(t)=b_2+\sum_{j=1}^{n} w_{2f}\cdot\frac{1}{1+e^{-(w_i t+b_{ij})}}$$

Weight vector W1 element is wij, the hidden layer threshold vector B1 element is bij, this process is derived, mainly combined with the fitting of the current waveform, and combined with BPNN fitting process, determine the form of expression.

4. The waveform fitting of corona current in the double exponential function model

Based on the double exponential function model, the calculation process of the simple and effective parameters is fused, and the effective fitting of the double exponential pulse waveform is achieved, and the typical form of the transmission

line is determined. Based on the determination of the current waveform of BPNN, as shown below:

$$i(t) = 2.335 \cdot i_p \cdot (e^{-0.01t} - e^{-0.0345t})$$

$$i(t) = 1.3 \cdot i_p \cdot (e^{-0.019tt} - e^{-0.285t})$$

The representation of the number of neurons with N, the expression of the waveform fitting process of the double exponential corona current. As shown in Figure 2, the number of neurons was 3 and 5, respectively.

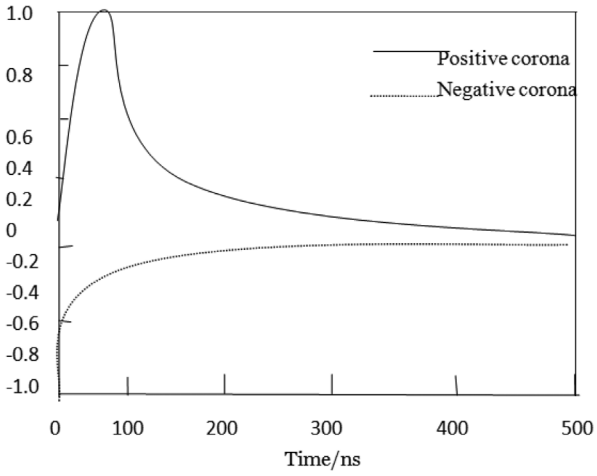


Figure 2 – the number of neurons were 3 and 5, respectively

When the number of neurons is fixed, it is to combine with the peak of the current waveform for effective analysis, and determine the number of neurons, increase the number of neurons, the current waveform to achieve a complete fit.

5. Gauss function model of the corona current waveform fitting

On the Gauss function model of an electric current waveform fitting process, mainly to achieve a high accuracy of the fitting. BPNN current waveform fitting process, the number of neurons is 3 and 5, the fitting of the image shown in figure 3.

We analyze the fitting error of the current waveform of the dual exponential function,as shown in table 1.

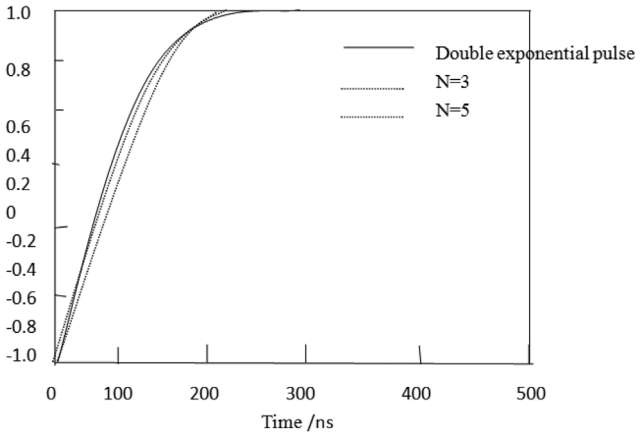


Figure 3 – the number of neurons 3 and 5 when the fitting effect

Neuron	MSE	
	Negative electric quantity	Positive energy
3	7.7183×10-4	9.0086×10-4
5	7.7189×10-4	3.0864×10-4
10	8.5327×10-5	2.1030×10-4
15	1.4528×10-4	7.6416×10-5
20	6.1525×10-4	9.0118×10-5
50	2.5836×10-5	9.948×10-5

Table 1 – Analysis of the fitting error of the current waveform of the double exponential function

The fitting curve and the current waveform are determined, with the increase of the number of neurons, and the fitting of the current waveform is realized. At the same time, there is a small error. Fitting process of positive corona current based on Gauss pulse, as shown in figure 4.

Based on the BPNN on the metal prominent, we defect corona current waveform fitting, as shown in table 2. Therefore, BPNN has a certain effect on the fitting of the electric current waveform of the metal, and the effective expression of the positive corona current.

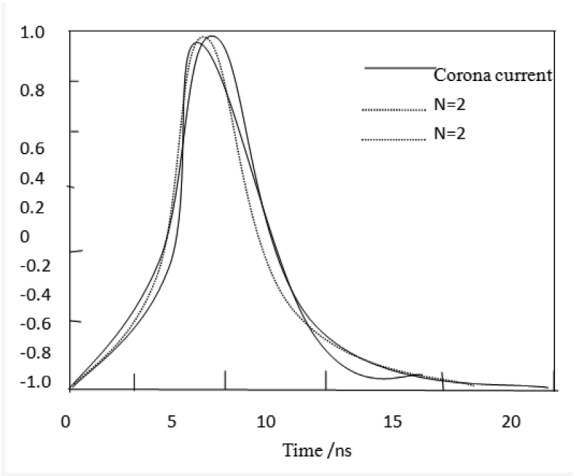


Figure 4 – Gauss pulse type positive charge current fitting

Neuron	MSE	
	Negative electrode discharge	Positive discharge
2	5.0411×10-4	4.2459×10-4
3	4.1672×10-4	3.2113×10-4
5	7.7880×10-5	9.183×10-4
10	5.5720×10-4	2.5693×10-5

Table 2 – BPNN on the curve fitting of corona current of metal protrusion

6. Waveform fitting based on arbitrary corona current

Based on the analysis of the waveform fitting process of any corona current, the change of the corona current waveform is analyzed with the structure of the specific detection system, and the structure of the positive and negative current waveform is determined. In the analysis of the difference of the positive and negative corona current waveform, the local oscillation is realized, and the measured current waveform is analyzed. Based on the analysis of the number of BPNN neurons, and determine the validity of the corona current waveform fitting analysis, and then determine the effective trend of the current waveform fitting. Once the number of neurons is gradually increased, the current waveform of the network will be increased continuously, and the validity of the

network waveform oscillator can be realized. Based on the comprehensive application of the negative electric current, the network fitting result is determined, and the effective extraction of the parameters is realized. When the number of neurons is 5 and 10, the image is shown in Figure 5.

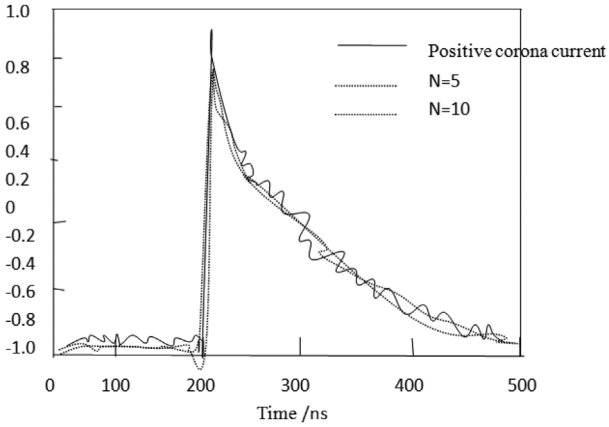


Figure 5 – waveforms of the number of neurons in 10 and 5

We analyze the influence of BPNNthe fitting error of the measured currentas shown in table 3. Therefore, BPNN has little influence on the measured current fitting error, in the process of corona current analysis, combined with the different structure of the detection system, analysis of different test environment. At the same time, we analyze the effective analysis of the corona current and the double exponential function.

Neuron	**MSE**	
	Negative electrode discharge	**Positive discharge**
5	0.0764	9.9027×10-4
10	0.0766	9.6655×10-4
20	0.0586	9.9785×10-4
30	0.0597	8.9236×10-4
40	0.0923	6.6268×10-4

Table 3 – Effect of BPNN on the fitting error of the measured current

7. Conclusion

Therefore, the neural network has a high fitting precision, and the actual fitting current waveform has a certain analytical expression. At the same time, it also has the characteristics of unified structure. On the model of the current description of the process, determine the number of neurons in different engineering needs, and in the fast extraction of characteristic parameters have a good application, to achieve effective simulation.

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Forecasting VaR in WTI Market by a Dynamic Extreme Value Approach

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Abstract: The purpose of this paper is to estimate tail-related risk measures including static and dynamic risk measures based on the extreme value theory (EVT) in the West Texas Intermediate (WTI) market. The study first estimates the static value at risk (VaR) by the peak over threshold model (POT) and verifies that the VaR based on this model is efficient and accurate by comparing it with the classic variance-covariance method. Considerate to the return series in the paper are asymmetrical, skewed and fat-tailed, the skewed t-distribution with GJR-GARCH model is used to model for the return series firstly, then the POT model is applied to the residuals from the GJR-GARCH and the dynamic VaR is calculated. In addition, the results of backtesting indicate that the method in the study of forecasting dynamic VaR describe the characters of the data appropriately.

Keywords: Extreme value theory, GJR-GARCH, peak over threshold model, value at risk

1. Introduction

Over the last twenty years, the global economy has fluctuated strongly and been confronted with unforeseen risk. In the financial world, people have faced huge losses because of the bankruptcy or near bankruptcy of serval institutions first in the United States and then globally. These financial disasters have attracted the attention of academics, policy makers and economic agents at large. It has become clear to us that risk management especially with regard to market risk for financial institutions needs to be reassessed and the development of standard measures of the market risk is very necessary to the international economy. The VaR that was first used in late 1980s at J.P. Morgan has emerged as a standard and popular measure of market risk. VaR is simply a quantile of the loss or profit distribution (in this paper ,we only focus on the loss distribution) of a given asset portfolio over a prescribed holding period from a mathematical viewpoint. VaR suggests that how much people can lose with a given probability over a certain horizon.

The existing approaches for estimating VaR can be divided into three types: the non-parametric historical simulation (HS) method, parametric methods based on an econometric model for volatility dynamics and the assumption of conditional normality,

and the extreme value theory based methods. The estimated loss distribution is simply given by the empirical distribution of past losses in the HS method. HS method avoids "ad-hoc-assumptions" on the form of the loss distribution and is easy to implement. However, in this method, the estimators of extreme quantiles are difficult to estimate accurately because extrapolation beyond past observations is impossible and extreme quantile estimates within sample tend to be very inefficient.

The methods based on econometric models such as GARCH-type models that assume conditional volatility which reflect the current volatility background. However, these methods suffer serious drawback that the assumption of conditional normality does not seem to hold for financial time series data. In order to overcome the drawbacks of normal distribution, GARCH models with skewed fat-tailed distributions are used to estimate VaR instead of GARCH models with normal distribution (such as Bali (2007),etc).

The estimation of return distributions of financial time series by using EVT is a topical issue and a lot of research for this method such as Embrechts et al. (1999), Longin (1996), Poon et al. (2004), etc. McNeil (1998) uses estimation techniques based on limited theorems for block maxima (BMM). McNeil uses a similar approach and shows how to correct for the clustering of extremal events caused by stochastic volatility. Danielsson and de Vries (1997) use a semi-parametric approach based on the Hill-estimator of the tail index. Embrechts et al. (1999) advocate the use of a parametric estimation technique which is based on a limit result for the excess-distribution over high thresholds. Recently, EVT has also been used to analyze extremes in financial markets due to the turmoils in various financial markets experienced around the globe. The tails of financial data series have been analyzed by Longin (1996), McNeil (1998), McNeil and Frey (2000), Neftci (2000), Gençay and Selçuk (2004), Hill (2010), Kabundi and Muteba (2011), Allen et al.(2013), Singh et al.(2013), Degiannakis et al.(2013), Ghorbel and Trabelsi (2014), Dendramis et al.(2014), etc.

EVT-based methods take more attention on the tail of loss distribution and yield a more accurate estimator of VaR. However, most traditional EVT-based methods for quantile estimation yields VaR estimates which neglect the current volatility background. To overcome the disadvantages of each of the above methods and estimate VaR more efficient, McNeil and Frey (2000) propose an approach based on above mentioned three kinds of approaches. This approach present a two step dynamic VaR estimating method which uses EVT with GARCH model. In consideration of the current market volatility background, a GARCH model is used to model for the raw return series in first step. The GARCH residuals are closer to independent and identically distributed (i.i.d) than the raw return series, but usually GARCH residuals show to exhibit fat tails. Then in the second step, they apply EVT to the GARCH residuals. As such, both time-varying volatility and fat-tailed return distributions are accommodated in the two step GARCH–EVT model. Because the GARCH-EVT is more superior than the traditional EVT models and the simple GARCH-type models with normal distributions in many cases, it is applied and referenced widely by some researchers (see Poon et al. (2004), Kuester et al.(2006), Karmakar (2013), Kumar and Maheswaran (2014), Yi et al. (2014), etc.).

The paper aims to study the tail-related risk measures including static and dynamic risk measures by extreme value theory (EVT) in the WTI market. Firstly, the study estimates

the static VaR both by the classic variance-covariance method based on the assumption that the loss distribution follows normal distribution and the POT model based on the extreme value theory which pays more attention to the fact that the loss distribution is fat-tailed. Secondly, respect to the important properties of loss distribution of most financial data that it has time-varying volatilities and fat-tailed distribution, we employ a two stage approach of EVT which was originally proposed by McNeil and Frey (2000) to estimate dynamic value at risk. At the same time, in order to describe a stylized fact of the volatility of asset returns whose volatility response to a large positive return is considerably smaller than that of a negative return of the same magnitude, we fit the standard GJR-GARCH model proposed by Glosten et al. (1993) instead of the normal distribution GARCH (see Bollersler (1986)) model at first. Then the peak over threshold method (POT) is applied to the residual extracted from the GJR-GARCH model for a suitable threshold to estimate VaR. Finally, the results of backtesting of historical daily log-return series indicate that the procedure gives better estimates than the methods which ignore the fat tails of the innovations or the stochastic nature of the volatility.

The rest of this paper is organized as follows. In Section 2, the models we consider are shortly discussed. Section 3 presents the empirical procedure and results about the West Texas Intermediate market daily log-return series by using the models in Section 2. In addition, Section 4 presents some conclusions about the research.

2. The models

2.1. Static VaR - based on POT model

There are two main kinds of models that researchers apply EVT to estimate the value at risk of a portfolio: the first is the block maxima model (BMM) approach based on the generalized extreme value distribution (GEV), while the second is the peak over threshold approach based on the generalized Pareto distribution (GPD). The BMM is a traditional method for fitting a block of maxima (extreme events) in a time series of independent and identically distributed observations to GEV using different statistical methods. But POT is considered more efficient and powerful in modeling for limited data as it approximats the exceedances of all large observations which exceed over a given threshold in a data set to GPD.

In practice, the BMM has a major defect that it is very wasteful of data. Therefore, it has been largely superseded by the POT, which we use all data that are extreme in the sense that they exceed a particular designated high level. In this paper, we adopt the POT to identity the extreme observations that exceed a high threshold and estimate the static VaR of our empirical data. Now we focus on the specific details of the POT and some properties of the models.

The main distributional model for exceedances over thresholds is the GPD whose definition is

$$G_{\xi,\beta}(x) = \begin{cases} 1-(1+\xi x/\beta)^{-1/\xi} & ,\xi \neq 0. \\ 1-\exp(-x/\beta) & ,\xi = 0. \end{cases} \quad (1)$$

Where $\beta > 0$, and $x \geq 0$ when $\xi \geq 0$ and $0 \leq x \leq -\beta/\xi$ when $\xi < 0$ .The parameters ξ and β are referred to, respectively, as the shape and scale parameters.

The GPD in the extreme value theory has played an important role in modeling the excess distribution over a high threshold. This concept is defined along with the mean excess function, which will also play an important role in the theory in returns. The following is the definition of excess distribution over threshold u and mean excess function.

Let X be random variable with distribution function F , the excess distribution over the threshold u has distribution function

$$F_u(x) = P(X - u \leq x \mid X > u) = \frac{F(x+u) - F(u)}{1 - F(u)} \tag{2}$$

for $0 \leq x < x_F - u$,where $x_F \leq \infty$ is the right endpoint of F .

The mean excess function of a random variable X with finite mean is defined by:

$$e(u) = E(X - u \mid X > u) . \tag{3}$$

The excess distribution function describes the distribution of the excess loss over the threshold u , given that u is exceeded. For a large class of underlying distributions F , the excess distribution function F_u can be approximated by GPD for some high threshold u (see Pickand (1975), Balkema and de Hann (1974)). In this paper we follow the common practice assumption that the exceedances can be modeled as stationary i.i.d processes.

Now the procedure of the POT is introduced. Given loss data $X_1, \cdots\cdots, X_n$ from F , let N_u be the number of the data exceeding our threshold u , and relabel these data $\tilde{X}_1, \cdots\cdots, \tilde{X}_{N_u}$ for convenience. In this paper, the method of maximum likelihood is applied to estimate the parameters of a GPD model by fitting this distribution to the N_u excess losses.

According to the above discussion, we can obtain, for $x \geq u$,

$$\bar{F}(x) = P(X > x)$$

$$= P(X > u)P(X > x \mid X > u)$$

$$= \bar{F}(u)P(X - u > x - u \mid X > u)$$

$$= \bar{F}(u)\bar{F}_u(x - u)$$

$$= \bar{F}(u)(1+\xi\frac{x-u}{\beta})^{-1/\xi}, \tag{4}$$

Which provides a formula for calculating tail probabilities if $F(u)$ is given. This formula (5) may be inverted to obtain a high quantile of the underlying distribution, which is interpreted as value at risk. For $\alpha \geq F(u)$, we yields (see Embrechts et al. (1997)):

$$VaR_\alpha = q_\alpha(F) = u + \frac{\beta}{\xi}((\frac{1-\alpha}{\bar{F}(u)})^{-\xi} - 1) \tag{5}$$

We estimate these quantities by replacing ξ and β their estimations with maximum likelihood method. And the simple empirical estimator N_u/n is taken to an estimate of $\bar{F}(u)$. So we can gain an estimation of the value at risk in the following:

$$\hat{VaR}_\alpha = u + \frac{\hat{\beta}}{\hat{\xi}}((\frac{n(1-\alpha)}{N_u})^{-\hat{\xi}} - 1). \tag{6}$$

We compare the estimation of the value at risk by POT with that by traditional variance-covariance method. Following Duffie and Pan (1997) , the variance-covariance based value at risk at time t is computed as:

$$VaR_\alpha = Z_\alpha \sigma_p \sqrt{\triangle t} \tag{7}$$

where Z_α, σ_p and $\triangle t$ are the standardized normal variable, the portfolio volatility and the time horizon, respectively. We use this formula to generate estimations of the value at risk based on the variance-covariance method and compare them with the estimation based on the peak over threshold method. Finally, we also demonstrate the efficiency of these two approaches by backtesting.

2.2. Dynamic VaR - based on GJR-GARCH and EVT

EVT can not only be used to calculate static VaR but also can be combined with auto-correlated time series models to forecast VaR. McNeil and Frey (2000), proposed a two step dynamic VaR forecasting method based on EVT. Considered the conditional heteroscedasticity of most financial data, they applied GARCH model to model for return sequences in the first step. In the second step, the POT model based on EVT is applied to the GARCH residuals which are closer to iid than the original returns. We now present our model which referenced the approach proposed by McNeil and Frey (2000) in the following. This approach is denoted as GJR-GARCH-EVT in this study.

Here we first use the ARMA(1,1)-GJR-GARCH model with the mean return modeled as an ARMA(1,1) process and the conditional variance of the returns as a GARCH (1,1) model:

$$r_t = u_t + \alpha_1 r_{t-1} + \varepsilon_t + \beta_1 \varepsilon_{t-1} \tag{8}$$

$$\sigma_t^2 = \omega + p\varepsilon_{t-1}^2 + q\sigma_{t-1}^2 + \lambda \varepsilon_{t-1}^2 I_{\{r_t<0\}} \tag{9}$$

where $\varepsilon_t \left| \Omega_t \right. \rightarrow$ skewed t-distribution with mean =0, variance $= \sigma_t^2$ and Ω_t is the information set of all information at time t.

As the return series in this paper are asymmetrical, skewed, fat-tailed and peaked around the mode, it is appropriate and accurate to use the skewed t-distribution with GJR-GARCH model instead of the normal distribution with GARCH model when estimating VaR. It is clearly demonstrated that the skewed fat-tailed distributions with GARCH provide very accurate and robust estimates of the actual VaR thresholds and perform equally well as the more specialized extreme value distribution in many papers (see Bali (2007), Karmakar (2013), Allen et al. (2013), etc).

GJR-GARCH model is chosen to remove the time series volatility clustering, which may be inconsistent with given assumption that exceedances of financial return series are i.i.d. Here we estimate these parameters of the GJR-GARCH model by maximum likelihood method. Then standard residuals are closer to i.i.d and are researched by the POT model.

For a 1-day horizon, an estimate of the conditional VaR is

$$\hat{VaR}_\alpha = \hat{u}_{t+1} + \sigma_{t+1} \hat{VaR}(Z_t)_\alpha \tag{10}$$

where the sequences $\{Z_t = \frac{r_t - u_t}{}\}$ are standard residuals series and $\hat{VaR}(Z_t)_\alpha$ is given in Equation (10), $\hat{u}_{t+1}$ and $\hat{\sigma}_t \sigma$ are respectively the one step forecast for the conditional mean and variance in time $t+1$.

3. Data and empirical results

This empirical study focuses on modeling for WTI daily log-return series. The sample data period in this paper is from 2000.1.4-2014.10.30, which provides us approximate 15 years of data with 3724 daily log-returns.

As we consider only the right tail of the generalized extreme value, which represents losses for an investor with a long positions in the abovementioned West Texas Intermediate market. We compute the distribution of maximal losses for the above investors before. This distribution is obtained as follows. Denote p_t the closing price at time^t in the WTI market, and we construct the negative return as $r_t = -100 * \log(p_t / p_{t-1})$, where $t = 1,2,\cdots,T$.

3.1. Description of data

The basic statistics are given in Table 1 and the time series plot of daily negative log-returns of the WTI market from the indices during 2000.1.1-2014.10 in Figure 1.

mean	standard	skew	Kurt	max	JB statistic
-0.01329248	1.052867	0.2485699	5.047643	7.422868	3998.6

Table 1 – Summary statistics

The kurtosis in Table 1 is greater than three for return series which suggests that the distribution of return in the WTI market is fat-tailed, and the skewness suggests this distribution is biased. The value of Jarque-Bera statistic for the series indicates that the returns do not follow a normal distribution.

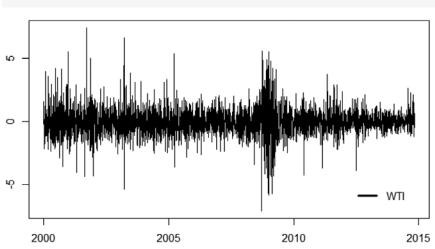


Figure 1 – Daily returns in WTI market.

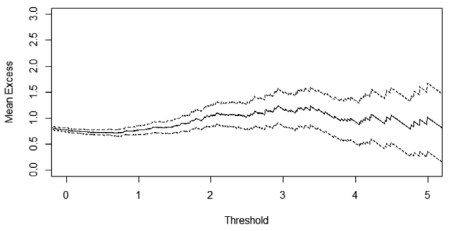


Figure 2 – MEF plot in WTI market.

Figure 1 shows that the time series plots of daily returns of the indices during 2000.1-2014.10. The extreme behaviour of the return series during the sample data period is showed by the above graphs.

3.2. Static VaR estimation

3.2.1. The VaR based on the POT approach and the variance-covariance approach

In this Subsection, We implement the POT approach and the traditional variance-covariance approach to model the extreme risk for the WTI market and estimate the VaR of the above return series. At first, as mentioned earlier, we employ the POT method by using GPD for tail estimation of the raw return series in the following.

The first step in this modeling is to select the right threshold for identifying the relevant tail region. Several techniques are successful for threshold determination. Here the sample mean excess function (MEF) is utilized to choose an appropriate threshold and it is expressed by

$$e_n(u) = \frac{\sum_{i=1}^{n}(X_i - u)I_{\{X_i > u\}}}{\sum_{i=1}^{n} I_{\{X_i > u\}}} \tag{11}$$

where $X_1, X_2, \cdots, X_n$ are sample data. So $e_n(u)$ is an empirical estimator of the mean excess function $e(u)$ which describes the expected overshoot of a threshold once an exceedance occurs. If the empirical MEF is a positively sloped straight line above a certain threshold u, it is an indication that the data follows the GPD with a positive shape parameter ξ. The MEF of returns can be applied to choose a suitable thresholds in POT model.

Figure 2 gives a mean excess plot for daily negative log-returns in WTI market, and from the MEF the threshold can be chosen as $u = 1.7$. Using this threshold, we estimate the parameters of the POT method by the maximum likelihood method and forecast the VaR with different quantiles based on the formula (6). The estimators of parameters are given in Table 2.

Total in-sample observation T	**3724**
threshold	u =1.7
Number of exceedances k	167
% of exceedances in-sample k/T	4.48
GPD shape parameter ξ	0.2051246(0.11312398)
GPD scale parameter β	0.7235175(0.09849234)

Table 2 – Parameter estimates for the POT model in WTI market

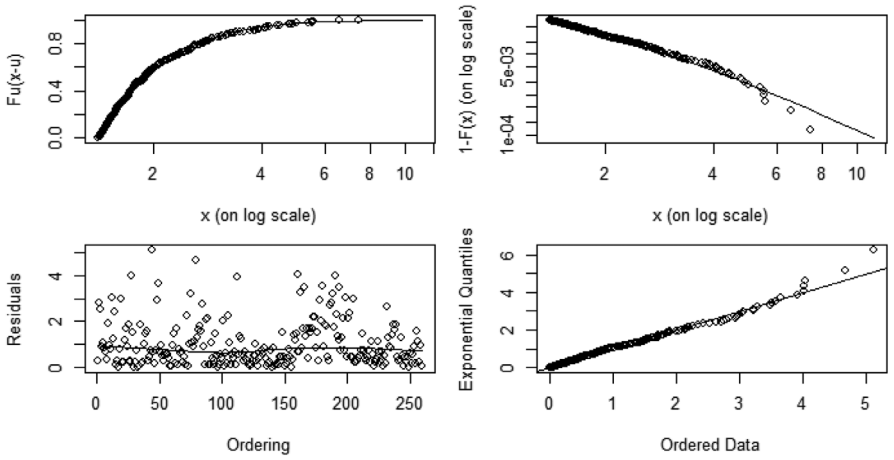


Figure 3 – GPD fit plots for WTI.

The POT method requires a suitable threshold u, values above which are fitted to GPD. To determine how the GPD fits the tails of the return distribution, we plot the empirical distribution of exceedances along with the cumulative distribution simulated by a GPD and compare the results visually in Figure 3. It proposes the empirical excess distribution function follows the trace of a corresponding GPD closely and implies that the threshold in this POT model is appropriate.

Next we use the same daily return data set to quantify static VaR based on the traditional variance-covariance approach. And the values of VaR based on the POT approach and the traditional variance-covariance approach are presented in Table 2.

	$\alpha = 0.99$	$\alpha = 0.975$	$\alpha = 0.95$
VaR in Equation (6)	2.971366	2.149145	1.6222134
VaR in Equation (7)	2.449335	2.063582	1.731812

Table 3 – Static VaR estimates

3.2.2 Backtesting of static VaR

One approach used to evaluate the performance of the value at risk techniques is the two sided binomial test. The theory we used to proceed our backtesting is that the expected number of breaches m which the actual loss exceeds the forecasted the value at risk is $n(1-\alpha)$ if the value at risk model is actual. In other word, if the model is effective, the number of exceedances (which is denoted by m) follows a binomial distribution whose expectation is $n(1-\alpha)$ and variance is $n\alpha(1-\alpha)$. We use the test statistic

$$z = \frac{m - n(1-\alpha)}{\sqrt{n\alpha(1-\alpha)}} \tag{12}$$

Whose approximation distribution is normal distribution.

On the one hand, if the number of exceedances is much larger than $n(1-\alpha)$, the model is considered to underestimate risk. On the other hand, if the number of breaches is too smaller than expected violations, the model is viewed to overestimate the risk. The values of the test statistic z and the numbers of breaches for the two sided binomial test are given in Table 4.

Confidence level	Expected violations	Violation based on Equation (6)	Violations based on Equation (7)	Value of z based on Equation (6)	Value of z based on Equation (7)
$\alpha = 0.99$	38	38	69	0.1251674	5.230679
$\alpha = 0.975$	94	89	99	-0.430335	0.6192626
$\alpha = 0.95$	187	183	153	-0.2406015	-2.496241

Table 4 – Results-backtesting of static VaR in WTI market

From Table 4 , we can find that the method based on the POT model is accepted in this paper at every confidence level ($\alpha = 0.99, 0.975, 0.95$). From another point of view, the method based on traditional variance-covariance with the assumption of normal distribution is rejected at confidence level $\alpha = 0.99$. The abovementioned conclusion is consistent with the result proposed by Kabundi and Muteba (2011) that the peak over threshold method is effective and accurate in high quantiles.

3.3. Dynamic VaR estimation

3.3.1. The VaR based on the GJR-GARCH-EVT model

In this Subsection, followed the model in Subsection 2.2, we first use a GJR-GARCH model to model for the raw returns. In consideration of the AIC, here an ARMA (1,1) model is applied as the mean equation. Table 5 presents the estimated parameters of the mean and volatility equations of the GJR-GARCH model with skewed t-distributed innovations applied to daily return series. Both the constant term and the ARMA(1,1) coefficient in the mean equation are found to be significant. Similarly, the parameters in the volatility equation: the constant, the ARCH(1) coefficient and the GARCH (1) coefficient, are all found to be significant. At the same time, the parameter which is to measure asymmetry of the series is not zero significantly and it illustrates that the GJR-GRACH model instead of GARCH model in the study is necessary.

Next we study the standardized residuals of our model followed subsection 2.2 and some results are given in Table 6.Table 6 presents some diagnostic statistics of raw returns and standardized residuals. The significant value of Ljung–Box Q(16) statistic indicates that raw returns are correlated and hence are not i.i.d as required by EVT, but the standardized residuals are closer to i.i.d as their Q(16) statistic is not significant. Thus the filtering procedure advocated by McNeil and Frey (2000) has been effective in producing i.i.d residuals on which EVT can be implemented. The Q2(16) statistic of standardized residuals also suggests that the GJR-GARCH model is well specified. However, the skewness, excess kurtosis and Jarque-Bera statistics in the table demonstrate that neither the return series nor the standardized residual series are normally distributed. All these findings motivate the second stage in Subsection 2.2 EVT implementation, where the standardized residuals is fat- tailed and skewed is explicitly modeled.

Parameter	Estimate	Std. Error	P-value
u	-0.015000	0.012971	0.247489
α_1	-0.036692	0.016518	0.026324
ω	0.004702	0.001552	0.002452
p	0041289	0.004448	0.000000
q	0.952442	0.003845	0.000000
λ	-0.202634	0.070535	0.004068
skew	1.091199	0.025446	0.000000
shape	7.039731	0.735744	0.000000

Table 5 – Parameter estimates for the GJR–GARCH mode

Statistics	Skew	Kurt	J-B statistic	Q(16)	Q2(16)
Raw returns	0.2485699	5.047643	3998.6 (0.0000)	49.6647 (0.0000)	536.0456 (0.0000)
Standardized residuals	0.3429893	2.537795	1074.756 (0.0000)	10.0352 (0.8648)	21.8893 (0.1468)

Table 6 – Diagnostic statistics of raw returns and standardized residuals in WTI market

On the other view, we plot correlograms for the raw returns and the standardized residuals in Figure 4 and it suggests the raw data are clearly not i.i.d where the standardized residuals are closer to iid, then we can applied EVT to the standardized residuals. At the same time, the adequacy of the GJR-GARCH modeling can be verified by this fact.

As discussed in Subection 2.2, EVT can also be used in a dynamic framework to forecast VaR. In this part of the empirical analysis we use a 2724 day log return moving window to evaluate the daily VaR for our data sample. The advantage of the moving window technique is that it allows us to capture dynamic time-varying characteristics of the data in different time periods. The data period here is approximately 17.5 years which gives us 1000 daily predictions. We choose a higher 10% quantile as threshold u to fit the standardized residuals from the GJR-GARCH model to GPD followed many researchers (see McNeil and Frey (2000), Allen et al. (2013), etc).

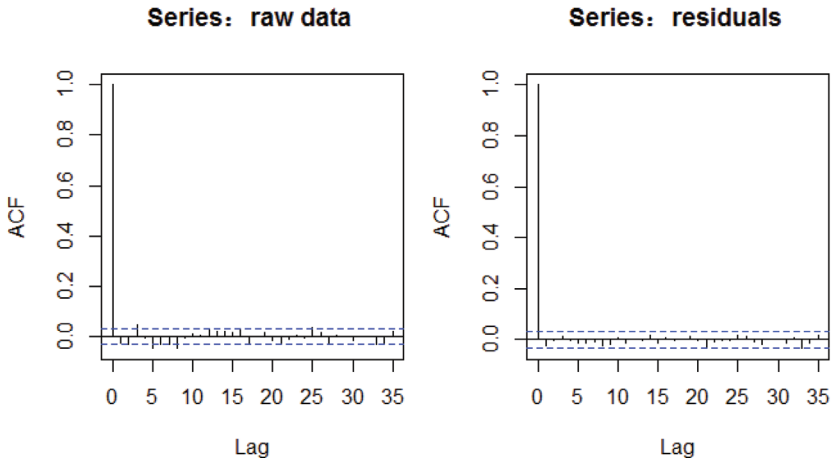


Figure 4 – Correlograms for the raw data and the standardized residuals

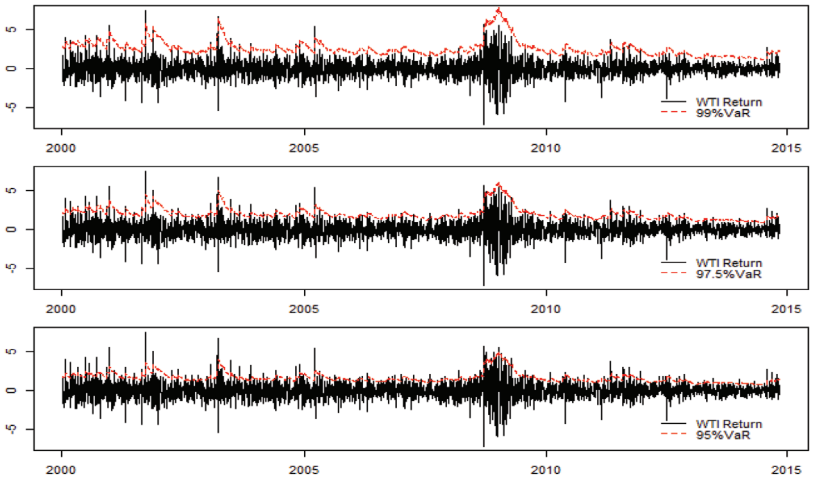


Figure 5 – Compare estimated dynamic VaR with returns.

Figure 5 shows the efficacy of estimated dynamic VaR based on the GJR-GARCH-EVT model. In this figure we plots the returns; superimposed on this figure is the dynamic VaR estimates at different confidence levels. It appears from the figure that the VaR changes quickly to reflect market fluctuations. The VaR also increases in periods of extreme volatility, while the values of VaR appear to be stable for a normal market condition. The fast changing position of VaR in response to market condition is tenable here. In the abovementioned model, the auto regression and asymmetry in returns, conditional volatility clustering, the heavy tails and skewed of the standardized

residuals are all described and accommodated. So these features ensure that VaR estimates from the GJR-GARCH-EVT model at any given time can reflect the most recent and relevant information.

3.3.2. Backtesting of dynamic VaR

In this subsection, in order to verify that the GJR-GARCH-EVT model is efficient and precise, we exercise backtesting on the dynamic VaR estimator not only by the violations introduced in Subsection 3.2.2 but also by the LR statics proposed by Kupiec (1995) which is used widely. The results are presented in Table 7.

	Expected violations	**Violations in GJR-GRCH-EVT model**	**LR statistic**	**Value of z**
$\alpha = 0.99$	38	45	1.531458	1.278025
$\alpha = 0.975$	89	98	0.2601014	0.5143029
$\alpha = 0.95$	183	181	0.1542307	-0.3909774

Table 7 – Results-backtesting (dynamic VaR)

The results in Table 7 reveal that the actual violations are very approximate to the expected violations at every confidence level and the results manifest that the model forecasts the VaR preferably.

4. Conclusions

As the volatility in the financial market increases, implementing an effective risk management system becomes more and more important. In risk management, the VaR methodology as a measure of market risk is widely accepted and used in both institutions and regulators. The high volatility of the WTI market demands the implementation of effective risk management. EVT is a successful and valid theory to estimate the effects of extreme events in fluctuating markets where extreme values may appear based on sound statistical methodology.

In this paper, on one hand, we pay attention to the POT method based on EVT which provides a statistical model for fitting extreme values above a threshold. In the empirical study, we demonstrates that EVT can be used to forecast VaR more accurate than the traditional variance-covariance approach. It is because that EVT provides more comprehensive results as it can model the extremes in a distribution which are less captured by models that based on the assumption of normality in the data. On the other hand, this study exhibits how to apply EVT to the daily return series and forecast the VaR which is used to measure the tail-related risk. The EVT based traditional models are usually applied to measure static market risk and they often neglect the stochastic

volatility and conditional heteroscedasticity of most financial data. To overcome this drawback, we refer to McNeil and Frey (2000) and combine the GJR-GARCH-EVT model. In this paper, as the return series are asymmetrical, skewed, fat-tailed, autocorrelation and stochastic volatility, we first model the skewed t-distribution with GJR-GARCH model for the raw returns. Then the standardized residuals from the GJR-GARCH are verified that they are similar to i.i.d, so that EVT models can be applied to them. However, the residuals are not normally distributed, so it is more appropriate that we use EVT based models than normal distribution based models to analyze the standardized residuals. Application in the study captures the heavy-tailed behavior in daily returns and the asymmetric characteristics in distributions.

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Neural Network Data Mining Application in Health Education and Intervention Effect of Health Risk Behaviors among College Students

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Abstract: In order to explore the effective method to reduce health risk behaviors of college students, by using questionnaire investigation, tracking experiment and data mining method, the author analyze intervention effect of health risk behaviors based on health qigong and education. Data mining is a kind of intelligent and integrated application technology, the results showed that there was a significant difference between diet and health risk behaviors, physical exercise and sleep ($P<0.01$). Compared with the previous experiment, the proportion of the students who have fixed exercise 3 times per week and each time of exercise 30min has increased 33% and 70%. So that, comprehensive intervention model can relieve college students' mood and enhance students' physical fitness, which has a significant effect on reducing the health risk behavior of college students.

Keywords: Neural network, Data mining, Health risk behaviors, Health education

1. Introduction

Adolescent health risk behavior refers to all the behaviors that cause direct or indirect damage to the health of young people, and even the quality of life. It directly crisis adolescent health and life, and the resulting health and social problems have become a global hot issue (Asudi, 2015). Unhealthy lifestyles and harmful health behaviors have become the main cause of people's health, leading to disease and death (Chen, 2002). In order to explore the suitable methods to reduce health risk behaviors among college students in China, to reduce health risk behaviors of potential negative effects on College Students' life, in view of the influence of health risk behavior of college students themselves and the external reasons, try to use Chinese traditional health culture represents the comprehensive mode of combination of fitness Qigong and health education respectively from the thought and cognition physical exercise intervention, in order to quickly reduce the health risk behaviors of college students, and enhance students "health first" philosophy of life, promote students to develop a good way of life lifelong benefit.

With the development of computer and network technology, the relevant information is very simple and easy to be realized (Douglas, 1997; Ji, 2007). But for a large amount

of data concerning wide fields, the former simple summary, according to the specified model to analyze the statistical method is unable to complete the analysis of such data (Jabbour, 2014). Therefore, data mining is born. Data mining is a kind of intelligent, comprehensive application of various statistical analysis, database, and intelligent language to analyze large data technology. The neural network is a set of connected input / output units, each of which is connected to a power. In view of the good learning ability of neural network, a data mining method based on neural network is proposed.

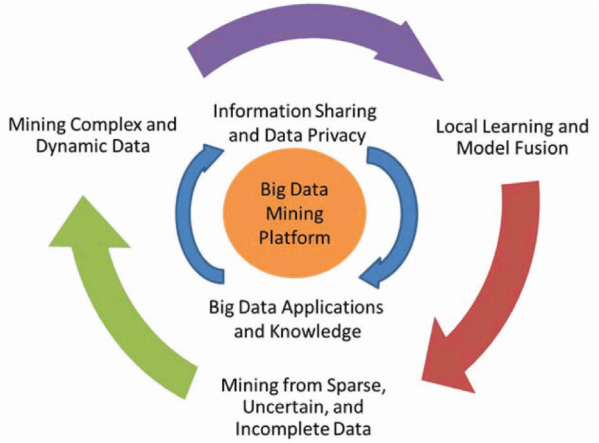


Figure 1 – Big data mining

2. Neural network data mining

In a simple way, data mining is to extract or "dig" knowledge from a large amount of data. Data mining is a process, which uses one or more kinds of computer learning techniques to automatically analyze and extract knowledge from the data of the database. The knowledge acquired by data mining is given in the form of a model or data generalization (Vachon, 2006). Knowledge discovery in database is a term that can be exchanged with data mining, and the use of frequency is very high. KDD is the application of data mining method. The work flow of data mining mainly includes: the pre selection data, access to knowledge, data cleaning and pretreatment, the judgment function type, data mining according to the mining algorithm, data conversion, output expression and comprehensive analysis. The whole working process of data mining is shown in Figure 2.

Neural network presents a mathematical model, which attempts to mimic the human brain. Knowledge is often represented as a hierarchical set of processing units that are connected to each other (Yang, 2001). These processing units are usually called neurons, which indicate the relationship between the brain and the brain. Each node has a weighted connection between the other nodes on the adjacent level. Each node

from the node connected to the input, and combined with a simple function, the use of weights to calculate the output value. A neural network is an information processing system consisting of one or more neurons. For the M neural network with input nodes and output nodes of the N, the relationship between input and output can be regarded as a mapping model of m dimensional Euclidean space to n-dimensional Euclidean space. The error between the actual output of the network and the expected output is a measure of the performance of the network. The neurons are the basic units of the neural network, the general performance of the nonlinear operation device of a multi input and single output, the network structure can be shown from a single neuron structure, there are three basic elements: (1) a group, the connection strength is expressed by the weight of each connection, and the weight is positive, and is negative. (2) a sum of units, used to obtain the weight of each input signal and (linear combination). (3) an activation function, which plays the role of nonlinear mapping and limits the output amplitude of neurons to a certain extent.

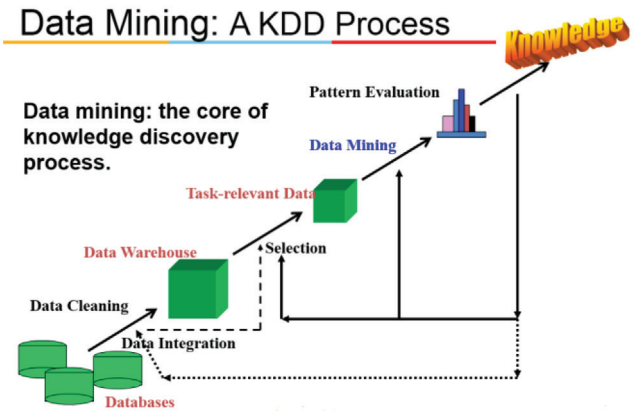


Figure 2 – Data mining workflow

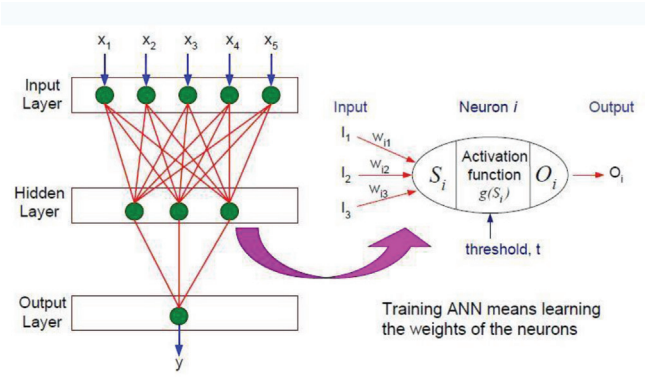


Figure 3 – The neural network

The advantages of data mining based on Neural Network: (1) the neural network can work very well when the data contains a lot of noise input data. Neural network evaluation function, such as S shape function can naturally smooth the external and random errors caused by input data variation. (2) the neural network not only can handle and predict the numbers, but also can process and predict the classification results. However, the transform of categorical data is a difficult problem. (3) the neural network can be used to request the information contained in the data in the data. The first condition of data mining is to have data, of course, it is not enough to have the data. Data preparation is a necessary step in the implementation of data mining. Data preparation is the definition, processing and representation of data, and these data are the data after mining, finally make it adapt to the specific data mining methods. Data preparation is divided into 4 steps: data cleaning, data selection, data preprocessing and data representation.

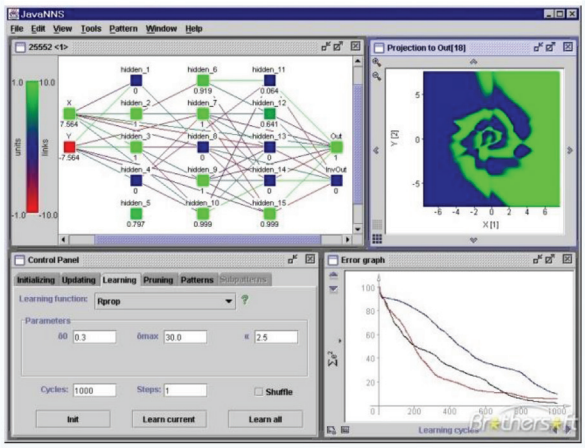


Figure 4 – The neural network

3. Object and methods

3.1. Object

In September 2012, stratified by grade 1000 college students (250 people each year) by random sampling questionnaire survey of health risk behaviors, and then sorted according to the questionnaire score, a total of 100 points, the highest health risk behaviors of college students from the serious as the experimental intervention object.

3.2. Methods

Questionnaire based on the Chinese adolescent health related behavior questionnaire (University) as the basis, reference to the United States CDC youth risk behavior monitoring system (YRBSS), the relative stability of the questionnaire. Interpretation of the questionnaire, the supervision of the students to complete the questionnaire, the release and recovery of the questionnaire are completed by the experimental teacher. Before the

experiment, 1000 questionnaires were issued, 947 were recovered, 921 questionnaires were selected, and the effective rate was 97.25%. After the end of the experiment, second questionnaires were carried out. After six months, third questionnaires were monitored, 100 questionnaires were distributed, and 100 questionnaires were recovered. The data were analyzed by SPSS16.0, compared with the rate of X^2 test.

3.3. The experiment design

According to the research purpose and subject characteristics, carefully designed experiment contents and steps in a comprehensive and detailed understanding of the subjects, psychological needs and exercise habits, exercise capacity on the basis of establishing reasonable 16 weeks intervention plan. The specific implementation plan is as follows:

The exercise prescription intervention program: every Monday, three, five in the morning to 90min Health Qigong exercises.

Intervention design: 100min health education lectures every Sunday night.

4. The experimental results and analysis

4.1. Health risk behaviors of college students before and after intervention

Through the investigation of the health risk behaviors of college students, we can see that: (1) the comprehensive intervention has good effect on the health risk behaviors of College Students' diet. The end of the experiment, compared with before the experiment there was a significant difference ($P < 0.01$), the various dietary risk behaviors were significantly decreased, especially the unbalanced diet, eat three meals a day is not the law, high salt diet, do not eat breakfast, overeating intervention effect is most obvious, the decline was more than 40%. (2) after half a year, it was found that there were different degrees of differences in the proportion of the dietary risk behaviors compared with the experimental results, but there was no significant difference compared with the end of the experiment ($P > 0.05$). Some unhealthy dietary behaviors such as high salt diet, overeating, showed a continued downward trend, some unhealthy dietary behaviors have rebounded, but the proportion is significantly lower than before the experiment (Table 1).

4.2. Before and after the intervention of college students to participate in physical exercise

Through the survey found: (1) the end of the experiment of college students to participate in physical exercise compared with before there was a significant difference ($P < 0.01$), the proportion of students weekly exercise more than 3 times and every movement of more than 30min were increased by 33% and 70%. (2) six months after the end of more than 3 times the weekly exercise and exercise more than 30min when compared with the experimental students proportion decreased, and the difference was not significant ($P > 0.05$), and much higher than the proportion of students before the experiment (Table 2).

Project	Before the experiment	End of experiment	Six months later	Project	Before the experiment	End of experiment	Six months later
High salt diet	66.00	14.00**	7.00**	Unbalanced diet	74.00	8.00**	8.00**
Too much to eat snacks	25.00	7.00**	8.00**	Do not eat soy foods daily Vegetable & Fruit	17.00	4.00**	6.00*
High fat and high sugar diet	12.00	2.00**	1.00**	Eat three meals a day is not regular	61.00	5.00**	6.00**
Partial eclipse	37.00	4.00**	3.00**	Do not eat breakfast	49.00	3.00**	5.00**
Picky	28.00	5.00**	3.00**	Eat less than 1 eggs a week	36.00	3.00**	5.00**
Hobby foods containing carcinogens	13.00	2.00**	1.00**	Three meals a day is not fixed	42.00	24.00**	28.00*
Binge eating	46.00	6.00**	4.00**	Daily at bedtime with supper	29.00	5.00**	6.00**
Over heat, strong, too cold, too sour diet	21.00	5.00**	3.00**	Dieting to lose weight in the first two weeks	7.00	0.00**	0.00**
Daily drink carbonated drinks 500ml and above	35.00	9.00**	11.00**	Eat too fast	29.00	8.00**	8.00**

Note: the end of the experiment is compared with the previous experiment P＜0.01**、 P＜0.05*;after half a year, compared with the former experiment P＜0.01**、P＜0.05*

Table 1 – Comparison of health risk behaviors of university students' diet before and after experimental intervention

Project	Almost no exercise	Occasionally once per week	Less than 3 times per week	3 times per week and above	Each exercise 30min above
Before the experiment	39.00	35.00	17.00	9.00	21.00
End of experiment	0.00**	0.00**	58.00**	42.00**	91.00**
Six months later	1.00**	2.00**	63.00**	30.00**	82.00**

Note: the end of the experiment is compared with the previous experiment $P<0.01$**; after half a year, compared with the former experiment $P<0.01$**

Table 2 – Before and after experimental intervention, college students take part in physical exercise

4.3. Smoking and drinking behavior of college students before and after the intervention

From table 3 and half a year after college students before and after the intervention of smoking and drinking situation: (1) compared with the experiment before the end of the experiment, and half a year after the student smoking and alcohol adverse situation improved markedly, often a large number of drinking and smoking 5 cigarettes per day, the proportion of students decreased greatly. (2) at the end of the experiment, never smoking and not drinking compared with before the experiment were increased by 22% and 15%, in addition to a day less than 5 branch group and 10 branch group, the proportion of students every day, compared with before has no significant difference ($P > 0.05$), the remaining groups were compared with before showing different degrees of difference. (3) after six months, the smoking and drinking of individual students were repeated, but compared with before the experiment, the amount of smoking and alcohol consumption decreased significantly, and the difference was not significant ($P > 0.05$) (Table 3).

4.4. Before and after the intervention of sleep and other pathological behavior of College Students

Through the survey of college students before and after the intervention, sleep and other pathological behavior can be seen: the students sleep and other pathological behavior showed significant improvement in the situation in the experiment after the intervention, students use the computer time is reduced, daily use of computer more than 6h by 41% to 25% before the experiment. Sleep and sedentary compared to the proportion of students were very significant difference before the experiment and at the end of the experiment and after half a year ($P < 0.01$); the proportion of students with the experimental 8h computer BMI index and every day were significant difference ($P < 0.05$). Although the first half after staying up late, insomnia, sleep behavior ratio has increased, but significantly lower than before the experiment (Table 4).

Project	Before the experiment	End of experiment	Six months later	Project	Before the experiment	End of experiment	Six months later
Never smoke	31.00	53.00**	49.00**	Never drink	7.00	22.00**	21.00**
Every day is less than or equal to 5 branches	41.00	33.00	34.00	Occasionally a small amount of beer or liquor	32.00	47.00*	44.00
10 to 6 per day	22.00	11.00*	13.00	Occasionally a large amount of beer or liquor	39.00	22.00**	25.00*
Every day more than 10	6.00	3.00	4.00	Often a large amount of beer or liquor	22.00	9.00*	10.00*

Note: the end of the experiment is compared with the previous experiment P＜0.01**、 P＜0.05*; after half a year, compared with the former experiment P＜0.01**、P＜0.05*

Table 3 – The situation of smoking and drinking behavior of college students before and after experimental intervention.

Project	Before the experiment	End of experiment	Six months later	Project	Before the experiment	End of experiment	Six months later
Often stay up late	49.00	11.00**	21.00**	Obesity BMI index > 23	29.00	17.00*	16.00*
Sleep less than 8h	59.00	11.00**	31.00**	Use the computer 4H the following /d	21.00	32.00	39.00
Insomnia, poor sleep quality	61.00	15.00**	26.00**	Use computer 4 - 6h/d	38.00	43.00	36.00
Go to bed after 12 p.m.	56.00	18.00**	20.00**	Use computer 6 - 8h/d	22.00	18.00	16.00
Sedentary	42.00	19.00**	16.00**	Use the computer 8h more than /d	19.00	7.00*	9.00*

Note: BMI index=weight (KG)/ Height (m) of the square; the end of the experiment is compared with the previous experiment P＜0.01**、 P＜0.05*; after half a year, compared with the former experiment P＜0.01**、P＜0.05*

Table 4 – Before and after experimental intervention, the situation of sleep and other pathological behaviors of College Students

4.5. Before and after the intervention of adverse psychological and disease behavior of College Students

From the table 5 research data analysis: the end of the experiment and half a year after the adverse psychological and disease behavior of the proportion of students was significantly decreased, compared with the previous experiment showed very significant difference ($P < 0.01$). Although there was an increase in the proportion of students with individual negative psychological and behavioral disorders after six months, the proportion was far lower than that before the experiment, and there was no significant difference compared with the end of the experiment ($P > 0.05$).

Project	Before the experiment	End of experiment	Six months later	Project	Before the experiment	End of experiment	Six months later
Don't love to communicate with people	32.00	13.00**	13.00**	Conceal disease	23.00	4.00**	5.00**
Love sulking	47.00	11.00**	17.00**	Fear of disease	19.00	2.00**	2.00**
Often anger	24.00	7.00**	10.00**	Do not follow the doctor's advice	45.00	11.00**	13.00**
Often impatient with people, hostility	23.00	6.00**	9.00**	Sick doctor	34.00	10.00**	12.00**
Depressive emotion	38.00	12.00**	19.00**	Do not take the initiative to regular physical examination	64.00	12.00**	12.00**
Masochistic	17.00	2.00**	2.00**	Indiscriminate use of tonic medicine	31.00	5.00**	8.00**

Note: the end of the experiment is compared with the previous experiment $P<0.01$**; after half a year, compared with the former experiment $P<0.01$**

Table 5 – Investigation of unhealthy psychology and disease behavior of college students before and after experimental intervention

5. Discussion

From table 1 to table 6 statistical data before and after the intervention can be seen, the situation of health risk behaviors among college students is serious, significant results achieved after 16 weeks of intervention, incidence of various health risk behaviors of college students are greatly reduced. The new model of comprehensive intervention is conducive to the elimination of bad habits of college students, so that students establish the correct concept of health care, to reduce the occurrence of health risk behaviors of college students is effective and sustainable. The constitution of traditional Chinese

medicine believes that the formation of different physical factors are congenital, age, sex, spirit, living conditions and diet, geographical environment, disease, physical exercise, social factors, etc.. Physical factors and the incidence of a great correlation, the particularity of the individual physical, often lead to a pathogenic factor or disease susceptibility. The nature and pathological process of the disease are closely related to the constitution of the patient. The evolution of the disease often depends on the tendency of the internal Yin and Yang contradiction movement.

After 16 weeks of qigong practice, increase the subjects and the nature of the exchange, the mental state and work action, one God together, to ease the pressure caused by the impact of a variety of nervous tension and fatigue, strong physique. At the same time, the organization of the exercise mode to meet the interest of college students, is conducive to enhance the emotional communication. The more the subjects are put into practice, the more you can cultivate aesthetic sentiment and confidence, the more likely it is to enjoy the sport to bring happiness, let the subjects fixated on qigong imperceptibly, to achieve "three integration", improve blood circulation, regulate viscera effect. And health education from students' thoughts and cognition on fully correct the influence of external environment caused by false beliefs and practices, and is beneficial to the students after the auxiliary life diet, health, health and other related theory of traditional Chinese medicine education, let the students understand the "emotion", "Shun four", "adjusting the diet" living "," health sense, so that students from the thought more clearly the importance of health, achieve "prevention before disease".

Six months after the intervention, the subjects were tested. The aim was to track the changes of the subjects' behavior, the effect of the comprehensive intervention, and summarize the comprehensive intervention methods and contents of the previous stage. From the measurement table 1 to table 6 after half a year, no repeated phenomenon of health risk behaviors of college students, and to continue to reduce the development of the situation, although the individual health risk behaviors occur and the proportion of the end of the experiment, compared to the increase, but the proportion is significantly lower than that before experiment. This is mainly with the end of the experiment, students can also take a positive attitude to actively participate in physical exercise, to resist the occurrence of health risk behavior has a direct correlation. Because of their psychological needs in correcting all kinds of bad habits when given a reasonable guidance, make corrective effect after the intervention has not been weakened, but has been consolidated and strengthened so as to solve the problem of repeated. On the other hand, it also shows that our comprehensive intervention is feasible and sustainable. The individual health risk behavior appears repeatedly mainly because of the students' self will is not firm and easy to be affected by the influence of outside factors. For this kind of situation, we need to carry on the long-term experiment intervention. Therefore, the use of the intervention, the length of time is the direction of the project to continue to study in the future.

6. Conclusions and recommendations

1. Health Qigong comprehensive intervention with health education mode can relieve emotion and enhance the physical fitness of students, enable students to establish a correct concept of health, the effect of reducing health hazard

behavior of college students has significant and strong sustainability. In the experiment, the proportion of health risk behaviors was significantly decreased, although the proportion of individual health risk behaviors was increased after half a year, but the proportion was significantly lower than that before the experiment.

2. The canteen food delicious, not affected by others, and family time class, family economic difficulties, learning pressure, social position, communication, part-time employment, lack of deep communion, hospital fees are too high, substandard drugs exposure is caused by the students in the experimental intervention during the first half of the individual health hazards the main reason of the recovery behavior.
3. The specific reasons for the school and the relevant departments should be accurate analysis of health risk behaviors in college students has, then select and establish scientific and reasonable mode of interventions, increase the campus health lifestyle propaganda efforts to carry out various forms of health knowledge lecture. Increase the number of public sports hours, the health and health related content into the physical education, and to ensure that two hours per week, the number of hours of teaching.
4. To enhance students' awareness of health care, using a variety of psychological counseling means more communication with students, to solve students' difficulties, students do not correct the correct way of life, strengthen self-education and self-discipline, strengthen the sports hardware investment, carry out various forms of sports activities, to attract students to participate in the movement to reduce the harm healthy behavior

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Meta-analysis on the Relationship between Knowledge Integration Capability and Core Competence

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Abstract: Based on 45 empirical study papers on the relationship between knowledge integration capability and core competence, using meta-analysis and meta-regression analysis method, this paper discusses the relationship between enterprise knowledge integration capability and core competence. The study shows that: Knowledge integration ability has significant positive effect on the core competence; the four measuring dimensions of knowledge integration capability have significant positive effect on the core competence; there will be no obvious relationship between knowledge integration capability and core competence if there is no mediating variable; the correlation between knowledge integration ability and core competence will be more significant under the China mainland culture background when compared with other culture background.

Keywords: knowledge integration capability; core competence; meta analysis; regression analysis

1. Introduction

With the rise of knowledge economy, knowledge gradually replaces the land, labor, and capital to become the important resource in enterprises. A large amount of enterprises in China start to take the knowledge integration capability as a key to improve the competitiveness. (Korean scholars, Yong Jin Kim & Seokoo Song, 2012) found that the knowledge integration capability has positive effects on competitiveness after studying 146 Korean enterprises. Chinese scholars analyzed the relationship between knowledge integration capability and competitiveness with traditional manufacturing, national defense industry, and non-traditional industries as research objects. They also found that there is a positive correlation (Li Yaping,2012; Du Yuwen,2008).

According to relevant references about knowledge integration capability and competitiveness, foreign scholars made a large amount of researches since 1980s. These researches aim at the effects of knowledge integration capability on competitiveness and the way of such effects. However, the results about the effects are different mainly in

aspects of improvement level, variable dimension, and industrial difference. American scholars, (Andreas Garstenauer & Tim Blackburn,2014) and (Barbara Beliveau & Eldon H. Bernstein,2011) investigated the traditional industries and non-traditional industries in America, respectively. They found that there is only a weak correlation between knowledge integration capability and competitiveness. Chinese scholars, (Xie Hongming, Ge Zhiliang& Wang Cheng, 2008) investigated 190 enterprises in 11 traditional industries of south China. They found that there is a direct and significant positive correlation between knowledge integration capability and the competitiveness of traditional enterprises. (Si Wengeng and Jiang Tianying, 2012) made a questionnaire survey among 82 hi-tech enterprises in Zhejiang. By analyzing 148 effective samples, they found that knowledge integration capability plays a role of complete mediation between social capital and competitiveness. Therefore, the knowledge integration capability has significant positive correlation to the competitiveness. Both domestic and foreign scholars found the positive effects of knowledge integration on competitiveness by research, but there is difference in the effect degree.

Domestic and foreign scholars have not achieved consent in the effect degree of knowledge integration capability on the competitiveness. In order to correctly and objectively analyze the effect degree, this work collected the single studies on the relationship between knowledge integration capability and competitiveness. Based on the hypothetical model of theory, all the content and results in collected single studies were analyzed comprehensively by Meta analysis. Therefore, the correlation between knowledge integration capability and competitiveness in universal layer was discussed. Then, the effects of different dimensions in knowledge integration capability on competitiveness were analyzed and compared and effects of intermediate variables, cultural difference, and industrial difference on the relationship studied. It is expected to provide rational explanation to the difference in the relationship between knowledge integration capability and competitiveness and practical enlightenment to the competitiveness improvement.

2. Correlation theory and hypothesis

2.1. Knowledge integration capability

In the view of organizational ability, Teese and Grant thought that knowledge integration capability is the essence of enterprise organizing ability. In the market with fierce competition, the enterprises must have the management ability integrating and allocating internal and external resources. In other words, enterprises should adjust the enterprise operation according to the environmental changes in time. Moreover, enterprises should be able to adapt the changes of external environment by using, integrating, and reorganizing the knowledge, skills, resources, and functions inside and outside of the enterprise. Inkpen indicated that knowledge integration capability is the capability to transfer and share the knowledge obtained by enterprises and individuals through network relation. Such a capability is significant for enterprises in acquiring competitive advantages.

Knowledge integration capability has become the most strategic important resource in the enterprise. Therefore, scholars analyze the knowledge integration capability in different views and layers. Domestic scholars, (Li Yaping,2012) and (Li Yijing, 2007)

studied the national defense industry and copper manufacturing enterprises. They found that knowledge integration capability plays a significant role in enterprises. Meanwhile, Li Yijing proposed that knowledge integration capability generally includes knowledge acquisition, knowledge sharing, knowledge transfer, and knowledge application. Moreover, new knowledge can be acquired during the practice to form a cycle. Therefore, knowledge integration capability has strategic significance for enterprises by improving the use value of knowledge in this cycle.

2.2. Relationship between knowledge integration capability and competitiveness

The knowledge integration capability has become an important strategic resource of enterprises. Therefore, the role of this capability gradually becomes significant for enterprises to maintain the competitive advantages. To promote the competitiveness, enterprises start to study the knowledge integration capability. (Andrew O Agbada PhD, 2013) studied 540 effective samples of banking industry in Nigeria. He found that knowledge integration capability can affect the competitiveness of local banks in dimensions of knowledge acquisition, knowledge sharing, knowledge transfer, and knowledge application. (Esmaei Shaaban & Heidar Ahmadi, 2012) and (Hira Waheed & Tahir Masood Qureshi, 2013) studied the hi-tech industry in Iran and Pakistani, respectively. The effect degree of knowledge integration capability on enterprise competitiveness they found is different from that in the conclusion made by Andrew O Agbada PhD. However, in all of these studies, the knowledge integration capability has significant positive effects on the competitiveness. On contrary, the studies on the relationship between knowledge integration capability and competitiveness by foreign scholars, (Andreas Garstenauer and Tim Blackburn, 2014; Kimble et al., 2016) and Chinese scholars, (Jiang Tianying, 2013) and (Zhu Xiumei, 2011) show that the positive effect of knowledge integration capability is weak on competitiveness.

Based on above analysis, this work proposed following hypothesis:

H1: Knowledge integration capability has a significant positive effect on competitiveness.

2.3. Effects of knowledge integration capability in various dimensions

Foreign scholars, (Barbara Beliveau and Eldon H. Bernstein, 2011) have proved that the four measurement dimensions of knowledge integration capability (knowledge acquisition, knowledge transfer, knowledge sharing, and knowledge application) have positive effects on competitiveness after studying American software enterprises. Moreover, (Esmaei Shaabani & Heidar Ahmadi, 2012) made the similar conclusion as Barbara Beliveau after analyzing the non-traditional enterprises in Iran. Chinese scholars, (Xie Hongming, 2008), (Sun Lingzhi,2014), (Zhu Meirong,2013), and (Yao Ligen, 2014) found that the four measurement dimensions of knowledge integration capability have positive effects on competitiveness after studying Chinese hi-tech industry and traditional industry. Meanwhile, (Reinout E.de Vries & Bart van den Hooff, 2006), (Huang Lijun, 2009), and other scholars also concluded that the knowledge integration capability has positive effects on the competitiveness by studying only one dimension, such as knowledge sharing and knowledge transfer.

Based on above analysis, this work proposed following hypothesis:

H2a: The dimension of knowledge integration capability, knowledge acquisition has significant positive effects on competitiveness.

H2b: The dimension of knowledge integration capability, knowledge sharing has significant positive effects on competitiveness.

H2c: The dimension of knowledge integration capability, knowledge transfer has significant positive effects on competitiveness.

H2d: The dimension of knowledge integration capability, knowledge application has significant positive effects on competitiveness.

2.4. Potential regulated variables

The results of studies on the relationship between knowledge integration capability and competitiveness by foreign and domestic scholars show some differences. This means that the relationship may be affected by some potential regulated variables. Compared with the source of general regulated variables, the regulated variables affecting the relationship between knowledge integration capability and competitiveness are mainly from current references which are organized in Meta-analysis. These variables include mediating variables, cultural background, and industrial factors.

1. Mediating variables

According to contingency theory, there are different potential variables affecting the relationship between knowledge integration capability and competitiveness in different organizations and environment. Moreover, the theory explains the effects of mediating variables on the relationship between knowledge integration capability and competitiveness. The conditions to realize the significant positive effects of knowledge integration capability on competitiveness were analyzed. (Shu-Mei Tseng & Pei-Shan Lee,2014) analyzed and studied the middle- and small-scale enterprises in Taiwan. They found that knowledge transfer has direct positive effects on the competitiveness. (Si-hua Chen, 2012), (Jen-Te Yang, 2015) and other scholars studied the direct significant effects of all dimensions in knowledge integration capability on the competitiveness, respectively. According to the studies by (Hayati Abdul-Jalal, Paul Toulson& David Tweed, 2013), (Andreas, 2014), (Wei Chenglong, 2009), et al., there are mediating variables between knowledge integration capability and competitiveness. However, the correlation coefficient between these two is up to 0.7, which means high correlation. This result is different from the studies by the most scholars (Kuo En Huang, Huan Ming Chuan&Chu Chun Huang, 2014).

Based on above analysis, this work proposed following hypothesis:

H3: The positive effects of knowledge integration capability on competitiveness is more significant in the condition without mediating variables, compared with the condition with mediating variables.

2. Cultural background

In general, it is believed that western culture is more beneficial to the knowledge integration capability than the relatively implicit value idea in the east. Scholars, (Marta Mas-Machuca & Carme Martinez Costa,2012) found that the correlation coefficient between knowledge integration capability and competitiveness is 0.8 by studying the

enterprises in Catalonian of Spain. The coefficient shows that the correlation degree is high, which is different from the result of empirical study with enterprises in China mainland as samples. The studies of scholars, (Xu Fangqiu, 2009), (Sun Lingzhi, 2014), (Reinout E.de Vries, 2006), (Margaret L. Sheng, 2013), et al. were organized. It is found that the degree of correlation between knowledge integration capability and competitiveness in the cultural background of China mainland is higher than that in the cultural background of non-China mainland.

Based on above analysis, this work proposed following hypothesis:

H4: The positive effect of knowledge integration capability on competitiveness in the cultural background of China mainland is more significant than that in the cultural background of non-China mainland.

3. Industrial factors

This work comprehensively analyzed the studies on traditional industry by (Mei-Tai Chu,2014), (Niksa Alfirevic,2005), (Chen Wei,2014), (Hong Jiangtao,2013) and those on hi-tech industry by (Hayati Abdul-Jalal,2013), (Hira Waheed,2013), (Chen Jianxun,2009,2008), and (Huang Lijun,2009). Compared with the traditional industry, the hi-tech industry has more significant positive effects on the competitiveness. However, there is also the exception. Chinese scholars, (Li Yaping,2012) et al. found that the coefficient of correlation between knowledge integration capability and competitiveness in traditional industry is up to 0.832, which is different from the relationship strength in general hi-tech industry.

Based on above analysis, this work proposed following hypothesis:

H5: The effect of knowledge integration capability on competitiveness is more significant in hi-tech industry than that in traditional industry.

According to the theoretical analysis and hypothesis about the correlation between knowledge integration capability and competitiveness, the hypothesis framework of the study on the correlation was established as shown in Fig.

3. Research method

Meta-analysis is mainly used to organize and conclude the empirical studies with several same research subjects but different results. Then, the correlation between research variables can be further defined by reanalyzing the statistical indexes and potential regulated variables in all research samples. At present, there have been a large amount of empirical studies on the relationship between knowledge integration capability and competitiveness. However, there is difference in various research results. Therefore, in order to better analyze the effect degree of knowledge integration capability on competitiveness, this work made a comprehensive empirical analysis on the relationship between knowledge integration capability and competitiveness by Meta-analysis.

3.1. Research samples

Firstly, the search was conducted with knowledge integration, knowledge acquisition, knowledge transfer, knowledge sharing, knowledge management, and core

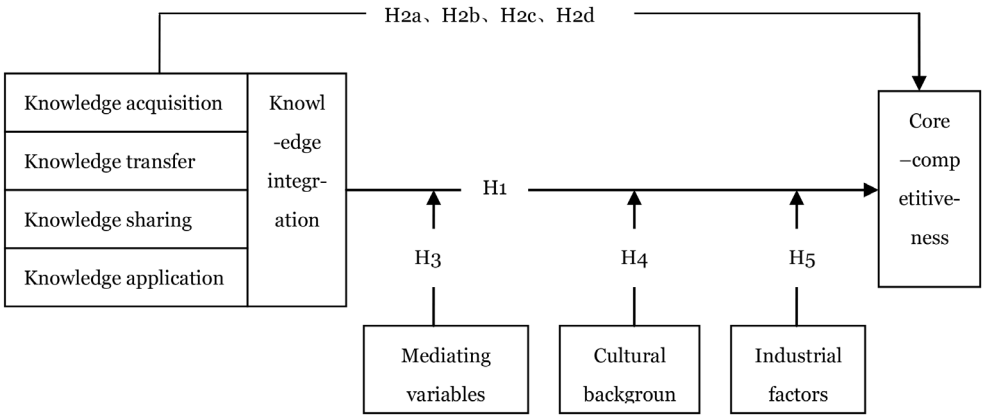


Figure 1 – Overall hypothesis framework of research

competitiveness as key words and 2005-2015 as timeline in VIP database, Chinese Journal Full-text Database (CJFD), EBSCO, Springer Link, and other databases. Then, screening was conducted to collect studies with clear content of the relationship between knowledge integration capability and competitiveness and correlation coefficient of the relationship. Finally, 45 papers were screened.

3.2. Heterogeneity test

This work processed the original data by Meta analysis. Relevant effect sizes were obtained by converting T value, F value, D value, chi-square value, and other statistical variables in empirical studies. The final effect size was generally obtained by weighted average method for the effect of knowledge integration capability in different dimensions on competitiveness. Moreover, the effect degree of knowledge integration capability on competitiveness was measured with the effect size. In some collected references, the knowledge integration capability was not strictly classified into knowledge acquisition, knowledge sharing, knowledge transfer, and knowledge application. Therefore, these references were summarized into four dimensions of knowledge integration capability according to the content. All of 45 papers were processed uniformly. Finally, the selected 45 references were imported into CMA2.0 (comprehensive meta analysis 2.0) for heterogeneity test. The results are shown in Table 1.

Model	Effect size	Sample volume	Heterogeneity test			Two-tailed test		95% confidence interval	
			Q value	Df (Q)	I-squared	Z value	P value	Lower limit	Upper limit
Random model	0.550	9772	888.730	44	95.049	13.330	0.000	0.483	0.610

Table 1 – Heterogeneity of inspection effect value

According to Table1, Q statistical value is 888.730 which is larger than the chi-square value of corresponding number. This means that the 45 empirical studies on the relationship between knowledge integration capability and competitiveness in this work have heterogeneity. Therefore, the random effect model was selected for analysis. Finally, the overall correlation between knowledge integration capability and competitiveness is 0.550. In other words, hypothesis H1 establishes that the knowledge integration capability has significant positive effect on competitiveness. I-squared value is 95.049% which means that the difference in effect size causes 95.049% observation variation, while the random error causes 4.951% observation variation. Therefore, there are potential variables which affect the relationship between knowledge integration capability and competitiveness in sample data.

4. Empirical analysis

4.1. Analysis on various dimensions of knowledge integration capability

By organizing relevant references, the knowledge integration capability has effects on competitiveness in dimensions of knowledge acquisition, knowledge transfer, knowledge sharing, and knowledge application. CMA2.0 software was used to make Meta analysis results of various dimensions in research samples. The results are shown in Table 2.

Class	Effect size	Reference number	Heterogeneity test			Two-tailed test		95% confidence interval	
			Q value	Df (Q)	I-squared	Z value	P value	Lower limit	Upper limit
KA	0.568	24	461.140	23	95.012	9.690	0.000	0.473	0.650
KT	0.606	18	369.974	17	95.405	8.460	0.000	0.493	0.699
KS	0.545	23	479.331	22	95.410	9.147	0.000	0.446	0.630
KU	0.553	32	605.618	31	94.881	11.332	0.000	0.474	0.624

Table 2 – Analysis test result of each dimension on knowledge integration

Table 2 shows that all the four dimensions of knowledge integration capability have significant positive effects on competitiveness. Moreover, the effects of knowledge transfer is the most significant with effect size up to 0.606. The positive effects of knowledge acquisition, knowledge sharing, and knowledge application on competitiveness are also significant with effect size about 5. The effect sizes of these four dimensions are all verified by Meta analysis. Therefore, hypothesis, H2a, H2b, H2c, and H2d establish.

4.2. Analysis on effects of potential regulated variables

According to the heterogeneity test for the effect size of research samples, the I-squared value is 95.049% which means that the difference in effect size causes 95.049% observation variation, while the random error causes 4.951% observation variation. Therefore, there are potential variables in sample data affecting the relationship between knowledge integration and competitiveness. Given that, mediating variables, cultural background, and industrial factors were taken as the potential regulated variables in this work to analyze the relationship between knowledge integration capability and competitiveness. The results are shown in Table 3.

Class	Effect size	Reference number	Heterogeneity test			Two-tailed test		95% confidence interval	
			Q value	Df (Q)	I-squared	Z value	P value	Lower limit	Upper limit
H3 mediating variable									
Y	0.414	17	295.317	16	94.582	7.087	0.000	0.309	0.510
N	0.624	28	483.605	27	94.417	11.729	0.000	0.543	0.693
H4 cultural background									
C	0.574	22	437.007	21	95.195	9.260	0.000	0.474	0.660
NC	0.526	23	447.120	22	95.080	9.317	0.000	0.432	0.609
H5 industrial factors									
T	0.549	26	498.933	25	94.989	10.051	0.000	0.459	0.627
NT	0.552	19	382.044	18	95.288	8.548	0.000	0.445	0.643

Table 3 – Inspection results on the potential adjustment variables

Table 3 shows that the effect size of correlation between knowledge integration capability and competitiveness is 0.624 ($p<0.001$) when there is no mediating variable. This size is significantly larger than that, 0.414 when there is mediating variable ($p<0.001$). Moreover, this effect size was verified by heterogeneity test and two-tailed test. It means that the relationship between knowledge integration capability and competitiveness is affected by mediating variables. When there is no mediating variable, the positive effects of knowledge integration capability on competitiveness will be more significant. This is consistent with the common sense. On contrary, when there is mediating variable, the knowledge integration capability will have limited effects on competitiveness through mediating variable. Therefore, hypothesis H3 establishes. Moreover, the relationship between knowledge integration capability and competitiveness is affected by cultural background. In the cultural background of China mainland, the effect size is 0.574 ($p<0.001$), which is larger than that in the cultural background of non-China mainland. This size was verified by heterogeneity test and

two-tailed test. This means that the positive effects of knowledge integration capability on competitiveness is affected by cultural background. In other words, the positive effects of knowledge integration capability on competitiveness is more significant in the cultural background of China mainland. Therefore, hypothesis H4 establishes. The correlation between knowledge integration capability and competitiveness is different in different industries. In traditional industry, the effect size of knowledge integration capability on competitiveness is 0.549 ($p<0.001$) which is smaller than that in hi-tech industry, 0.552 ($p<0.001$). This means that the effect degree of knowledge integration capability on competitiveness is affected by the research industry. In hi-tech industry, the positive effect of knowledge integration capability on competitiveness is more significant. Therefore, hypothesis H5 establishes.

4.3. Regression analysis

In order to further verify above hypothesis and the effect degree of potential regulated variables on the relationship between knowledge integration capability and competitiveness, Meta-analysis results were verified by Meta regression. The results are shown in Table 4.

	Model 1		**Model 2**	
	Coef.	**Std.Err.**	**Coef.**	**Std.Err.**
Existence of mediating variables	0.3450*	0.0580	0.4380*	0.0600
Cultural background of samples	0.2090*	0.0630	0.1590*	0.0590
Industrial factors of samples			0.0210	0.0590
Adjusted R2	0.2980		0.3020	
F-statistic	1.5160		3.4510	
Significance	0.0470*		0.0250*	

Note: * means that $p<0.05$

Table 4 – Meta regression analysis

According to Table 4, the results of overall regression test in model are significant ($p<0.05$). The results for the regression test in the existence of mediating variables and cultural background are significant (Coef=0.345, Coef=0.438, $p<0.05$). According to the further verification, hypothesis H3 and H4 establish. In model 2, the results for the regression test in the existence of mediating variables and cultural background are significant (Coef=0.209, Coef=0.159, $p<0.05$). The results support hypothesis H3 and H4. In other words, the differences in the existence of mediating variables and cultural background have significant effects on the strength of relationship between knowledge integration capability and competitiveness. However, the regression results of industrial

factors are not significant (Coef=0.159, p>0.05). Therefore, the results of Meta regression further verify the above results in heterogeneity test.

5. Conclusions and prospects

This work organized and summarized the empirical studies on the relationship between knowledge integration capability and competitiveness from 2005-2015 by Meta analysis. According to the analysis, this work discussed the correlation between knowledge integration capability and competitiveness, as well as the influences of various dimensions in knowledge integration capability on competitiveness and those of potential regulated variables on the relationship. Following conclusions are obtained:

Firstly, there is a positive correlation between knowledge integration capability and competitiveness with effect size up to 0.550 (p<0.001). Therefore, the positive effect of knowledge integration capability on competitiveness is significant. In the time of knowledge economy, the competition environment becomes increasingly complex and fierce. Data shows that the sales income of 520 key Chinese enterprises is equivalent to the sum of the first two enterprises among top 500 enterprises in the world [38]. This shows that Chinese enterprises are lacking in competitiveness at present. In order to obtain the competitive advantages, enterprises must integrate and utilize their own knowledge.

Secondly, knowledge acquisition, knowledge sharing, knowledge transfer, and knowledge application have positive effects on competitiveness with the correlation coefficients of 0.568, 0.545, 0.606, and 0.553, respectively. According to above data analysis, four measurement dimensions of knowledge integration capability have significant positive effects on the core competitiveness. In order to obtain competitive advantages, the most enterprises should pay attention to the knowledge sharing and application and enhance the ability of knowledge acquisition and transfer.

Thirdly, the existence of mediating variables, cultural background of samples, and industrial factors have significant regulated effects on the relationship between knowledge integration capability and competitiveness. Knowledge integration capability has direct effects on competitiveness. When inserting mediating variable into the relationship, the effect degree of knowledge integration capability on competitiveness will decrease. Therefore, when studying the relationship, the mediating variable should be avoided as much as possible. In the cultural background of China mainland, the relationship between knowledge integration capability and competitiveness is closer. This may be because the value idea impedes the confirmation of enterprise competitive advantages in the eastern cultural idea. Once upon the enterprise integrates the knowledge, the competitiveness will significantly improve. Compared with traditional industry, hi-tech industry requires a large amount of technology and knowledge as support. Therefore, the positive effect of knowledge integration capability on the core competitiveness is more significant in hi-tech industry.

This work firstly verified the correlation between knowledge integration capability and competitiveness. Then, the influences of knowledge integration capability on competitiveness were discussed in four measurement dimensions (knowledge acquisition, knowledge transfer, knowledge sharing, and knowledge application). Meanwhile, the

potential regulated variables, mediating variable, cultural background, and industrial factors, which affect the relationship were revealed by analyzing the research samples. The results show that the existence of mediating variable, cultural background of sample, and industrial factors have significant effects on competitiveness. However, limited by conditions when collecting data, the sample size in this work shows a certain limitation. Moreover, this work did not study the effects of potential regulated variables on the correlation between knowledge integration capability and competitiveness. Therefore, data collection should be enhanced in the subsequent studies to further discuss the influencing mechanism of potential regulated variables on the relationship.

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Research on the Optimization of Multimedia Information Technology in College English Teaching

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Abstract: With the development of information network technology and the decline of the cost of electronic computers and other related equipment, the teaching forms and teaching methods of College English teaching have been greatly changed. Multimedia information technology assisted teaching mode through the image, audio and video data show that teachers and students can better into teaching, can effectively promote college English teaching quality improve. In this paper, through the comprehensive use of literature, survey, etc., through the a city 10 ordinary universities to carry out a questionnaire survey, draw the conclusion: (1) The overall level of multimedia information technology in College English teaching is low. (2) The way and method of using multimedia information technology to assist college English teachers. (3) The importance of modern education technology in Colleges and universities is insufficient, and the information quality of both teachers and students need to be improved.

Keywords: Multimedia information technology, College, English Teaching

1. Introduction

With the rapid development of information technology, in the current society gradually emerged more and more new technologies in teaching actively with a lot of advanced technology (Roland, 2009; Wangm, 2015). Although the related information technology provides a richer way for the form and content of classroom teaching, it also has some disadvantages which are not suitable to the traditional teaching form. Especially, the computer technology has brought a certain impact and change to the teaching content, teaching method and teaching means (Deffuant, 2000; Abreu et al., 2015). Teachers and students in the teaching process to actively apply and adapt to the advanced teaching methods and teaching means, in order to better integrate with the community (Deng, 2012; Pankaj, 2015). In recent years, multimedia information technology assisted teaching has been gradually applied to the extensive promotion and application. Because of its own characteristics and advantages, it has gained the attention of the educators in the classroom teaching, and it has been applied in the rural education gradually. Multimedia equipment and multimedia information technology assisted teaching system, such as Fig1-2.



Figure 1 – Multimedia devices



Figure 2 – Multimedia teaching system

2. Object and Method of Investigation

2.1. Object of investigation

In a city 10 ordinary universities in 20 English teachers as the object of investigation, specific as Table 1.

University& college	The number of teachers	Ratio
X1 University	3	15%
X2 University	2	10%
X3 University	3	15%
X4 University	3	15%
X5 University	2	10%
X6 college	1	5%
X7 college	2	10%
X8 college	2	10%
X9 college	1	5%
X10 college	1	5%

Table 1 – Survey statistics

2.2. Research method

1. Literature data method

From the school library, Cnki.net retrieval "multimedia information technology", "University", "English Teaching" and other words, and the related literature review, analysis and summarize.

2. Questionnaire survey method

On the basis of absorbing and referring to the related research results and questionnaire design methods of the previous studies, this paper makes communication with the relevant person in charge of College English teachers and schools to obtain professional advice. "The application of multimedia information technology in College English teaching" was designed, and the data needed for this study were obtained.

3. Interview method

Through communication with some teachers, principals and students of 10 universities in a City, and then collect real data information for this study.

3. Problems in the application of multimedia information technology in College English Teaching

3.1. English teacher multimedia information technology application ability is limited

From the Figure 3-1, this survey of 20 college English teachers, the ability to support the teaching of multimedia information technology is very good, a total of 3 (15%); A good total of 5 (25%); a total of 7 (35%); there are still 5 teachers (25%) that their ability to apply multimedia information technology is not very good. It can be seen that

the information literacy of teachers is one of the important factors that influence the optimization of College English teaching.

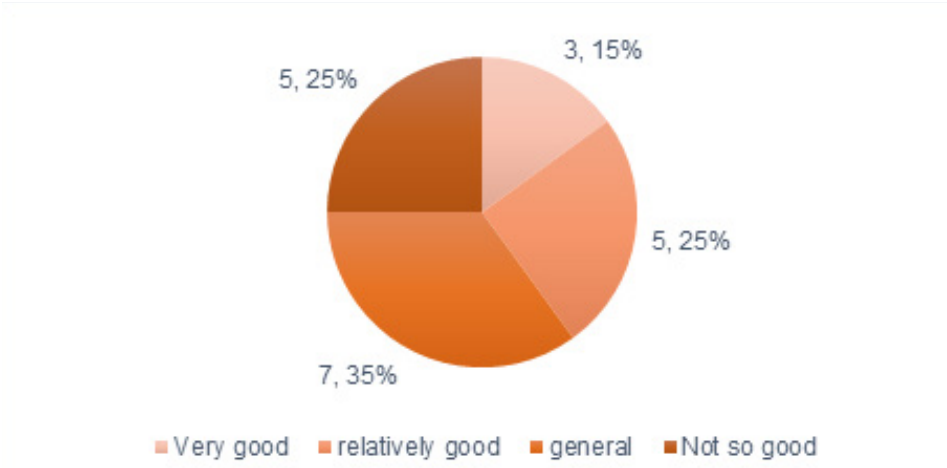


Figure 3 – Teachers of English multimedia information technology application ability

3.2. Advantages and disadvantages of multimedia information technology in English Teaching

It can be known from figure 3-2 that the advantages of multimedia information technology in College English teaching mainly include: (1) More vivid and visual display of the teaching content, highlighting the heavy and difficult points of teaching; (2) Improve the information quality of teachers and students; 3) Enrich the teaching methods and methods to improve the teaching efficiency; (4) Create a more realistic language application environment, to mobilize the enthusiasm of students. Disadvantages mainly include: (1) The level of school teaching hardware facilities is higher; (2) The relevant teaching software in the market is short of; (3) The production of teaching courseware is more time consuming; (4) The ability to apply information technology to teachers and students is higher.

3.3. The teaching mode of multimedia information technology in English teachers is single

By figure 3-4 shows that the survey of College English teachers (a total of 20 people), 10 (50%) teachers choose their own operations, the teaching content presented on the screen; 5 (25%) teachers choose their own operations, the teaching content presented on the computer; 3 (15%) teachers choose to operate with the students, the teaching content is presented on the computer; 2 (5%) teachers choose the other, the author through interviews with the two teachers, to understand the teaching methods to be taken by the students to operate, the content presented on the screen. It can be seen

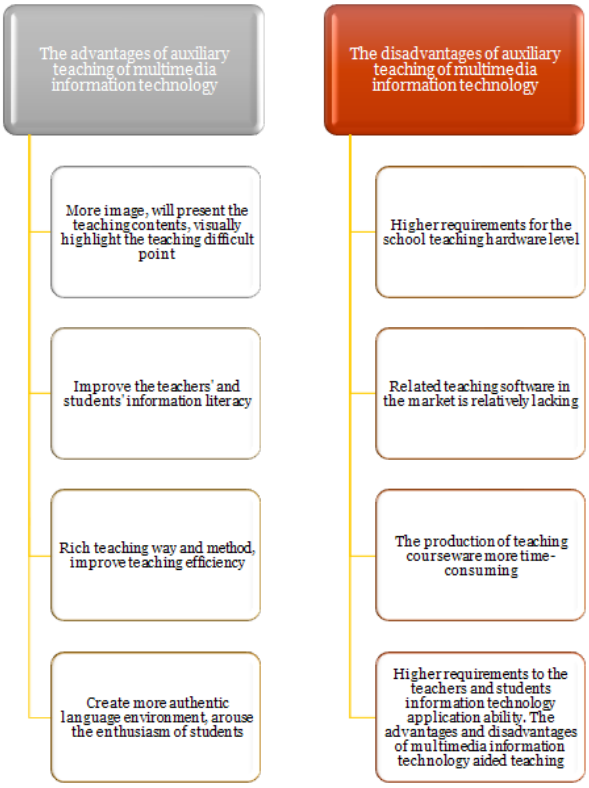


Figure 4 – The advantages and disadvantages of auxiliary teaching of multimedia information technology

that in the current college English teaching, multimedia information technology assisted instruction is still very single, most teachers still choose to operate through their own. By students to watch the way of teaching courseware for learning, not only has not fully the role of multimedia information technology to play the role of teaching, it is more likely to lead to the application of information technology in the form.

3.4. The support of multimedia information technology assisted instruction in Colleges and Universities

From the table 3, we can know that the survey of 10 colleges and universities, the number of multimedia classrooms > 10 a total of 3 (30%);6-10 a total of 2 (20%); 2-5 a total of 4 (40%); there are still 1 (10%) universities only have 1 multimedia classrooms. It can be known that the construction of multimedia classroom in Colleges and universities is still not optimistic, some colleges and universities are not enough to support the efforts of this area, thus making the role of multimedia information technology in English teaching has been greatly restricted.

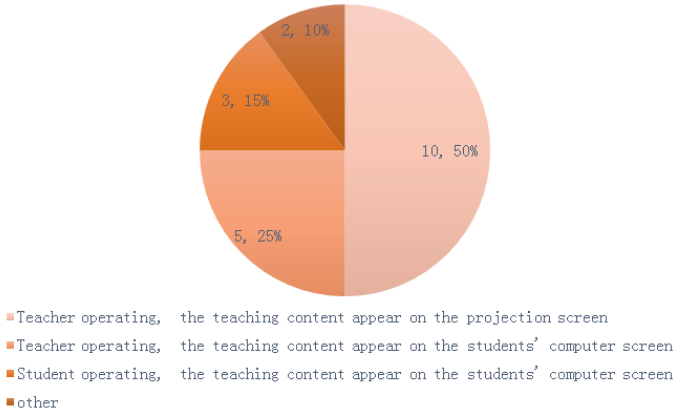


Figure 5 – Teachers of English multimedia information technology teaching

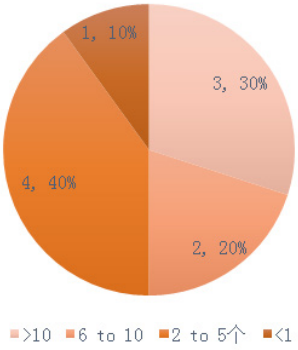


Figure 6 – Number of multimedia classroom in colleges and universities

3.5. Application of multimedia information technology in College English Teaching

From the table 2, the current multimedia information technology to assist college English teaching is mainly used in oral English, English listening, English reading and English writing in four aspects Among them, 20 teachers in the survey were applied in the teaching of English listening; 6 (30%) teachers choose to apply in English reading teaching; 5 (25%) teachers choose to use English in oral English teaching; Only 4 (20%) teachers choose to apply in the teaching of English writing. It can be seen that different teachers have different range of application of multimedia information technology, and the important value of multimedia information technology in oral English teaching has been recognized.

Teaching unit	The number of teachers	ratio
Spoken language	5	25%
Hearing	20	100%
Reading	6	
Writing	4	20%

Table 2 – Multimedia assisted college English teaching of the main information technology application unit

3.6. Multimedia information technology to assist college English Teaching

From table 3, we can know that the survey of 20 teachers, 16 (80%) teachers use teaching materials supporting CD-ROM; 13 (65%) teachers to use teaching courseware; 12 (60%) teachers to use the cyber source; only 4 (20%) teachers using their own teaching courseware. It can be seen that the majority of teachers are more dependent on the existing multimedia courseware and other related resources, because of the time of the self-made teaching courseware and the requirement of the teacher's information quality is higher. Therefore, the number of teachers to adopt this method is less.

Teaching method	The number of teachers	ratio
Teaching materials supporting Disc	16	80%
Self-made teaching courseware	4	20%
Network resources	12	60%
Teaching courseware	13	65%

Table 3 – Multimedia information technology auxiliary method of college English teaching

3.7. On the factors restricting the assisted English teaching with multimedia information technology

From the table 3-3, we can know that the 10 universities in this survey, the restrictions of multimedia information technology assisted English teaching factors mainly include 5 aspects. Among them, 17 (85%) teachers think that the operation mechanism of multimedia information technology is the main influencing factor; 11 (55%) teachers choose the students self-study ability is insufficient; 10 (50%) teachers' choice of school multimedia information technology teaching condition is limited; 8 (40%) teachers choose their own information English technical ability is limited; 5 (25%) teachers choose other.

4. Conclusion and suggestion

4.1. Conclusion

Multimedia information technology to help the overall level of College English teaching is low. Mainly affected by three factors. First, the ability of College English teachers to

limiting factor	The number of teachers	ratio
Information about themselves English technical ability is limited	8	40%
School multimedia information technology teaching conditions is limited	10	50%
Students self-study ability is insufficient	11	55%
Not build perfect operating system multimedia auxiliary teaching information technology	17	85%
other	5	25%

Table 4 – Limiting factors of multimedia assisted English teaching information technology

apply multimedia information technology to assist teaching is limited; Second, college students' information literacy level is low, and the lack of self-learning ability; Third, colleges and universities in the multimedia information technology to support the teaching of software and hardware to support more inadequate.

The ways and methods of using multimedia information technology in College English teachers are very single, which cannot fully play the significant advantage of multimedia information technology.

The importance of modern education technology in Colleges and universities is insufficient, and the information quality of both teachers and students need to be improved.

4.2. Proposal

Update the concept of modern educational technology in a timely manner, strengthen the cultivation of information quality of teachers and students in Colleges and Universities. On the one hand, to provide teachers with a wealth of multimedia information technology training, such as the organization of lectures, teaching observation and other forms, and constantly improve the quality of teachers' information. On the other hand, in the school teaching curriculum plan to increase the weight of modern educational technology, improve the quality of students' information.

Attach importance to the construction of the operating mechanism of multimedia information technology assisted teaching in Colleges and universities, and improve the conditions of the software and hardware facilities. The relevant person in charge of the school should strengthen the view of multimedia information technology assisted teaching value, which aim to enhance the effectiveness of College English teaching, establishing and perfecting the multimedia information technology assisted teaching mechanism. From the multimedia information technology course construction, the construction of hardware and software, the information quality training of teachers and students, and so on, to improve the level of software and hardware construction of multimedia information technology. And combined with the actual situation of the school to improve the number of multimedia classroom construction, construction of school-based curriculum can be taken to increase the number of teaching software, to provide a strong support for the teaching of teachers.

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Appendix

A survey on the application of multimedia information technology in College English Teaching

1. Your title:

   A Assistant teacher B Lecturer C Associate professor D Professor

2. Your age:_____

3. How is your multimedia information technology assisted teaching ability?

   A Very Proficient B Relative Proficient C Not Proficient

4. Your understanding of multimedia information technology assisted instruction?

   A Very Familiar B Relative Familiar C Not Familiar

5. When you take the multimedia information technology to assist the teaching, mainly used in what unit of teaching? (Multiple choices)

   A Speaking B Listening C Reading D Translation E Writing

6. Your current multimedia information technology to take the main teaching methods:

   A Supporting CD-ROM B Self-made teaching courseware
   C Internet D Teaching courseware

7. In your opinion, the main factors that restrict the current English Teaching of multimedia information technology include:

   A Own information English technical ability is limited
   B School multimedia information technology teaching condition is limited
   C Students' self-study ability is insufficient
   D The operating mechanism of multimedia information technology assisted instruction is not built.
   E Others

8. The number of multimedia classrooms in your current school:

   A≤1 B2-5 C6-10 D>10

9. Does your current school often organize the relevant training of multimedia information technology:

   A Often B Occasionally C None

10. What kind of multimedia information technology in your teaching

    A Their operations, the teaching content is presented on the projection screen
    B Their operations, the teaching content is presented on the computer
    C Operating with the students, the teaching content is presented on the student computer
    D Others

11. What do you think are the advantages and disadvantages of the application of multimedia information technology:

Advantages:

A More image, intuitive display of teaching content, highlighting the difficulties of teaching
B Improve students' information quality
C Enrich teaching methods and methods, improve teaching efficiency
D Create a more realistic language application environment, mobilize the enthusiasm of the students

Disadvantages:

A The level of school teaching hardware facilities is higher
B Market related teaching software is relatively lack of
C The production of teaching courseware is more time consuming.
D Higher requirements for the teachers and students' information technology application ability

12. What do you think of the current college students' information quality and self - learning ability:

A Very Good B Good C Ordinary D Not Good

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Study on the Application of Computer Network in Aerobics Teaching in Normal Colleges

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Abstract: In recent years, along with the promulgation and implementation of outlines, standards and directive opinions of physical education, the college physical education teaching philosophy is being constantly updated. Computer network assistive teaching cannot only fully play the advantage of convenience, and immediacy but also can demonstrate the complicated actions easily. This paper adopts documentary study and survey method along with questionnaires collected in 8 colleges of a city, including the application range of computer network in aerobics as well as the current application development in theory and practical teaching. In addition, by studying on teacher's attitude toward applying computer network in practice and comparison between network assisted teaching mode and traditional teaching mode, we can have the following conclusions: the network assisted teaching mode for aerobics in colleges remains to be strengthened; the aerobics philosophy of normal colleges lags behind; the aerobics teaching mode in normal colleges is traditional; faculties and teachers in general schools still prefer rational mode to carry out aerobics.

Keywords: Computer Network, Normal Colleges, Aerobics Teaching

1. Introduction

The internet connects the whole world with information network, and the whole world becomes a global village. Based on this, the information is soaring with a big leap (Chen, 2014; Li, 2015). Therefore, education and teaching is also facing new challenges. How to cultivate excellent talents with good abilities to adapt to the society is a topic which is highlighted by the society.

In college aerobics teaching, the traditional teaching mode pays attention to the cultivation of techniques, learning methods and misconceptions. However, it cannot recognize the dynamic characteristics of students' development, and only evaluate students based on their learning results without taking into consideration their differences (Guan, 2014). At the same time, teachers act as the dominators in class while students do everything passively. As a result, the lack of subjectivity cannot provide support for the all-round development for students and they will lose interest in learning with poor passion (Panikhina, 2012). Therefore, by taking advantage of network and

information technology to support the aerobics is f significant importance (Wang, 2013; Zhang, 2014). The constitutions of assisted network teaching system includes: projector, computer, audio system etc., which can integrate their advantage with the classroom and the concrete system is shown as follows:

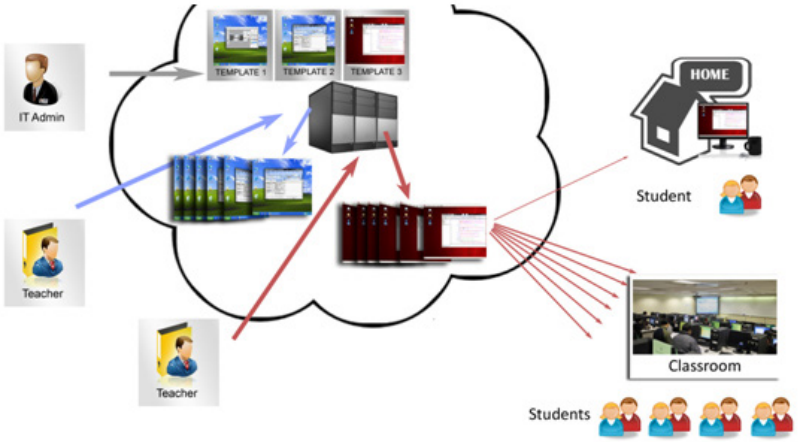


Figure 1 – Multimedia teaching equipment

2. Research objects and methods

2.1. Research objects

Take 400 students and 16 teachers of physical education from 8 normal colleges in XX cities as research objects, see the table 1.

University& college	The number of teachers	The number of students
A1 University	2	58
A2 University	2	51
A3 University	2	47
A4 University	2	34
B1 college	2	62
B2 college	2	41
B3 college	2	30
B4 college	2	77

Table 1 – The object of study basic distribution table

2.2. Research technique

1. Literature Review Method

By searching the key words such as normal colleges, aerobics, current conditions in online libraries and China National Knowledge Infrastructure, we can check, summarize and analyze the literatures. At the same time, we have to have a good knowledge of relevant physical education policies, to further collect and organize it and acquire important theoretical basis for this paper.

2. Questionnaire survey

By referring to relevant researches and questionnaire design methods, we should communicate with physical teachers and relevant people in charge to obtain professional suggestions. In addition, we designed questionnaire for the application of network in aerobics in normal colleges and carried out validity test by consulting 10 professionals.

	Structure validity (on average)	Content validity (on average)
Teacher Questionnaire	8.26	8.21
Student Questionnaire	8.54	8.35

Table 2 – The questionnaire validity of test results

We sent out 410 questionnaires for this survey, and reclaimed 400 (without invalid ones), so the valid return rate is 97.56%; there are 16 questionnaires for teachers and all of these are recycled and the valid return rate is 100%.

3. Interview method

By communicating with parts of teachers, deans and students from 8 normal colleges of XX cities, we collected real data information for this survey.

3. Research results and analysis

3.1. Basic information of research objects

Basic information of teachers

Basic information		number of people	ratio
gender	male	3	18.75
	female	13	81.25
age	21-25	5	31.25
	25-30	7	43.75
	19～25	2	12.5
	26～30	1	6.25
	≥31	1	6.25

Table 3 – Basic information of Aerobics teachers in Normal Colleges [n/(%)]

Basic information of students

Basic information		number of people	ratio
gender	male	187	46.75
	female	213	53.25
age	18-20	97	24.25
	21-23	112	28
	24-26	115	28.75
	>26	76	19

Table 4 – Basic information of Aerobics students in Normal Colleges [n/(%)]

3.2. The application condition of computer network in college aerobics teaching

1. Application range of computer network in college aerobics teaching

According to content, we can know that all these 8 schools have adopted computer network in aerobics teaching; 7 schools (87.5%) adopt computer network in theoretical aerobics teaching; 6 schools (75%) can fully take advantage of computer network to integrate aerobics theory with practical teaching.

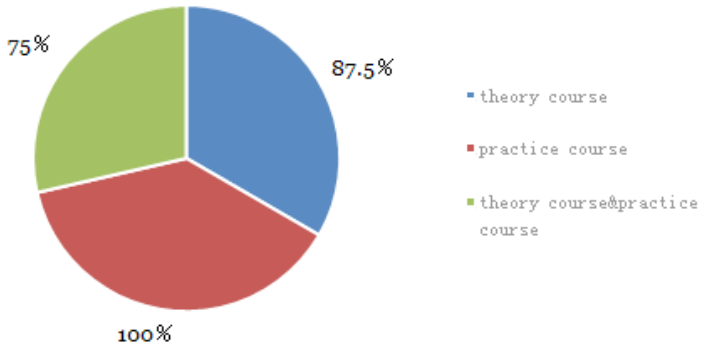


Figure 2 – Scope of computer net work application in aerobics teaching

2. Application of computer network in aerobics theoretical teaching and practical teaching in colleges

According to figure 3, we can know that the application of computer network in aerobics teaching includes three aspects: the source of teaching courseware for you to design and download with charges; the course design frequency includes often, rare and none; the course contents include selecting texts, images, combination of voice and audio, texts, images, combination of video and animation, combination of texts, images, audio, animation and hyperlink.

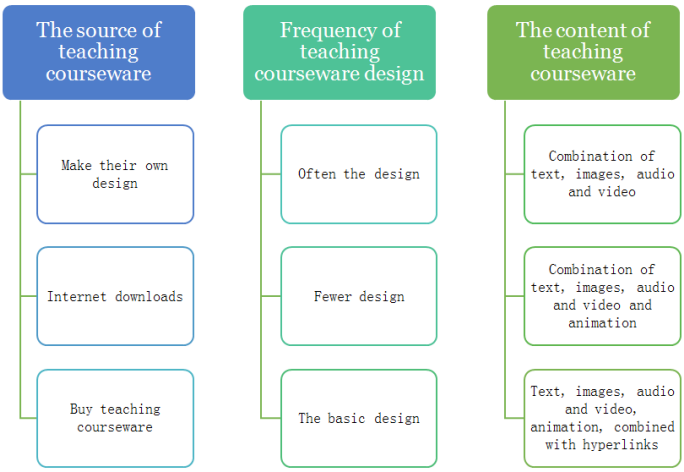


Figure 3 – Computer network present situation

From figure 3 we can see that in aerobics practical teaching in colleges, the application of computer network mainly shows in four aspects: common aerobics, sports aerobics, combination of mass competition and self-made teaching.

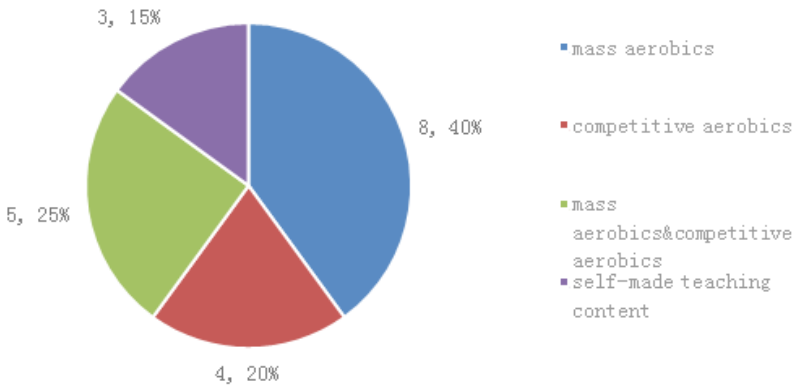


Figure 4 – Computer networks and the application status o

3. Teachers and students' attitude toward computer network application in aerobics teaching

According to figure 5, we can see that only 115 (27.64%) students strongly support computer network application in aerobics teaching; 239 (57.52%) people commonly support it; 20 people support it (4.81%) and 42 people (10.10%) do not support it.

Based on this, we can see that only parts of teachers and students support it and most of students and teachers prefer traditional teaching mode.

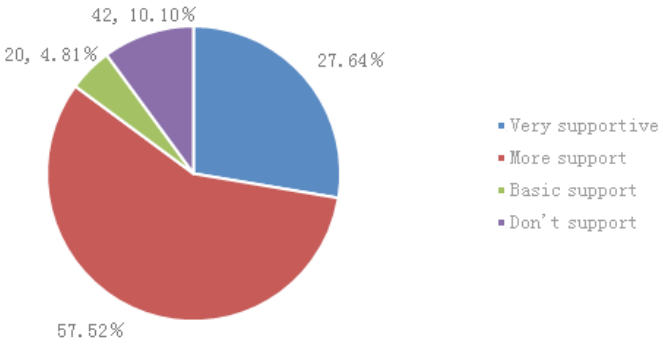


Figure 5 – General attitude of the teachers and students of computer network application

4. Comparison between traditional aerobics teaching and computer assisted teaching

According to figure 5, the advantages of computer network application in aerobics teaching include the following: it is more active and vivid, which will stimulate their passion and the teaching environment is better while the teaching resources are diversified; disadvantages include: it is difficult to control the class order, teachers have limited ability in information technology application and the teaching video, to some extent will reduce the effect.

Advantages	**Disadvantages**
More intuitive, image teaching demonstration	Teaching order is difficult to control
Effectively stimulate interest in learning	Teachers' information technology application ability is limited
The classroom atmosphere more active	Teaching video reducing the learning effect
More abundant teaching resources	
The teaching method more diversified	

Table 5 – The advantages and disadvantages of college computer network auxiliary aerobics teaching

According to table 5, we can see that the advantages of aerobics include the following: the teaching blackboard writing is clearer and teachers can fully play their role while the demonstration is vivid, which can contribute a harmonious relation. The disadvantages include the following: students do not have passion and the quality of teachers will affect the teaching while the age, physical conditions will all contribute to the demonstration.

Advantages	Disadvantages
Teaching blackboard writing clearly	Students' lack of learning motivation
Teachers' active role is obvious	Teacher's specialty influence the teaching quality
Teachers' demonstration action leading is stronger	Teachers' age, physical condition influence the teaching effect
More harmonious relationship between teachers and students	Teaching demonstration actions lack of accuracy

Table 6 – Regular institutions of higher learning aerobics the advantages and disadvantages of traditional teaching

4. Conclusions and suggestions

4.1. Conclusions

1. The teaching ability of aerobics teacher for computer network assisted teaching remains to be improved. The ability of aerobics teacher for computer network assisted teaching is poor and most of the teachers take demonstration as the main methods. In addition, they rarely participate in training, which is not beneficial to the scientific development to aerobics teaching.
2. The teaching philosophy of traditional aerobics lags behind. Aerobics teachers did not fully realize the specialties of the teaching content and they still adopt methods such as oral explanation with demonstration. What's more, they strengthen practices and mistake correcting and cannot fully play the advantages of computer network assisted teaching.
3. The teaching mode of aerobics is traditional. In aerobics teaching mode, we can adopt computer network to carry out assisted teaching in both theoretical teaching and practical teaching. However, the combination and implementation needs to be improved.
4. Teachers and students in normal colleges still prefer traditional teaching modes to carry out aerobics practice and learning. Even though the computer network assisted teaching has been realized and promoted in different subjects and levels with good effects, students and teachers are still relying on the traditional teaching mode.

4.2. Suggestions

Timely update teaching philosophy. In the background of information technology and education reform, aerobics teachers should positively change the teaching philosophy of teaching materials and teachers-centered and highlight the main body of students. By properly and scientifically taking advantage of computer network assisted teaching, we can trigger students' passion and let them master basic techniques. For example, teachers can adopt group teaching with 2 to 3 people in one group and let them carry out independent practice along with internal, external discussion and comment. In addition, teachers can comment based on their performance to timely master the learning condition of students.

Fully take advantage of computer network assisted teaching. The advantages of computer network assisted teaching are prominent. For example, students' passion can be trigged and there are diversified online teaching resources, which can help to improve the accuracy. Therefore, teachers should fully play the advantages of computer network and reasonably control to avoid the disorder of classes. Based on this, we can improve the computer network teaching quality.

Organically combine computer network assisted teaching and traditional teaching. We should change the single teaching mode and take advantage of the glittering array of network resources to enrich the contents of aerobics teaching and combine the advantages of regular, basic, standard and dominant features of traditional teaching to organically combine these two together.

Strengthen the ability for computer network assisted teaching. Teachers should constantly improve their theoretical knowledge and take computer network assisted teaching as their important targets to directly and vividly the demonstrations based on videos. Based on this, we can stimulate students' passion from the perspective of listening, and visibility to stimulate their thinking ability and improve their learning motivation.

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Appendix

Questionnaires for Studying on the Application of Computer Network in Aerobics Teaching in Normal Colleges

1. Gender:A Male B Female
2. Age:_____
3. Main methods you adopted to carry out aerobics:_____
4. Information technology ability:

   A Excellent B Good C Ordinary D Poor
5. Application condition of adopting computer network in aerobics teaching

   A Mainly in theoretical class B Mainly in practical class C Combination of both theoretical classes and practical classes
6. Views toward computer network application in aerobics teaching

   A Strongly support B Support C Basically Support D Do not support
7. Teaching arrangement of aerobics teaching in your school

   A Freshmen year B Freshmen year and sophomore year C Freshmen year to junior year C Freshmen year to senior year
8. Which kind of teaching modes do you prefer for aerobics teaching

   A Traditional mode B Computer network assisted teaching C Combination of both
9. Disadvantages and advantages of traditional teaching
10. Disadvantages and advantages of computer network assisted teaching

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Structure and Competitiveness of Forestry Sub-Industries in Heilongjiang Reclamation Area Based on Esteban Model

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Abstract: The forestry sub-industries of Heilongjiang Reclamation Area as the research object, the forestry sub-industries output values of Heilongjiang province as the reference, Esteban model is applied to calculate the output values deviation increment involving the location component, industrial structure component, the pure competitiveness and the distribution component of primary industries of forestry in 2003~2014. The pure competitiveness share and interact share between industrial structure and competitiveness are analyzed in this paper compared with the previous research on the structure and competitiveness of forestry industry by using the traditional shift-share method. The results show that the cultivation and planting of forest trees industry has a advantage of pure competitiveness and the interact advantage between industrial structure and competitiveness, which performance specialized production; forest product collection industry has the advantage of industrial structure, and the interaction between industrial structure and competitiveness shows non specialization of production; forest harvesting and transportation industry does not have the advantage of industrial structure, and the interaction between industrial structure with competitiveness is not specialized in production either.

Keywords: Forestry sub-industry, Esteban model, Homothetic variables, Distribution component

1. Introduction

The regional economic growth share was divided into three components: national growth share, the industrial structure share and competitiveness share respectively according the traditional shift-share model originally proposed by Dunn (1960). The traditional shift-share model was often used to analyze the structure and competitiveness of forestry industry in the whole country or some provinces in previous studies. Some scholars (Zhong, 2011; Chao, 2012; Xie, 2012; Ran, 2010; Zhang, 2014; Tian, 2015) took the national forestry as a frame of reference and used the traditional static and dynamic shift-share model with three components to study the forestry industrial structure, competitiveness and industrial development in different provinces in China. German wood industry structure (1999~2006) was analyzed by using the traditional dynamic

shift-share method (Klein et al., 2009). Furthermore, the traditional shift-share analysis method are also applied to analyze the output comparative advantage in agriculture, service industry and equipment manufacturing industry and so on (Zhong, 2011; Xu and Geng, 2011; Li, 2014).

Esteban (1972) improved the shift-share model, which by means of introducing homothetic variable (or homothetic concept) obtained a distribution component. Comparing with traditional shift-share model (Dunn, 1960), the Esteban model includes four components. Lionel and Lelf (2014) analyzed the reasons that Dunn (1960) built shift-share model and Esteban (1972) improved the traditional shift-share model, then the necessity of testing the two kind models was illustrated. Some scholars also used Esteban model to carry out some researches in different fields. Jo and Lindsay (2011) pointed out that compared with Thailand, Vietnam has a competitive advantage in attracting tourists from the America, Australia and Europe based on the Esteban model including four components. The fluctuation of consumer price of the eastern, central and western part of China in 2001~2012 was divided into four components based on Esteban model (Liao and Hu, 2012). In addition, the Esteban model was improved when it was used to analyze the comparative advantage of output value of equipment manufacturing industry and service industry (Jia, 2012, Xiang and wen, 2013).

On the basis of the current researches, the Esteban model is chosen to analyze the industrial structure and competitiveness of forestry sub-industries in Heilongjiang Reclamation Area in this paper. When the Esteban model is adopted to analyze forestry industrial structure and competitiveness, the competitive component existing in traditional model is divided into pure competitiveness component and distribution component that could reflect the interaction on forestry industrial structure and competitiveness, which can provide some references for determining the forestry advantage industry in Heilongjiang Reclamation Area.

2. Research method and data sources

2.1. Research method

With the reference of multiple economic indicators of the higher level region or the whole country, the shift-share analysis method could be used to evaluate regional industry structure and industry competitiveness so that the industry or sector has relative competitive advantage could be found, which could be conducive to determine the reasonable direction of regional economic development and the industrial structure adjustment (Xiang and wen, 2013).

The calculation formula of the traditional shift-share model is expressed as

$$G_t = N_{ij} + P_{ij} + D_{ij}$$

$$N_{ij} = b_{ij,o} \cdot R$$

$$P_{ij} = b_{ij,o} \cdot (R_j - R\ )$$

$$D_{ij} = b_{ij,o} \cdot \left(r_j - R_j \right)$$

$$R = \sum_{j=1}^{n} (B_{j,t} - B_{j,o}) / \sum_{j=1}^{n} B_{j,o}$$

$$R_j = (B_{j,t} - B_{j,o}) / B_{j,o}$$

$$r_j = (b_{ij,t} - b_{ij,o}) / b_{ij,o}$$

where $b_{ij,o}$ is the economic variable value of base period in i region j industry and $b_{ij,t}$ is corresponding variable value of the reporting period, $B_{j,o}$ and $B_{j,t}$ is the corresponding variable value of higher level region, N_{ij} is regional growth deviation share, P_{ij} is industrial structure deviation share, D_{ij} is competitive power deviation share and the sum of the three share is regional economic variable growth value (G_t).

By introducing homothetic concept variables, the competitiveness component (D_{ij}) of the traditional shift-share model (composed of three effects) is decomposed into pure competitiveness component (D_{ij}^*) and the distribution component (A_j) that is used to represent interaction between industrial structure and competitiveness, which is said to be Esteban model whose total increment share is divided into 4 components (Esteban, 1972).

When the Esteban model is used to analyze the output values of forestry industry and its sub-industries of Heilongjiang Reclamation Area, the model is expressed as

$$G_t = N_j + P_j + D_j^* + A_j = b_{j,o} \cdot R + b_{j,o} \cdot (R_j - R) + b_j^* \cdot (r_j - R_j) + (b_{j,o} - b_j^*) \cdot (r_j - R_j)$$

Where N_j is regional growth component, P_j is industrial structure component, D_j^* is pure competitiveness component, A_j named distribution component reflects the interaction between industrial structure and competitiveness ($j = 1,2,3$, in which 1-cultivation and planting of forest trees industry, 2-forest product collection industry, 3-forest harvesting and transportation industry). The expression $b_j^* = (\sum_{j=1}^{n} b_{j,o}) \cdot (B_{j,o}) / \sum_{j=1}^{n} B_{j,o}$ is homothetic variable, where $b_{j,o}$ and $B_{j,o}$ are the base period values of forestry sub-industries ($j = 1,2,3$) of Heilongjiang Reclamation Area and Heilongjiang province respectively.

2.2. Data source

According to the classification based on Statistical Yearbook of Heilongjiang Reclamation Area, the output data values (calculated at current prices) of the primary industry of forestry and its sub-industries (cultivation and planting of forest trees, forest product collection, forest harvesting and transportation) are obtained. The same classification output data values of the primary industry of forestry of Heilongjiang province are obtained from China Forestry Statistical Yearbook, which is shown in Table 1.

year	t	Heilongjiang Reclamation Area				Heilongjiang province			
		Primary industry of forestry	Cultivation and planting of forest trees	Forest product collection	Forest trees harvesting and transportation	Forestry first industry	Cultivation and planting of forest trees	Forest product collection	Forest trees harvesting and transportation
2003	1	21316	16673	2340	2303	468088	169612	50871	247605
2004	2	17005	11997	2884	2124	515757	144885	109293	261579
2005	3	18019	11013	5069	1937	603371	114919	176920	311532
2006	4	18663	8417	8268	1978	640080	106224	223039	378845
2007	5	20994	9014	8185	3795	871506	114064	305878	451564
2008	6	30125	13425	13286	3414	986598	146988	373165	466445
2009	7	40430	22658	13538	4234	1098417	201970	474713	421734
2010	8	56838	31160	19507	6171	1345431	265229	614451	465751
2011	9	74053	45963	17129	10961	1912038	347996	1233483	330559
2012	10	100226	60670	27003	12553	2206007	421715	1530097	254195
2013	11	108458	63863	33288	11307	2929714	164434	2579923	185357
2014	12	90530	44914	35541	10075	651823	212829	246936	192058

Data source: Heilongjiang Reclamation Statistical Yearbook (2004~2015); China Forestry Statistical Yearbook (2003~2014).

Table 1 – The output value of forestry industry (Units: ten thousand Yuan)

3. Forestry sub-industries shift- hare analysis

3.1. Static Esteban model analysis

Using the forestry output values of Heilongjiang province as a reference, the forestry sub-industries output values deviation increment based on the static Esteban model from 2003~2014 in Heilongjiang Reclamation Area are reported in Table 2.

The total deviation increment values of all the forestry sub-industries are 60846.98 ten thousand Yuan, which is composed with deviation increment values of industrial structure, pure competitiveness and the interaction of industrial structure and competitiveness during this period in Heilongjiang Reclamation Area. Among them, the forest product collection industry increment value is the largest (32282.5 ten thousand Yuan), the forest harvesting and transportation industry increment value is the smallest (6868.02 ten thousand Yuan), the cultivation and planting of forest trees industry increment value is between the increment value of the two sub-industries.

From the perspective of the industrial structure, only the forest product collection industry deviation increment value is positive, and the other two sub-industries are

		Cultivation and planting of forest tree	Forest product collection	Forest trees harvesting and transportation	Total
Regional growth deviation share (N_j)	Increment	6544.53	918.50	903.98	8367.01
	Growth rate	0.3925	0.3925	0.3925	—
Industrial structure deviation share (P_j)	Increment	-2296.26	8100.23	-1420.63	4383.35
	Growth rate	-0.1377	3.4616	-0.6169	—
Pure competitive power deviation share（D^*_j）	Increment	11114.78	23940.30	40581.43	75636.51
	Growth rate	1.4390	10.3343	3.5991	—
Distribution component share (A_j)	Increment	12877.96	241.96	-32292.79	-19172.87
	Growth rate	1.4390	10.3343	3.5991	—
G_t	Increment	28241.00	33201	7772.00	69213.99
$G_t - N_j$	Increment	21696.48	32282.5	6868.02	60846.98

Table 2 – The output value deviation share of forestry sub-industries based on static Esteban model (Units: ten thousand Yuan)

not dominant; from the pure competitiveness component, the three sub-industries all have advantage, and the forest harvesting and transportation industry has the most obvious advantage; from the perspective of the interaction of industrial structure and competitiveness, the deviation increment values of the cultivation and planting of forest trees industry and forest harvesting and transportation industry are positive, and the forest harvesting and transportation industry does not have the interact advantage of industrial structure and competitive power.

Because the static Esteban model can only reflect the overall changes of the reporting period compared to the base period, the dynamic analysis based the Esteban model is carried out in order to show the fluctuation tendency of the industrial structure and competitive power of the forestry sub-industries in different periods.

3.2. Dynamic Esteban model analysis

The deviation increment values of forestry sub-industries structure and pure competitiveness are calculated according to the dynamic Esteban model in 2003~2014 in Heilongjiang Reclamation Area and the results are shown in Table 3. P_j and D^*_j represent the industrial structure component and pure competitiveness component of the forestry sub-industries respectively.

year	Cultivation and planting of forest tree		Forest product collection		Forest trees harvesting and transportation	
	P_1	D^*_1	P_2	D^*_2	P_3	D^*_3
2003~2004	-4128.62	-1040.16	2449.04	-2121.89	-104.56	-1512.74
2004~2005	-4519.28	596.20	1294.61	500.38	44.80	-2406.31
2005~2006	-1503.29	-549.31	1012.98	1957.09	300.68	-1813.30
2006~2007	-2422.01	-8.92	81.46	-2480.64	-335.49	8026.70
2007~2008	1411.45	551.48	719.62	2971.18	-376.11	-1450.56
2008~2009	3500.16	1407.89	2109.66	-2884.57	-714.18	4786.09
2009~2010	2001.34	461.07	940.64	2560.56	-510.24	5481.41
2010~2011	-3398.79	1826.42	11437.37	-29315.49	-4390.05	20983.75
2011~2012	2670.09	1457.44	1485.47	16050.68	-4217.37	4817.03
2012~2013	-56917.23	12697.47	9668.57	-31516.71	-7517.61	1981.20
2013~2014	68450.01	-3597.78	-4220	92831.40	9200.11	-995.74

Table 3 – The dynamic components of Industrial structure and pure competitiveness (Units: ten thousand Yuan)

1. Industrial structure and competitiveness

When using the dynamic Esteban model to analyze the labor productivity, Wu and Zhao (2011) draw a scatter diagram, the industrial structure component for the vertical axis and pure competitiveness component for the horizontal axis. In fact, the “competitiveness” component of horizontal axis of the original figure (Wu and Zhao, 2011) should be the “pure competitiveness” component when Esteban model is used.

Based on the research of the two scholars, the three sub-industries dynamic scatter diagram of industrial structure and pure competitiveness is drawn from 2003 to 2014 in Heilongjiang Reclamation Area, which is shown in Figure 1.

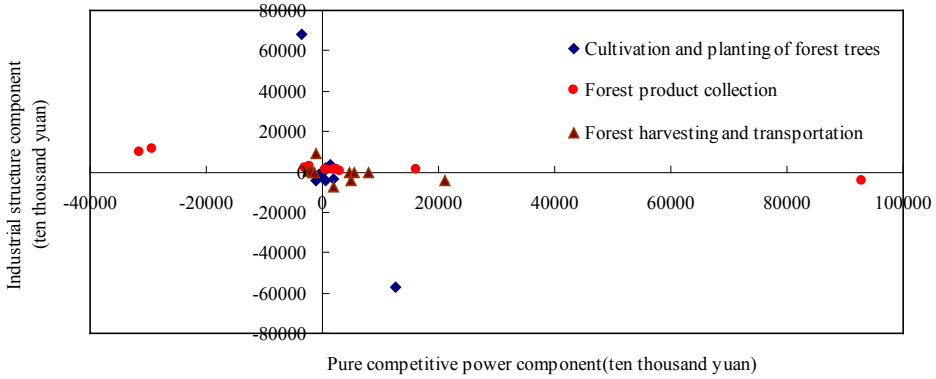


Figure 1 – The dynamic scatter point distribution of the industrial structure and the pure competitiveness

According to Table 1 and Figure 1, three sub-industries are analyzed as follows. First of all, from the perspective of industrial structure, there are 10 scattered points in the first and second quadrant among the 11 scattered points of the forest product collection industry, accounting for 90% of the total number of scattered points, which indicates that the forest product collection industry has a strong industrial structure advantage. The scattered points in the first and second quadrant of the cultivation and planting of forest industry and forest harvest and transportation industry are all less than the number of forest products collection industry, only for 5 and 3 scattered points respectively, which means the two sub-industries have no advantages of industrial structure.

And then, from the perspective of pure competitiveness, the scattered points of the cultivation and planting of forest trees industry mainly distributed in the first and the forth quadrant, accounting for 64% of the total number of points, which indicates that this sub-industry has a competitiveness advantage. At same time, the pure competitive advantage of forest products collection industry and forest harvesting and transportation industry are also obvious too, because the scattered points distributed in the first and the fourth quadrant accounted for 55% of its total points respectively.

2. Interaction between industrial structure and competitiveness

For the further analyzing the interaction between the industrial structure and competitiveness of the three sub-industries, the dynamic distribution component values (A_j) are listed in Table 4. It can be known that the scattered point distribution rate of distribution component of cultivation and planting industry, forest product collection industry and forest harvesting and transportation industry is 73%, 9.1% and 9.1% in the first quadrant respectively. This result indicates that the cultivation and planting trees industry in Heilongjiang Reclamation Area not only the output growth rate is more than that of Heilongjiang province but also the output values are more than the values that should be increased share according to the cultivation and planting trees industry structure of Heilongjiang province.

According to the calculation formula of each component based on Esteban model, we can know that the distribution component is $A_j = (b_{j,o} - b_j^*) \cdot (r_j - R_j)$. The values of ($r_j - R_j$) is reserved for two decimal places in this table. If the A_j values are calculated directly based on the values of column ($r_j - R_j$) in the table, the error could be larger. So the retained decimal values automatically by software are used to calculate the values of A_j ; b_j^* is the homothetic variable.

According to the data in Table 4, the dynamic scatter plots of distribution component that could describe the interaction between industrial structure and the competitiveness are shown in Figure 2.

The interaction between the industrial structure and competitiveness based Esteban model was analyzed (Wu and Zhao, 2011; Xiang and Wen, 2013) according to the explanation of the positive and negative values of the index $(b_{j,o} - b_j^*)$ and index $(r_j - R_j)$ of distribution component (see Table 5). So the distribution component of the three forestry sub-industries was analyzed according Table 5 in this paper. For the convenience of analyzing, the index name of the cell position of Table 5 (Wu and Zhao, 2011; Xiang and Wen, 2013) is adjusted to be consistent with the four quadrant of Figure 2.

year	Cultivation and planting of forest tree				Forest product collection				Forest trees harvesting and transportation			
	b_1^*	$b_{1,0}-b_1^*$	r_1-R_1	A_1	b_2^*	$b_{2,0}-b_2^*$	r_2-R_2	A_2	b_3^*	$b_{3,0}-b_3^*$	r_3-R_3	A_3
2003~2004	7723.87	8949.13	-0.13	-1205.16	2316.59	23.41	-0.92	-21.45	11275.55	-8972.55	-0.13	1203.77
2004~2005	4777.00	7220.00	0.12	901.10	3603.49	-719.49	0.14	-99.91	8624.51	-6500.51	-0.28	1813.70
2005~2006	3431.93	7581.07	-0.16	-1213.42	5283.52	-214.52	0.37	-79.46	9303.55	-7366.55	-0.19	1435.77
2006~2007	3097.20	5319.80	-0.0029	-15.31	6503.21	1764.79	-0.38	-673.18	11046.09	-9068.09	0.73	-6589.38
2007~2008	2747.73	6266.27	0.20	1257.67	7368.40	816.60	0.40	329.28	10877.88	-7082.88	-0.13	944.50
2008~2009	4488.16	8936.84	0.31	2803.39	11394.30	1891.70	-0.25	-478.90	14242.53	-10828.53	0.34	-3638.85
2009~2010	7434.01	15223.99	0.06	944.22	17473.01	-3935.01	0.15	-576.65	15522.98	-11288.98	0.35	-3986.31
2010~2011	11204.65	19955.35	0.16	3252.83	25957.60	-6450.60	-1.13	7285.06	19675.74	-13504.74	1.07	-14402.51
2011~2012	13477.84	32485.16	0.11	3512.82	47772.65	-30643.65	0.34	-10295.67	12802.51	-1841.51	0.38	-692.88
2012~2013	19159.87	41510.13	0.66	27509.25	69517.23	-42514.23	-0.45	19274.48	11548.90	1004.10	0.17	172.25
2013~2014	6087.35	57775.65	-0.59	-34146.91	95508.74	-62220.74	0.97	-60476.54	6861.92	4445.08	-0.14	-645.03

Table 4 – The dynamic distribution component

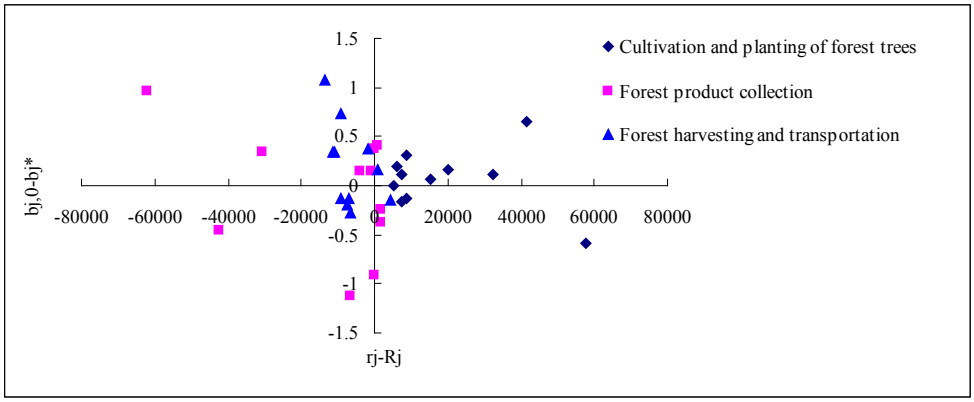


Figure 2 – Dynamic scatter points distribution of distribution component

	Non-specialization	Specialization
Advantage	$b_{j,0}-b_j^*<0$; $r_j-R_j>0$	$b_{j,0}-b_j^*>0$; $r_j-R_j>0$
Disadvantage	$b_{j,0}-b_j^*<0$; $r_j-R_j<0$	$b_{j,0}-b_j^*>0$; $r_j-R_j<0$

Table 5 – The index value explanation of distribution component

Each forestry sub-industry has 11 scattered points in Figure 2. The Forest cultivation and planting industry has 7 scattered points in the first quadrant. When taking into account the interaction between industrial structure and competitiveness, forest cultivation and planting industry has advantage, performancing the specialization of production; the forest harvesting and transportation industry (there are 5 scattered points distributing in the first and second quadrant) and forest product collection industry (there are 6 scattered points distributing in the first and second quadrant) do not have interaction advantage between the industrial structure and competitiveness, performancing the non-specialization of production comparing to forest cultivation and planting industry.

4. Conclusion and prospect

The dynamic and static analysis results of the structure and competitiveness of three forestry sub-industries based Esterban model are consistent from 2003 to 2014 in Heilongjiang Reclamation Area. The cultivation and planting of forest trees industry has outstanding advantage of pure competitiveness and the interact advantage between industrial structure with competitiveness, performancing production specialization, but has no industrial structure advantage; forest product collection industry has interac advantage between industrial structure with competitiveness, showing non specialization of production; forest harvesting and transportation industry does not have

the advantages of industrial structure, and the interaction between industrial structure with competitiveness is not specialized in production either.

However, the application limitations and development prospects of the method were reviewed when static and dynamic traditional shift-share model, Esteban model and spatial expansion shift-share model were used in different research fields (Shi, 2007). Therefore, the improvement of the spatial expansion based Esteban model may be applied to research industrial structure and competitiveness in future research.

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Research on the Urban Planning Strategy from the Perspective of Sponge City

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Abstract: Urban flood disaster and water pollution management is one of the core problems which restrict the development of urban ecology in China. The reason is the sharp increase of urban impervious area, the decrease of rainfall infiltration, the increase of surface runoff and the load of municipal drainage system of the increase. Under this basis, in this paper, we conduct analysis on the urban planning strategy from perspective of sponge city. The sponge city construction from the source to the terminal entire process control rain water system, compares with the traditional rain water use, the sponge city pays great attention to the rain water the nature to accumulate, the nature seepage and the nature purifies that is one kind of the green sustainable rain water emissions pattern. Therefore, it is necessary to deepen and then construct the sponge city control index on the basis of the original regulation index, so that the sponge city construction idea can be truly implemented in the process of urban development and construction. This paper starts from the analysis of the network topology and the systematic design to construct the new idea on the urban planning strategy. The numerical simulation proves effectiveness of the method it can work well from the long-term perspective.

Keywords: Urban Planning, Sponge City, Countermeasure, City Plan

1. Introduction

The rapid development of the new theory of science and technology has profoundly affected all aspects of the human social life, and urban planning thought is no exception. Non-deterministic urban planning thought will lead us to understand and deal with the complex system of city from another angle, of the many planning issues (Ahern, 2013; Camps, 2016). Between the urban planning and the management has the close relation, they should be an organic whole cannot divide at will (Admiraal, 2016). The urban planning and the management implementation is a whole which circulates unceasingly, it including a series of gradual work, this cyclic process connects basic policy goal formulation and the project management execution, believes firmly can the question feedback which appears in project implementation give the following closely determination plan goal process among which the essential ones can be organized as follows.

1. **Plan backward view**. Urban planning as the primary dominant urban development has gradually lost its status, which is mainly reflected in the planning has not yet expired, but the scale of urban construction has been completely break the original plan.
2. **Planning ahead of view**. Planning ahead has also become new planning phenomenon, reflected in the planning is too advanced, regardless of the actual needs of the current development, one step to complete the long-term goals, the planning raised very high.

Impelled the ecology theory widespread application and the ecology city, ecology community's plan construction and the research in the worldwide scale, in under this idea initiative, many countries and the international organization are revolving the human survival and the development subject starts development path which seeks the population, the economy, the resources and the environment coordinates and more ideal urban construction pattern (Gómez, 2013). The domestic and the foreign many scholars have carried on the elaboration to the ecology city concept, although at present has not formed the unified definition while the basic content frame and the rationale is quite consistent, namely the application ecology principle establishes the society, economy, nature coordinated development and the material, energy, the information highly effective use, ecology positive cycle humanity lives together that is city ecosystem unit combination and environment which highly effective, harmonious and continues(Liu, 2015). Its goal is to build a harmonious system of human and nature, the efficient operation of the economic system and the healthy development of the social system to achieve a virtuous circle of urban ecosystems (Lowe, 2015). Planning is the most important features of future orientation. Urban planning as an independent discipline satisfies the key lies in the future, the future can be guidance of planning is in essence a kind of uncertainty about the future of ease and offset, and the role of planning is organized by providing the information, policy makers in decision-making for the future development of the fits, thus for the social various aspects provide the basic framework and personal decisions.



Figure 1 – The Sample Demonstration of the Urban Planning Consequent

Under this circumstance, this paper proposes the novel urban planning strategy from the perspective of sponge city. The remaining of the research is organized based on the listed architecture. In the section 2, we introduce the background and basic characteristics of the sponge city. In the section 3, we propose the novel model of the urban planning strategy. In the section 4, we simulate the method to test and verify the effectiveness. In the section 5, we summarize the research.

2. The Characteristics and Background of Sponge City

Sponge city is a new generation of urban rainwater management concept, refers to the city to adapt to environmental change and response to natural disasters such as rain brought good "resilience" or the "toughness". The sponge city construction because of its main theoretical basis for the development of low-impact technology, so in the Europe and America is also known as low-impact design and low-impact development (La Rosa, 2013; She, 2016). US researchers based on the urban rainwater management research laid the sponge city construction of the three theoretical references.

1. **Green infrastructure**. The green infrastructure idea and the technology aim at the city hydrology management not merely, it integrates for the first time the natural resource as the change main body the urban construction and the



Figure 2 –The Sample Sponge City Architecture

management, limits and guides the people through the plan design technology method to its use, further has enriched theory connotation.

2. **Best management measure**. The best management measure is at first uses in managing the American city and the countryside the surface source pollution non-compulsory policy, afterwards developed into controls the city rainfall amount of runoff and water quality comprehensive measure.
3. **Low impact development**. The main idea of low impact development is to reduce the impact of regional development on rain water. LID concept and technology have the basic impact on urban planning and management.

Therefore, unifies domestic and foreign manages the theory achievement and the experience in city rain which and so on the aspects obtain, accumulates, the nature seepage, the nature take the nature purifies as the goal "the sponge city" the theory can apply and develop that fuses city rain to store and regulate infiltrates technical, and the urban planning and the scenery botanical garden design. In the following figure two, we show the sample sponge city architecture as references.

Compared with the United States, Germany, Japan and other developed countries, the construction of rainwater management system in China is relatively late in the research and practice of "Sponge City". Therefore, drawing on the mature practice cases of foreign countries, combined with China's national conditions, climate and geography. It is of great significance to study sponge city's content goal, technical method jointed construction method and implementation strategy. Based on the literature analysis, we give the countermeasures for different regions.

1. **Green, public facilities area**. District public facilities such as the road green belts should strengthen the infiltration of the water and collection, parking lot, parks, green belts, such as the space in order to strengthen the infiltration of water, and there are conditions can be laid new absorbent material or excavation of underground reservoir, the water can be used for fire emergency or surrounding green irrigation water.
2. **Business district**. Large trees can absorb the more water, so commercial plants can choose large trees or hardwood the heat island effect can slow down the business district, to improve the environment.
3. **Unbuilt area**. Requests the sponge urban construction to take the urban planning permission and the project construction pretage condition, in link strict checks and so on construction drawing examination, the construction permission, completion approval can the good promotion sponge city and green city construction. Policy and preferential measures can be adopted to promote the sponge type construction and residential area, the sponge type road and the square, to increase the building and the road to absorb rain.
4. **Residence community**. The area should be the construction of the area should be green belt, should focus on the building. The green area is large enough to build an artificial lake, which has a better effect on absorption of water and the improvement of environment. The second is the construction of the underground water storage facilities and the permeable floor. Once again, the green roof of the community can also help the sponge city.

Artificial lake, river, rivers, lakes and other water system for the environment and the improved substantially, the sponge construction of the city to focus on and rectification and roof greening of the city, the climate, the regulation of heat island effect of ease this quite critical role.



Figure 3 – The types of Trees used in Sponge City Construction

Evaluation Index	Requirements	Classification
Technical specifications and standard construction.	The formulation is perfect, the standard technical document that can safeguard the local sponge urban construction the smooth implementation.	*Management System*
Ecological restoration of the shoreline.	Urban water system of lakes shoreline, add cover plate of the natural canals of ecological restoration to the blue line control requirements, restore the ecological function	*Specific Construction Requirements*
Urban rainstorm waterlogging disaster prevention.	A historical ponding thorough elimination or reduces obviously, or the ponding degree obviously reduces under same level rainfall condition.	*Implementation Effect*
Performance appraisal and reward mechanism.	For the government investment construction, operation and maintenance of the sponge city construction projects, the need to establish the effectiveness of the construction and the sponge city construction of the responsibility of the implementation and the assessment mechanism, etc.	*Management System*
Rainwater resource utilization	Rainwater collected and used for road sprinkling, garden green-land irrigation, municipal mixed use, industrial and agricultural production and cooling of the total rainfall.	*Specific Construction Requirements*
Industrial preferential policy	The formulation promotion correlation enterprise develops preferential policy.	*Management System*

Table 1 – The Performance Evaluation Index and Requirement of Sponge City Construction

In the natural system, the use of regional excellent water and heat conditions to carry out urban natural vegetation restoration, such as the urban forests, natural wetlands which improve the urban microclimate, improve biological retention and purification effect in the city planning built area per unit area control volume rate, ecological land red line, and an appropriate increase in the area of water and in road construction, transformation of the built-up roads in the form of impervious structure to enhance the green belt on both sides of the road construction scale and level of biological purification as a rain zone, the urban land between the ecological corridor road network integration and coherence to improve the integrity of urban ecological network. Accordingly, in the following table one, we illustrate the sponge performance evaluation index of city construction and requirements.

3. Our Proposed Methodology and Strategy

3.1. The City Topology Modelling

The urban planning decision support system is the human-computer interaction system which comprehensively utilizes various data, information, knowledge and especially model technology, to solve semi-structured and unstructured decision-making problems in various types of the urban planning decisions. In the non-structurized urban planning decision-making as often needs to pass “the degree” the judgment carries on the plan decision-making, for instance the plan design proposal achieved the plan prospect the degree, the plan result achieves policy-making anticipated degree and so on, only then establishes some kind of model describes in the urban planning “the degree” the concepts can to plan the decision-making to play in the true sense assistance role (Lehmann, 2015).

At present this research involves is low correlation function formula. Along with extension theory own development, will future be able to extract multi-dimensional multi-dimensional and the sector correlation function formula and the nature, with will describe a more complex question. The correlation function theory basis is the extension collection theory and extension theory to “the distance” the definition, after had the concept which the extension is apart from, may the precise quota and the sector position relations, or and between the nested interval relations like this can have the extension centralism thing some nature description to develop from the qualitative description to the quota description. While analyzing the network topology, we should consider the model listed as equation one.

$$\partial S_n = \sum_{i=0}^{n} (-1)^i < x_o, ..., \hat{x}_i, ..., x_n > \tag{1}$$

The evaluation indexes of the structural characteristics of complex networks are: degree distribution, coefficient, diameter, centrality, validity and so on. Through a series of comparative analysis, it is considered that the BC value can be combined with the following complex network structural characteristic indicators: IC, CC, and SC, which can express the structural characteristics of the road network reasonably and comprehensively. On the basis of the study, this paper uses the four indexes to measure and analyze the validity and reliability of the ring road network, the grid road network and the free-form road network structure as follows.

$$_{glob}(G)=\frac{1}{N\cdot(N-1)}\cdot\sum_{\substack{i,j\in G\\ i\neq j}}\varepsilon_{ij}=\frac{1}{N\cdot(N-1)}\cdot\sum_{\substack{i,j\in G\\ i\neq j}}\frac{1}{d_{ij}} \quad (2)$$

$$C(G)=\frac{1}{N}\cdot\sum_{i\in G}C_i \quad (3)$$

$$(G_i)=\frac{1}{k_i\cdot(k_i-1)}\cdot\sum_{\substack{l,m\in G\\ l\neq m_i}}\frac{1}{d'_{lm}} \quad (4)$$

In the present research of the theory of complex network evolution model, the method of statistical physics (mean field theory, master equation, rate equation, generating function) has been widely used, while these methods have important significance and evolutionary mechanism of the structural stability in the model research, graph theory and social network, network analysis and analysis method of static geometry the research is based on complex network. In the figure 4, we show the city topology modelling and the planning paradigm.

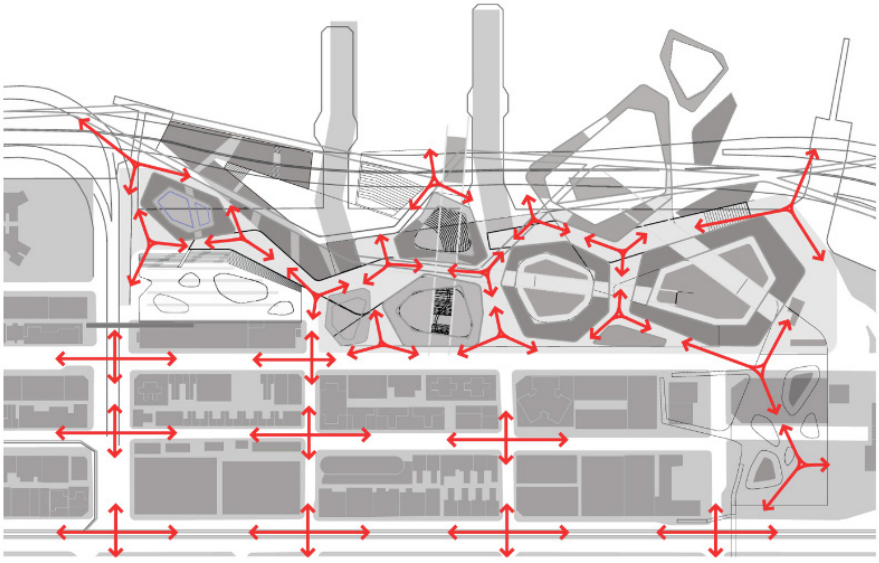


Figure 4 – The City Topology Modelling and the Planning Paradigm

While considering this model, the influence of the current node on the efficiency of the global network travel is evaluated that can effectively evaluate the current node in the global road network importance, and the BC value of each other. The index bridge nodes in the detection of the road network topology with high accuracy, the actual response to

the actual traffic state of the bridge-like topology, for numerical analysis, the equation 5 defines the model.

$$S_n \text{ has } \binom{n+1}{p+1} \text{ faces of dimension } p \text{ with } (0 \le p < n) \tag{5}$$

Where the function $\text{has}\binom{n+1}{p+1}$ represents the node features and the corresponding complexity, under the condition of $0 \le p < n$. Because the BC value may effective obtain the overall situation road network the essential analysis situs node, and therefore the BC value may use in the road network the fail-safe analysis. With the BC value is mutually the supplement as the IC value may appraise the current node effectively in the overall situation road network the importance. Every step of the BBV model first is the change of network topology, the impact of the change and then solve the topology change on weight; The evolution of the traffic flow driven technology every step of the weighted network model is first consider the change of the network weights, then consider the growth of network topology in a changing circumstances. The formula 6 demonstrates this procedure.

$$\begin{aligned} S_{21} &=< x_0, x_1, x_2 > \text{ and } S_{22} =< x_0, x_2, x_3 > \\ C_2 &=< x_1, x_2 > - < x_0, x_2 > + < x_0, x_1 > \\ &\quad + < x_2, x_3 > + < x_0, x_2 > + < x_3, x_0 > \\ &\quad =< x_1, x_2 > + < x_0, x_1 > + < x_2, x_3 > + < x_3, x_0 > \end{aligned} \tag{6}$$

3.2. The Proposed Urban Planning Model

Based on the prior discussions, this part proposes suggestions on the urban plan. Eco-city planning is starting point for building an eco-city. It is usually a question of why eco-cities are being built and how eco-city plans are to be addressed. This is the concern of most city managers, for this, we give the listed suggestions for the further development. (1) Constructs the sustainable development great measure system is the urban development intrinsic, the basic request, only then realized fully to the city own development foundation and the development potential that can develop fruitfully based on long-term goal developmental strategy. Therefore, any city or the area in the ecology urban construction beginning must carry on the science rigorous system analysis to the city foundation strength. (2) We also urgently need to establish circular system of social production and consumption. The basic requirement of ecological city is to improve the efficiency of economic operation, no pressure environment and resources at the same time, thus establish a circular economy as the leading system of circular economy is an important part of the ecological city planning and construction. (3) The ecology city is implements the sustainable development the important method, its goal is for the human society and the nature coexistence co-prosperity, the promotion economy and the environment coordinated development, beauty advances together harmoniously, the

human and the nature coordination evolution, moves towards, the health, the civilized trinity compound ecology wealthily is prosperous and the establishment benign city ecosystem structure is the ecology city basic goal.

In further, we can summarize the mentioned countermeasures as: To create a green balance system of the city; to protect the urban landscape system; to improve the urban landscape ecological construction; to respect the city's historical context and regional culture; to establish a smooth ecological corridor; the basic construction of suburban agro-ecosystem; the establishment of green ecological transport system; green ecological living environment; the construction of a beautiful environment of the township and the city as the systematic target.

Under the non-definite plan thought instruction urban planning, focuses on the non-definite factor analysis, under the consideration dissimilar condition the plan may the selectivity, emphatically in to the important uncertainty monitoring and different match plan coordination, emphasis plan from the top downward and from bottom to top bidirectional interaction. From this angle, we give listed suggestions.

1. **Uncertainty analysis program**. In this procedure link, the mainly is inquires the non-definite factor origin, carries on the classification to these factors that carries on the analysis through mathematics method to these essential factor sensitivity, definite uncertainty several levels, thus is clear about many scenes which will possibly appear in not the far future, finally will have to obtain is the uncertainty level element of certainty table.
2. **Strategic attitude selection process**. Under the premise of the full understanding of future, it is necessary to make clear urban development strategy under different prospects, and therefore to determine the strategic attitude. For the city, the choice of strategic attitudes should be subject to social pluralism influence and constraints, it is necessary to provide three different of the strategic attitude of the framework, in order to facilitate the choice of multiple city subjects.
3. **Reverse target setting procedure**. To reverse such the goal is to clear quality standards, with the modern urban development stages of reverse thinking before city demonstration in this stage and the city may face all kinds of uncertainty. From perspective of economic benefits, social benefits and general environmental benefits, clear milestones to be reached, urban development and the city in the process, can bear the risk and cost.

4. The Experimental Implementation

In this part, we simulate the proposed model. In the following figure 5, we show the visualized arrangement and design pattern of the sponge city. In the figure 6, as the first set of the experiment, we show the numerical result of the simulation on the designed urban network topology, we can conclude from the figure that the model can balance the real conditions well. As the section set of the experiment, we show the numerical result of iteration simulation of the model in the figure 7. It process that in a long term simulation, proposed model can also obtain the performance.

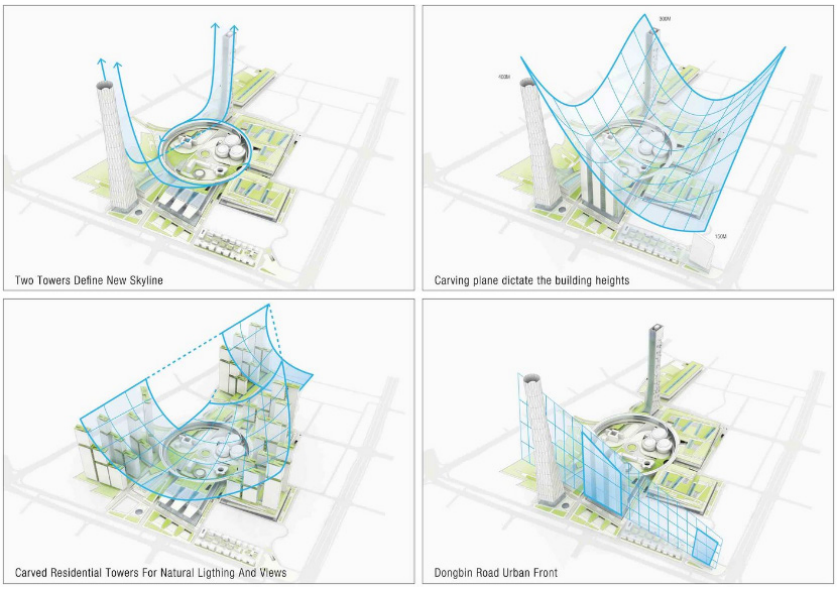


Figure 5 – The Visualized Arrangement and Design Pattern of the Sponge City

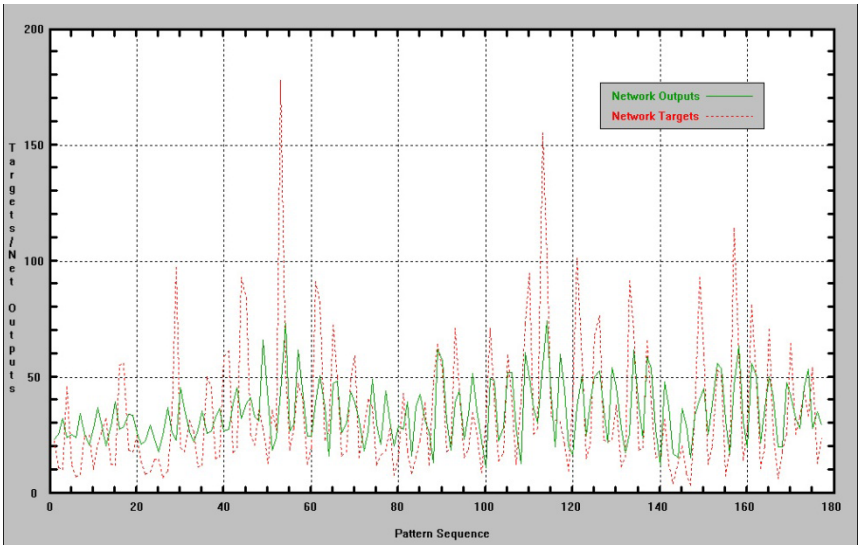


Figure 6 – The Experiment Simulation Set One on the Urban Network Topology

5. Conclusion

In this paper, we conduct analysis on the urban planning strategy from perspective of sponge city. The concept of sponge city includes ecological restoration, human

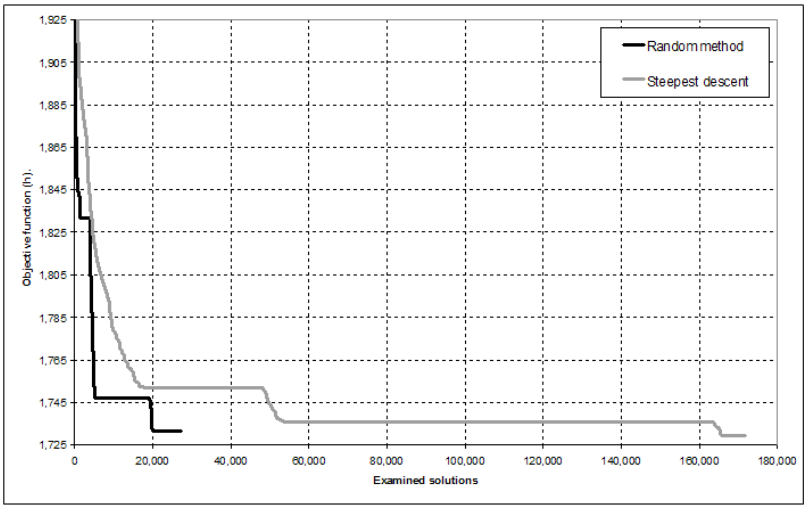


Figure 7 – The Experiment Simulation Set Two on the Urban Network Topology

interference, source control, low impact development and some other important ecological ideas, fit the background of China's contemporary ecological civilization construction that is also a solution to China's urban waterlogging and water quality sustainable way. For alleviated the city waterlogging from the source, reduces the city runoff pollution load, the frugal water resources, protects and improves the city ecological environment, the country proposed construction "sponge city" the new idea, advocated constructed the low influence development rain water system. The sponge city is refers to the city to be able to look like the sponge to be same, in the adaptation environmental variation and should to aspects and so on the natural disaster have "the elasticity" good, rains when absorbs water, the inpoundment, the seep, only the water, when the need will gather the water which will save "the release" and uses. This paper starts from the analysis of network topology and the systematic design to construct the new idea on the urban planning strategy. In the future research, we will apply the methodology into real design to verify it.

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Design of Campus Card Hardware and Software Platform based on GPS and Wireless Communication Network

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Abstract: This paper proposes the novel paradigm for the design of campus card hardware and software platform based on the GPS and the wireless communication network. University campus card from first single consumer settlement to cover current teaching management, laboratory management, library management, computer room management, basic logistics management and water control and other aspects of school management is a very wide range of systems engineering which includes the provision of basic data and authentication and settlement of the system platform. The system integrates the functions of the document management, file management, time, attendance restaurant management, apartment management, computer room management and other management services. To optimize the traditional system, we integrate wireless communication network and GPS to construct location aware platform. This administrative mode has replaced traditional expense administrative mode, the management for school has brought highly effective and convenient and security. We design the visualized interface to enhance the UI experience of the system. The result proves the effectiveness.

Keywords: Campus Card (CC), Hardware and Software, GPS and Wireless, Communication Network, Systematic Design

1. Introduction

In the past few years, along with the unceasing progress of science and technology, each school started widely to apply the campus one pass and related technology product promoted arrival of digitized campus as well as helping fast construction of digitized campus, the school spending one calorie various, effectively raised the efficiency of school card service (SCS) management that made up for the traditional student checking attendance and other aspects to manage the flaw (Ames, 2013). It reduced the duplication of school in management and construction to invest effectively, greatly reduced the cost, saved resources and simplified current management procedure of school to campus construction which is of the great importance (Bhushan, 2014). University campus card from first single consumer settlement to cover current teaching management, laboratory management, library management, computer room management, basic logistics management and water control and other aspects of school management, is a very wide range of systems engineering which includes the provision of basic data and authentication and settlement of the system platform, and for the campus needs a

variety of identity authentication and core consumer billing applications developed in two parts and the architecture can be organized as follows.

1. **Application interface**. It is the variety of basic applications docking card background interface layer that including the interface server and the local database, the database used to store institutions and user data, blacklist and consumption of water data.
2. **The one pass backstage.** It is one pass basic platform, including core server and central database, but also includes to the backstage carries on the related workstation that the management monitoring and inquired, such as service management, basic system administration and settlement management. These constituted core function of one pass system platform.
3. **Application system.** It is a variety of rich campus card function of the third party system. Generally include the application server, the database, client, credit card and card reader, etc.

It integrated the application of the computer technology, network communication technology, database technology, automatic control technology and general IC card technology (Essinger, 2013; Dong, 2015). The system integrates the functions of the document management, file management, time, attendance restaurant management, apartment management, computer room management and other management services. It truly realizes “one card in hand, traveled all over campus”, realizing all kinds of data unified and operational normative that is the school to the standardization, scientific, modern management of the important symbol (Fang, 2013). Among all the potential modification of the school card, the GPS based method is the essential one. The architecture of the GPS can be separated into the two aspects. (1) The GPS information receiving module is connected with the external GPS module entity through the serial port and reads the GPS information received by the GPS module to the ARM development board through the serial port and the GPS information processing module selects the information read from the serial port;

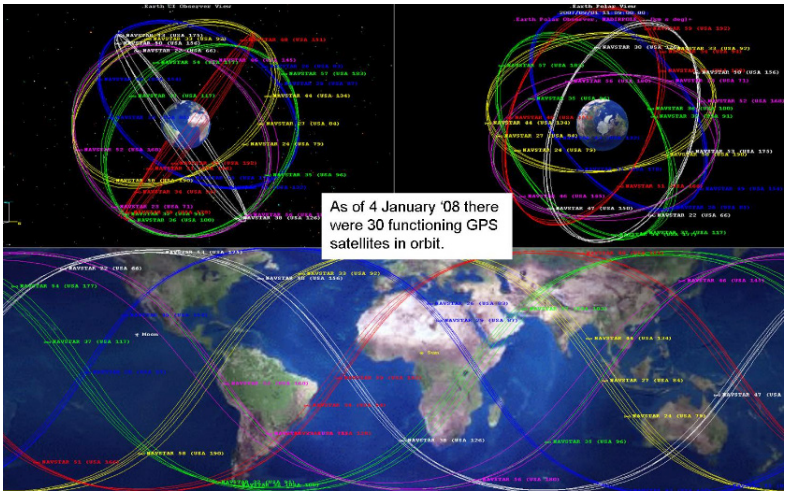


Figure 1 – The systematic demonstration of the GPS technology

the GPS information transmitting module The information is written to the external GPRS module through the serial port to complete the transmission of GPS information. (2) Information of GPS information receiving module receive terminal transmission; GPS information transformation module completes the transformation of extraction as well as coordinate system of latitude and longitude; terminal position labelling module labels on the electronic map terminal position. The figure one gives the systematic demonstration.

To integrate the GPS with the SCS, this paper conducts research on the core design of campus card hardware and software platform based on GPS and general wireless communication network (Guinaldo, 2013). The rest of the manuscript is organized as follows. In the section 2, we introduce the Java based web port development paradigm to serve as the basis of the software part of the system. In the section 3, we discuss the core techniques and algorithms for the GPS and wireless communication network. In the section 4, we propose the design paradigm for the system. In the section 5, we summarize the work and make schedule for further research.

2. Java Based Web Port Development Paradigm

The JINI systemic structure is to face the dynamic distribution computation Java-based solution. Java is an object-oriented cross platform language has equipment independency and probability, as well as good security. These also diagnosed to provide an open solution for foundation distributed fault. JINI network structure from the infrastructure, programming model, the service consists of three parts. Infrastructure is the central part of the architecture, and its goal is to provide mechanisms for devices, services, and users to discover, join, or separate from the network (Gutiérrez, 2014; Huang, 2014). The programming model is based not only on Java application platform, but also on its ability to move code between the nodes. The programming model defines a set of interfaces, and the infrastructure and the services are implemented using this set of interfaces. The figure 2 shows the systematic architecture.

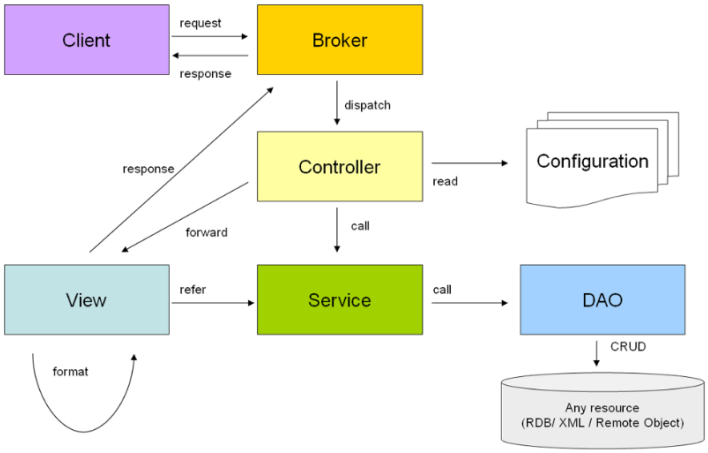


Figure 2 – The Java based web port development paradigm flowchart

For our system, we consider MVC mode. MVC stems from the Smalltalk language, in Smalltalk-80, the MVC model is to refer to model view pneumatic control model, it including three types of objects: The model provides the business logic, service data and provides the data accessing method; The view is the demonstration of the model on selected screen; The controller is used to handle user command as well as program event, manages interaction that user and view have. The MVC architecture is ideal for the multi-user, extensible, maintainable, highly interactive systems with high levels of component reusability (Jiang, 2014; Mukherjee, 2014). The separation of model and view makes it possible to use multiple views the model makes the software more easy to maintain and expand while the code repetition rate to a minimum. With the combination of JINI, the MVC will be equipped with the listed advantages. (1) Extendibility. JINI network not central control, when new service automatic joining, the entire JINI network dynamic will manage itself voluntarily, but does not need the manager to carry out the disposition and supervisory work. (2) Flexible. JINI network services can be free to communicate with each other or call, but they are not interdependent between each other, this loose connection to the JINI-based applications with great flexibility. (3) Reliability. JINI realizes the communication through Internet. But two machines between the Internets have many channels, this regarding the user said that is transparent. In distributed system that in realizes based on JINI, if the service end of current use breaks down, the client side can seek for other available service end automatically, after finding, reconnects, if could not find, the client side will wait for that the appearance of available service end and prompts the user.

```
1  class Controller implements java.awt.event.ActionListener {
2      //Joe: Controller has Model and View hardwired in
3      Model model;
4      View view;
5      Controller() {
6          System.out.println ("Controller()");
7      } //Controller()
8      //invoked when a button is pressed
9      public void actionPerformed(java.awt.event.ActionEvent e){
10         //uncomment to see what action happened at view
11         /*
12         System.out.println ("Controller: The " + e.getActionCommand()
13             + " button is clicked at " + new java.util.Date(e.getWhen())
14             + " with e.paramString " + e.paramString() );
15         */
16         System.out.println("Controller: acting on Model");
17         model.incrementValue();
18     }
19     public void addModel(Model m){
20         System.out.println("Controller: adding model");
21         this.model = m;
22     } //addModel()
23     public void addView(View v){
24         System.out.println("Controller: adding view");
25         this.view = v;
26     } //addView()
27     public void initModel(int x){
28         model.setValue(x);
29     } //initModel()
30 }
```

Figure 3 – The sample JINI jointed MVC paradigm for our system

3. GPS and Wireless Communication Network

3.1. Global Position System (GPS) Characteristics

The traditional GPS hardware receiver based on the special-purpose AISC chip, the user may design the specific essential GPS receiver through the re-development, but if satellite system or parameter and other changes, then must develop, the cost is relatively high and the GPS software receiver by RF front-end hardware and the signal processing procedure constitution. Accordingly, the systematic architecture of the GPS can be organized as the follows.

1. **Catches realization of module.** Holds to trace the module to be used for the exam to jump the digital intermediate frequency GPS signal, from carrying was left the C/A code by the despread. The C/A code is the GOLD code sequence, its characteristics have high autocorrelation characteristics, therefore the software receiver often uses this basic correlation property to realize the capture, the digital intermediate frequency GPS signal and local signal that will sample make the correlation.
2. **Tracks realization of module.** The acquisition phase is the CA code phase and basic Doppler frequency offset coarse value, and because of the relative motion of the satellite and the receiver, CA code phase and load are Doppler are changing at any time.
3. **Sampling Analysis.** FFT flag territory fast catch in algorithm, transforms the correlation to quite the territory carries on, with the small computation load. When with the basic labor flag search optimal algorithm, anchor ring correlation theorem of this algorithm digital signal processing-based, that related realizes according to the link through the operation chip.

To analyze the above algorithm, we use the discrete Fourier transform to transform the correlation operation to the frequency domain, in order to avoid time-domain large number of sampling points of mutual computing. Suppose we have the GPS signal of $x(n)$ and the local transformation signal $y(n)$, the corresponding function can be expressed as follows.

$$r(n) = \sum_{m=0}^{N-1} x(m) y(n+m) \tag{1}$$

We conduct the DFT on the $r(n)$ and we can get frequency domain expression, the calculation of the correlation operation is converted to a simple multiplication in the frequency domain can be expressed as the follows.

$$R(k) = \sum_{m=0}^{N-1} \sum_{m=0}^{N-1} x(m) y(n+m) \exp(-j2\pi kn / N) \tag{2}$$

Carries on inverse transformation IDFT type (2), may obtain the correlative value peak value, if the core peak value is bigger than the pavilion value of being equal to decides, that signal success obtained, thus obtains the starting phase of C/A code and carries to search for the sketchy value of frequency.

Generally, when the GPS receiver uses a cyclical the pseudo-code is the 1ms integral extravagant may complete the capture of GPS signal. The phase for the initialized signal pattern can be then defined as formula 3.

$$\theta_m(k) = \tan^{-1}\left[\frac{\mathrm{Im}(X_m(k))}{\mathrm{Re}(X_m(k))}\right] \tag{3}$$

The results of each channel are respectively integrated into the phase detector of the delay phase-locked loop. The phase detector obtains general code phase error according to the autocorrelation characteristic of the CA code. The error is adjusted by the loop after the local CA code of the NC oscillator NCO, control pseudo-code generation rate, so that the local CA code to keep the track of the input signal phase changes in the code to achieve accurate strides. Under this basis, we demonstrate the global position system distribution accordingly in the figure 4.

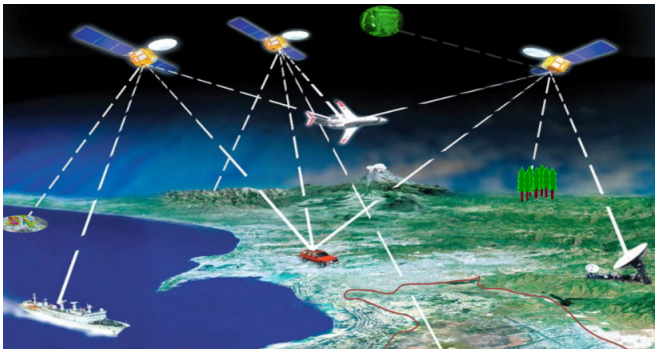


Figure 4 – The global position system distribution demonstration

3.2. Wireless Communication Network (WCN)

The wireless communication uses electromagnetic wave signal in characteristics that in the free space disseminates to carry on one mailing address of exchange of information. In the development of the recent year information communication domain, it developed application to be broadest quickly. Wireless communication network optimization is to analyze the parameters of the existing network and find out the reasons that affect the network quality as system to run high-quality, the existing network resources to obtain the best benefits, to achieve the maximum economic benefits (Qian, 2014). The application of fuzzy logic in the communication network mainly involves queuing control, mobile positioning, the wireless access, routing, wireless consciousness, cross optimization, power control, channel estimation, congestion and flow control, spectrum allocation and the handover performance evaluation etc. These research works are well distributed in the different wireless communication systems (Tang, 2014; Wang, 2014). On this basis, but should also consider that the wireless communication node in the open country region working day talent, receives such as the topography and mask and some other influences of actual environment. Meanwhile in the wireless communication,

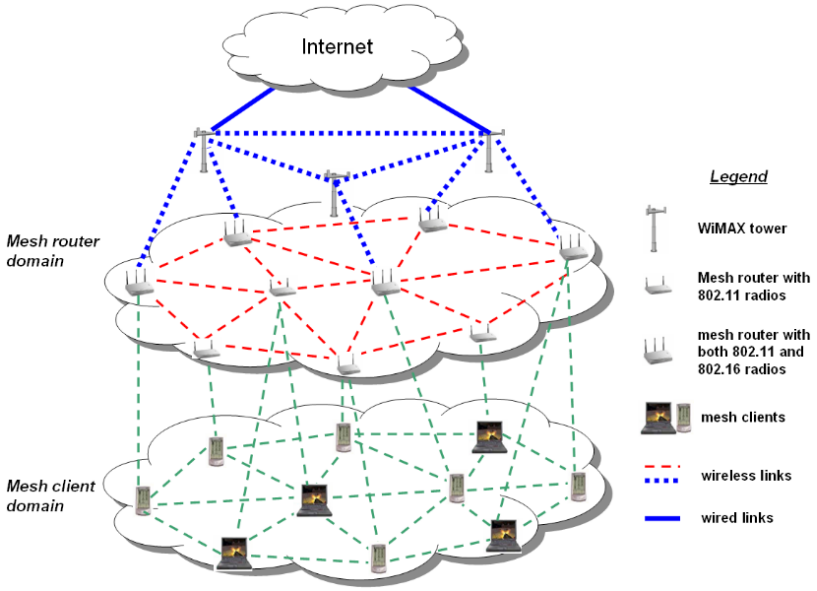


Figure 5 – The wireless communication network layered architecture and the components

supposing of sending signal in the communication facility to surrounding certain scope will be having the disturbance (Wang,2014). These will cause the communication node launch scope and electric wave signal strength and other targets came under the influence of certain extent. Therefore, during the maximized coverage scope gives dual attention to effect of the actual environment on the communication, this core communication node optimization deployment appears especially important as shown in the figure 5.

In the field environment, the signal transmitted by the communication node is affected by the irresistible factors such as terrain and wood. After communication wave propagates through a path, the energy will be attenuated by the diffusion of radiation energy. Considers all the factors in the radiating capacity proliferation of signal in the spreading process and weaken that as a result of the weaken causes as the result of the regional environment factor that its synthesis weaken size may define as the following formula 4.

$$L = L_0 + \delta \tag{4}$$

Where the L_0 represents the free-space loss, δ is the environmental impact factor. Both of them can be define as formula 5 and 6, respectively.

$$L_0 = G_T G_R \left(4\pi d / \lambda\right)^2 \tag{5}$$

$$\delta = \sum_{w=1}^{k} \delta_w / k \tag{6}$$

The algorithm is a sorting method which is close to the linear weighting method to solve the multi-objective problem of single decision maker. In the figure 6, we show the systematic concern of the linear based communication.

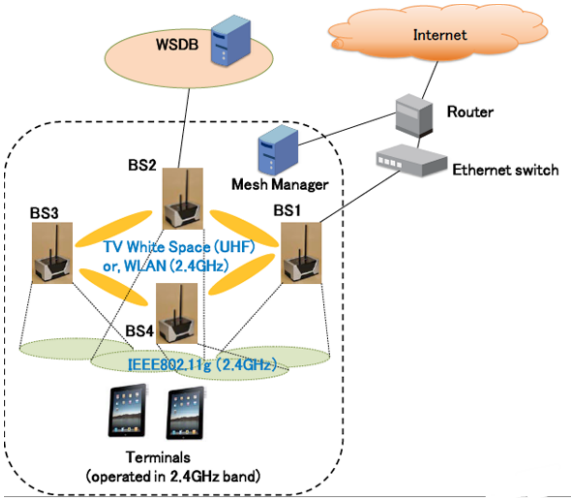


Figure 6 – The linear based communication paradigm

The basic idea is that the satisfied scheme should be as close as possible to the positive ideal scheme as far as possible and ideal solution. In terms of network attributes, parameters such as the jitter, latency, and packet loss ratio must be considered as formula 7.

$$p\left\{\bigcup_{i=1}^{N} R_i\right\} = 1 - p\left\{\bigcup_{i=1}^{N} \overline{R}_i\right\} = 1 - \prod_{i=1}^{N}\left[1 - p\left(x_j, y_k, i\right)\right] \tag{7}$$

The corresponding cover rate for the WCN can be defined as follows.

$$P_{cover} = \sum_{j=1}^{m} \sum_{k=1}^{m} p\left\{\bigcup_{i=1}^{N} R_i\right\} \Delta s / S \tag{8}$$

4. The Implementation of the Campus Card System

4.1. Software Part Implementation Paradigm

The one pass system uses EJB to have the following advantage. The EJB server has provided such as the business and the security and so on middleware service, the

application and development personnel only need pay attention in realization of the business logic, but is not the realization of floor. Extendibility, as EJB can act according to growth that we apply to expand, EJB server also has often provided the load equalization and considers the data recording the burst characteristics, the time concentricity as well as to system requirement the stability and security.

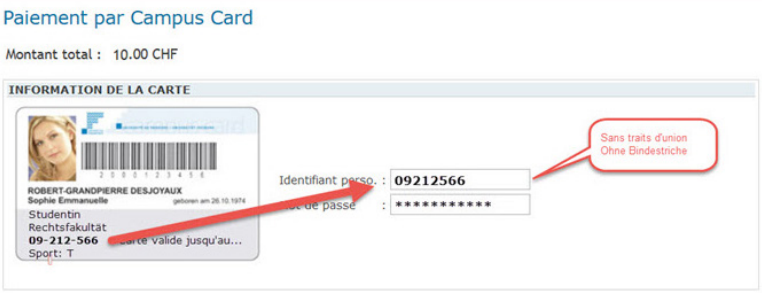


Figure 7 –The interface for verifying the student identity

In the figure 7, we show the sample interface for verifying the student identity, which is using the code for encryption. We can organize the steps as follows.

- Main method. The client side needs to call conversation Bean addRecord method to realize to increase the record function. The addRecord method in conversation Bean must do the following work. Searches the appropriate checking attendance project, the foundation attendance record, according to the condition of punch-in time setting cardholder.
- Builder based on the prepared Bean to provide a wizard to help clients to test the prepared Bean. As a wrapper class, we only need to test the client class to make some changes in line with their requirements as can be used.
- The attendance definition table is one-to-many with the attendance record table. Accordingly, the relationship is also mapped to two core entity beans. Right-click Schedule and create a relationship, just move the mouse to the CheckRecord can be established.
- The system platform uses J2EE standard, J2EE standards development-based the application can the stepping platform transplant, and provides various services that in the enterprise computation has needed; In J2EE most standard definitions connection, for example JNDI, JDBC, etc., can therefore with the product coordination of many manufacturers, easily the widespread support; J2EE set essential widespread standard, considerably simplified the application and development and deploys the process.

4.2.Systematic Implementation of the Campus Card

In the campus card system, extensive use of the query machine to facilitate staff and students to query consumer account information and historical consumption of water, in order to enhance service capabilities it also set up a binding bank card account to

the general campus card wallet transfer deposit machine, to facilitate the majority of teachers and students staff teaching, research and life. Based on the prior discussion on the techniques, we can summarize the system as follows.

- Graphic operation terminal menu development conforms with the user interfaces of various service applications to the graphic operation terminal browser that realizes the corresponding service through the operation of graphic operation terminal. In use process graphic operation terminal browser masking operation system tabletop, but system maintenance, the system administrator may the external connection keyboard, assign out the browser control menu through the combination key, inputs the password to withdraw from the graphic operation terminal browser can through the long-distance tabletop way maintenance operation.
- Business access, it can be divided into the card system access, dormitory management system repair, online ordering, study room row seat, mobile recharge access, mobile banking access, outreach advertising access, digital campus portal access and other third-party service application access.
- The wiring access, we must have for the power source access of graphic operation terminal main engine power supply, is for the Internet access of service connection visit, the GPS signal module, the blue-tooth module and the DDN special line access match.

To visually demonstrate the systematic architecture, in the figure 8, we show the final user interface of the designed system. We can log on the campus network card website, query, report loss, electronic account transfer recharge and some other operations. But also can

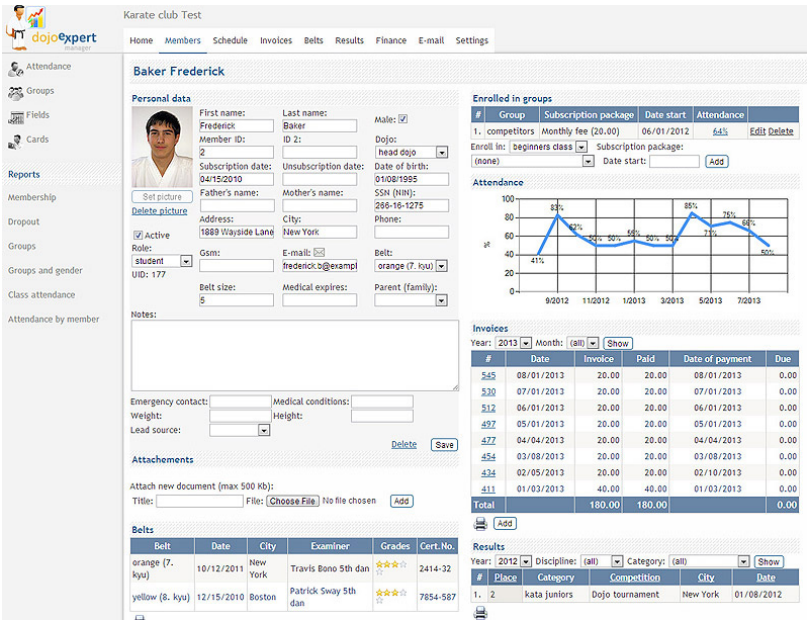


Figure 8 – The final user interface of the designed system

realize the function of online banking silver card circle; in the personalized development of the network common collection system, can be achieved based on the electronic account of the online payment collection. Based on the security requirements of the card, usually campus card system equipment will be divided into a VLAN, and set to the campus access permission, in the public network access, the need to set up a VPN server to log on campus card website.

5. Conclusion

This paper proposes the novel paradigm for the design of campus card hardware and software platform based on the GPS and wireless communication network. “Campus one pass” is the important component of digitized campus construction, educates one of the informationization construction shoring of foundation points. It the IC card and the digitized concept of the robustness and computer network integrates the campus, each management information systems organically fuses school teaching, scientific research, management and other, forms to cover the school scope the digital space. In the campus, every need cash and ticket or needs to distinguish the status the situation to use card to complete. This administrative mode has replaced the traditional expense administrative mode, the management for school has brought highly effective and convenient and security. Its realization not only can the standard school administration, raise the working efficiency, and can facilitate the student life. Our research combines GPS and WCN to construct the new paradigm for the systematic design. In the future research, we will apply the proposed method in Chinese universities to test the effectiveness.

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Research on the Community Security Big Data Mining Auxiliary Risk Early Warning Model based on Artificial Intelligence and Information Retrieval

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Abstract: The industrialization production and the society transform bring the population the flowing and the migration, while the urban population increase brings the complex social order control question. To deal with these challenges this paper proposes the community security big data mining auxiliary risk early warning model based on the artificial intelligence (AI) and information retrieval (IR). Based on our research, compares with the policy formulation system analysis method, but that the multi-source and the course theory sophistication lies in the attention policy formulation process is not the policy formulation change appraised policy anticipated and non-anticipated result. It is distinguished based on B/S pattern long-distance video frequency supervisory system between the traditional C/S pattern system, after in other words, the Web technology, the IP multicast technology as well as the so-called JMF technology all unifies. Moreover, information mining algorithm is integrated to construct the robust dealing system. The performance of the system is verified through the numerical and experimental simulation.

Keywords: Information Retrieval, Artificial Intelligence (AI), Community Security, Risk Early Warning, Data Mining.

1. Introduction

The industrialization production and the society transform bring the population the flowing and the migration, while the urban population increase, brings the complex social order control question, from this brings the police service work production and the development, and this is the police service work development rule. Social security is the direct embodiment of political security and social order is the basic requirement of the regime security (Bennett, 2013). Therefore, the innovation of the social security management is an important content of the whole social management innovation (Buscher, 2012; Hovy, 2013). However, in the international and domestic environment and urbanization process to accelerate the basic situation and characteristics of situation has not changed, strengthen and innovative security management, the task is extremely difficult.



Figure 1 – The Community Security Components and the Inner Organizations

As shown in the figure one, we show the community security components and the inner organizations. Along with the science and the technology development, the tradition guards against the system to expose some of the security hidden danger question gradually peacefully in the use process, like the defense basic dependence security personnel identifies artificially, discovered and processing reports to the police the situation not promptly and so on (Blanco, 2012; Modgil, 2013). In the today's intelligent information technology, security systems began to use some of advanced computer technology, communications technology, control technology and IC card technology, to provide users with better and more secure living environment (Mellit, 2014). Under this circumstance, in this paper, we conduct research on community security big data mining auxiliary risk early warning model based on artificial intelligence and information retrieval. The remaining of the paper is organized as follows. In the section 2, we review and analyze the basic concepts of the community public security. In the section 3, we introduce the artificial intelligent and information retrieval technique as the basis for the methodology. In the section 4, we propose the big data based community public security enhancement platform. In the section 5, we conduct simulation on the proposed method. In the section 6, we summarize the manuscript.

2. The Basic Concepts of the Community Public Security

The social management policy involves the multitudinous policy activity, and they constituted the social management policy main body, the social management policy formulation and appearing are together the result which internal and external a series of basic factors affect together. The social management legislation covering domain is widespread, according to its controlled member difference, may divide into four big kinds as the follows.

1. **Maintenance and the Public Safety**. Food safety, drug safety, natural disasters, social order, management of the floating population and special population will affect social stability and public safety.

2. **Industry and Organization Management**. Industry and organization and management of the main contents of the legislation is reflected in the state of all walks of life and the promotion and regulation of various social organizations, mainly through industry and social organizations standards.
3. **Standard for Social Security Services**. Labor and basic social security legislation, designed to protect the labor rights and interests of citizens and basic life while its mainly involve labor laws and regulations, the people's livelihood security laws and regulations, etc. The legislation embodies the social management legislation human-oriented legislative requirements.
4. **City's Comprehensive Management Class Specification**. In the city synthesis management domain legislation, manifested social management legislation politics, the economy has blended the characteristic, its primary coverage was to the city superintendent's rights and obligations, executive program and the legal consequence carries on the stipulation.

The multi-source and course analysis frame answered three important questions: How does policy maker's attention is assign, the concrete question is how forms and that how and carries on to the question and the solution discovery in where. Compares with the policy formulation system analysis method, but that the multi-source and the course theory sophistication lies in the attention policy formulation process is not the policy formulation change appraised policy anticipated and non-anticipated result, and will consider as them is the future policy beginning will be responsible the policy formulation process will decompose separate into some may manage and the reasonable analysis unit (Pereira, 2013). Specifically, the internal participants in China's social management policies include the following categories. One is the political party took our country social management policy the leader, communist party of China has played the decisive role in the general social management policy formulation and the establishment process. Two is the government our country all levels of governments is fulfilling the social management policy maker and main performer's role that has the important influence function to the exterior social superintendent's thought and general decision-making (Ristani, 2016; Simpson, 2014). Three is the government officials, they are the social management policy concrete performer, also is the government collects the policy information important origin, their work manner and the work achievements will be able to affect the social management policy to carry out the effect, then initiation policy vicissitude. Four is national people's congress and the political consultative conference, their function mainly manifests in provides the legal safeguard and the policy suggestion for that our country social management. They constitute an important component of social coordination in the China's social management policy and the countermeasures.

Based on above analysis, we can them summarize the community public security concerns as the follows. (1) In the face of economic transition, the impact of social transformation brought about by various social and security incidents, there have been many major and vicious cases, a serious threat to people's health and safety of the life. (2) Accelerated social stratification in the same time, the China lacks the necessary social distribution channels, leading to strife between the outbreak of the intense conflicts and disputes. (3) In the process of group events, China's legal construction and system design behind the economic development in the process of the socialist modernization.



Figure 2 – The Demonstration of the Community Public Security Monitoring System

As for these concerns, the solutions of the community public security should be on the way, in figure 2, we show the monitoring system as one of the countermeasure, in the later sections, we will introduce the proposed methodology in detail.

3. The Technique Basis for the Proposed Method

3.1. The Artificial Intelligence Technique

Artificial intelligence in the pattern recognition refers to the use of the computer instead of human or human to help to perceive external information that can be said that a kind of human perception of a simulation. It explores the establishment of computer pattern recognition system, through the computer system to simulate the human sensory recognition and perception of external information (Wang, 2014). It is well known, the definite inference has many shortcomings and the insufficiency, under the movement rule, the accuracy often is relative and the inaccuracy is inevitable. The indefinite theory is the theory of probability, the credible theory and reliable theory general designation. At present, the experts and scholars have put forward based on the research and experiment on many uncertain reasoning model based on probability theory, subjective Bayes method based on the fuzzy set theory, the possibility of the Dem Pster-Shafer evidence theory, rough set method, data mining method and fuzzy logic inference. In the figure 3, we show the sample ones.

The basic indefinite inference was in a high-level intelligent system development realization important research area, the uncertainty inference principle applies in the scientific research and industrial production has all obtained the preliminary result (Wang, 2013). On the other hand, the definite inference as also was solves the traditional expert system knowledge vulnerability and that inference monotonous extremely important method, uncertainty inference passes through many year development already to establish the integrity system and the mature research technique from now on will be able to have broader application place inevitably. Fuzzy proposition logic imperfect root in general proposition conjunction definition, because took line foreword flexible logic, fuzzy proposition logic besides the acknowledgment atomic proposition

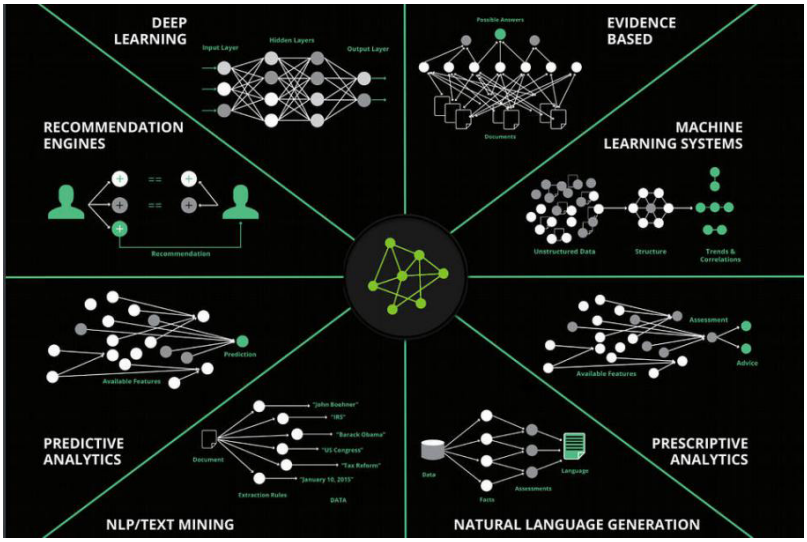


Figure 3 – The Components of the Artificial Intelligence Technique

true value flexibility is a fuzziness, but that also must solve about the molecular fuzzy proposition true value question. In the following table, we show the essential logistic concerns of the artificial intelligence technique.

Universal Logic Mode	Characteristics
Established to describe the relationship between propositions flexible connective operation model of uncertainty.	These operator clusters can describe the uncertainty of the relationship between flexible propositions. And it has been proved that this model contains all kinds of uncertain reasoning models, such as reasoning model based on probability, reasoning model based on trust measure and reasoning model based on trust degree.
Establish a flexible reasoning model which can describe the reasoning process uncertainty.	Due to the true value is allowed in the generic logic flexible, flexible, relationship dimension, flexible, flexible and model of flexible degree, the existence of, can describe the relationship between the unity of opposites and contradictions of transformation, provides mathematization of dialectical logic symbolic.
Establish proposition true value uncertainty description of flexible true range.	It has induced each logics which has first, describes each kind of true value uncertainty true value territory W general form is the random multi-dimensional ultra-foreword space and the related properties.
The establishment can describe the restraint degree uncertainty flexible classifier operation model.	The common formula sets and reasoning models of flexible logic are rich in content, including deductive reasoning, inductive reasoning and hypothetical reasoning, which are defined on the basis of three primary elements.

Table 1 – The Essential Logistic Concerns of the Artificial Intelligence

3.2. The Information Retrieval Model

In the research of semantic retrieval, the main idea is based on ontology semantic network and reasoning mechanism of ontology is used to realize general semantic relation. Due to the particularity of the ontology theory its powerful and the robust semantic network is a prerequisite for practical application of ontology, and it has become an important factor restricting its development.

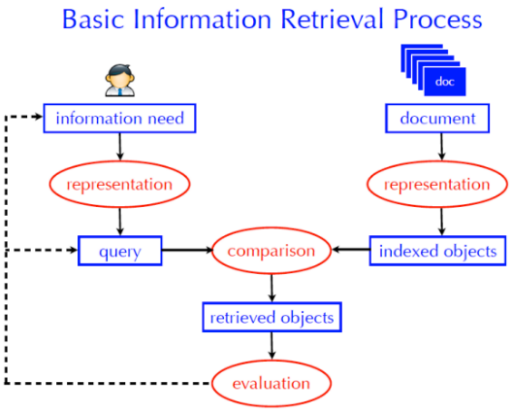


Figure 4 – The Flowchart of the Information Retrieval Model

As reflected from the figure 4, the flowchart of the IR model is shown. The semantic analysis always is the important topic which many computer practitioners study, also is the natural language understood the domain needs to solve the fundamental question and pursue goal. The semantic analysis is refers in the analysis sentence syntax structure and in each word meaning foundation as promotes can reflect this sentence significance the formalized expression. As the primary standard of the IR, the formula 1~2 demonstrate the similarity measurement paradigms.

$$similarity' = similarity^{\frac{1}{weight}}, 0 < weight < \infty \tag{1}$$

$$similarity(D,Q) = \frac{D \times Q}{\|D\| \times \|Q\|} \tag{2}$$

The $\|D\| \times \|Q\|$ represents the manipulation of the vectors, and the (D,Q) is the related representation of the measurement. It is semantic information query analysis, that retrieval is an important content of the basic concept of retrieval condition not only contains also contains semantics, various forms of input for the users, such as the words or natural language, and specific background information or the process of semantic relationships, so that the computer can better understand the user input, in the formula 3, we define the standard for testing the performance.

$$PF = 1.0 - \left(\frac{\#\ \text{of missing terms}}{\text{total number of terms in query}} \right)^{1.25} \tag{3}$$

First, all the documents related to candidate experts are fused into a profile file, then the traditional IR metric is used to calculate the relevance of the profile file to the given topic, and the candidate experts are sorted. Although this method was confirmed can enhance the accuracy which the expert searches, while in confirmed individual specialty in the breadth and the depth, and the existing text abstract technology still lacked the enough accuracy may rest on the Bayes theorem formal description technique based on the outline method is the following expression.

$$R_{pq}(\rho) = \sum_{s=0}^{(p-|q|)/2} \frac{(-1)^s (p-s)!}{s! \left(\frac{(p+|q|)}{2} - s \right)! \left(\frac{(p-|q|)}{2} - s \right)!} \rho^{p-2s} \tag{4}$$

$$\rho = \left(x^2 + y^2 \right)^{1/2} / N, and \theta = \tan^{-1}(y/x) \tag{5}$$

Where the $\left(\frac{(p+|q|)}{2} - s \right)! \left(\frac{(p-|q|)}{2} - s \right)!$ represents the query features that can be sensed, $\left(x^2 + y^2 \right)^{1/2}$ represents the ranges that can be touched. The document-based approach proved to be superior to the pure contour-based approach in terms of the retrieval accuracy and thus became the most frequently cited base model for the subsequent expert modeling studies. This method does not conduct the detailed analysis of the whole sentence semantics, but some sentence in semantic role labeling for a given verb, these components are endowed with certain semantic meaning, and as part of the framework of the verb. And for this pattern, we should add the judgement shown in the formula 6.

$$\begin{cases} \text{if } x_i^{(t)} = 0\ , \quad \Delta w_i = w_i^{(t+1)} - w_i^{(t)} = 0 \\ \text{if } x_i^{(t)} = 1\ , \quad \Delta w_i = w_i^{(t+1)} - w_i^{(t)} = \begin{cases} 1 & \text{if } w_i^{(t)} = 0 \\ (\alpha - 1) w_i^{(t)} & \text{if } w_i^{(t)} > 0. \end{cases} \end{cases} \tag{6}$$

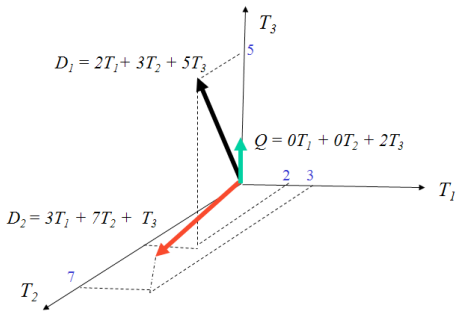


Figure 5 – The Analytical Space for Information Retrieval Model

We take the analytical space shown in the figure 5 as the instance, after the above flow, may for contain richly natural language sentence processing the semantic information semantic fragment, while between in which semantics fragment main description concept semantic relations. This article determined is advantageous for the analysis and the recording semantic relations, like the “agent”, “object”, “time”, “place”, “have semantic relations and so on the”. Describes between the concepts semantic relations through these labels, and thus achieves the expression sentence semantics information the goal as the following equation.

$$p(\mathbf{x}|j) = \frac{1}{(2\pi)^{n/2}|C|^{1/2}} \exp[-\frac{1}{2}(\mathbf{x}-\mu)^T C^{-1}(\mathbf{x}-\mu)] \tag{7}$$

The query expansion method inherits the research results of query extension in IR domain, and extends the original query statement dynamically during query, which makes the extended query statement can express the query intent of the user better than the original query statement and the $(\mathbf{x}-\mu)^T C^{-1}(\mathbf{x}-\mu)$ shown in the formula 7 can be then transferred as the formula 8.

$$h_{score}(\mathbf{x}) = (\mathbf{w}\cdot\mathbf{x}) = \sum_{j=1}^{n} w_j x_j \tag{8}$$

Where the $w_j x_j$ represents the parameters considered, in order to embody the semantic-based retrieval, the technique of supporting synonyms extended query is adopted, which makes the query effect more perfect. When querying, the query weight is well set according to the similar distance between the synonym and the original word. Original semantic inquiry analysis method mostly based on the user browsing or simple key words match. May obtain the high analysis rate of accuracy based on the user browsing method, but needs the user to pay the suitable time price. Based on the key words match inquiry analysis simple direct-viewing, but in under the natural language meaning uncertainty influence that often with difficulty obtains lets user satisfaction the analysis rate of the accuracy. Under this basis, our method can fit the needs and overcome the drawbacks.

4. Our Proposed Framework

4.1. The Data Mining and the Community Security

Along with the networking and the information technology development, the digital family starts to enter people’s line of sight. The digital family using the computer technology, the networking and the microelectronic technology unifies into and the family life related electric appliance an organic whole. For the community security sensing system, it should contain the following components. The universal control module is responsible for the control of the entire system while including control of external communication interface expansion, network transmission, start the video module and read the video data. General control module can be extended through the expansion interface to complete the function, such as through the serial port control alarm sound

and the network transmission module packs the video stream according to the common network protocol format. Human-computer interaction module is responsible for keyboard operation and status information display. As the demonstration, we segment the system into the listed parts and aspects.

1. **Management center computer (MCC) system**. Host system is responsible for the overall scheduling system, to the network node to send commands to receive node data and to analyze, store, display and print. The operating system uses the Linux 2.4 kernel to manage real-time and multitasking applications. To facilitate the general management of the file system devices, Linux uses the ext3 file system, where all files and directory trees form an overall directory hierarchy.
2. **Alarm host**. Alarm host placed in residential buildings, by in home in various sensors to collect the corresponding analog signal. When the signal to alarm threshold, start alarm Settings, through CAN bus to management center of the microcomputer system, and CAN achieve intrusion alarm and disconnection alarm and teardown alarm etc. Various type of alarm. In the chip has the full resources to be able to move the embedded operating system that has the rich material to be possible to reduce the development cycle while will later reduce the development difficulty.
3. **CAN summary connection**. CAN bus interface is used to complete the CAN bus protocol conversion and data processing. The system uses CAN controller SJA1000 and the bus transceiver 82C250 as the core of the port structure. Video frequency processing is through the widespread use main line standard, and has provided the widespread connection function, like welcome the television card, the video frequency USB camera capture card and USB photograph the prime Video4Linux video frequency application equipment. Regarding USB camera itself, the driver needs to provide the basic I/O connection function, including opens, reads, writes, the closure, the interrupt processing, the memory mapping function.

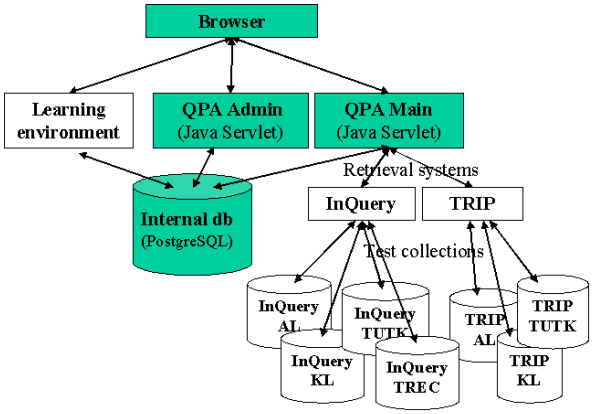


Figure 6 – The Database and Data Flow based Streaming System Architecture

4.2. The Community Security and Video Monitoring Surveillance

It is distinguishes based on B/S pattern long-distance video frequency supervisory system between the traditional C/S pattern system, after in other words, the Web technology, the IP multicast technology as well as the so-called JMF technology all unifies through the real-time transmission technology and the Applet technology realizes together the video frequency data long-distance control and transmission, so long as this system has the browser to be possible to realize the majority of the customer operation is opposite is more convenient in the traditional C/S pattern system, moreover raised the network use factor enormously. For the system, we have the following requirements for ensure of the systematic robustness.

White stripe amplitude: the amplitude of the white bar relative to the reference black level;

White bars: the difference between the width of the start and the end of the white bars and the percentage of the width of the white bars;

Brightness non-linearity: The transmission channel causes the distortion to the different brightness level different gain;

Intermodulation distortion: The distortion of the luminance component caused by the change in chrominance amplitude in a composite television signal;

2T pulse width: 2T pulse signal between the two half-time width between points;

2T pulse bite ratio: the standard 2T pulse signal and the signal is the same amplitude, the measured system bandwidth is not large enough, the output of the 2T pulse amplitude decreases, the width increases, 2T pulse banners than the resulting distortion;

2T sine square wave distortion: 2T sine squared pulse through the measured system, the output of the relative amplitude of the double echoes of the percentage of the weighted value;

Through the JMF technology and the basic video frequency gathering card may the signal from the matrix machine transmission to the system server also needs to use the multi-thread technology as well as double cushion technology in transmission process carries on the compression to the video frequency, like this may promote the efficiency of compression, reduces CPU the period of revolution. But the video frequency transmission module is the entire video frequency supervisory system core part, whether does this module construction quality relate the overall system directly the image transmission as well as real-time carries on the monitoring to the scene, whether moreover also relates the network by the greatest degree use.

5. Experiment Verification

In the figure 7, we show the designed community security user interface, in the figure 8 and 9, we illustrate the visual tracking tests of the system. Also, to consider the influences of the prior discussed mode, we test the systematic effectiveness with the demonstrative curves shown in the figure 8 and 9. We can see from the result that the system can track the people and environment information well.

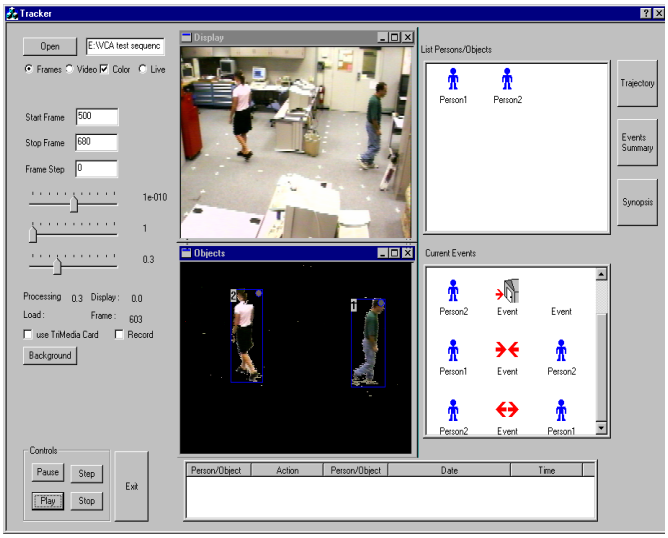


Figure 7 – The Community Security User Interface

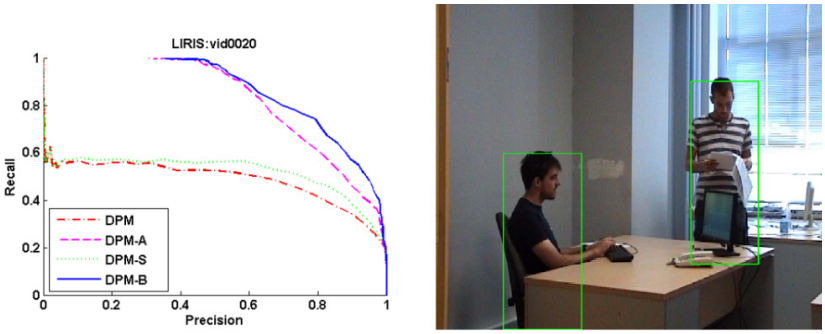


Figure 8 – The Visual Tracking Test of the System Set One

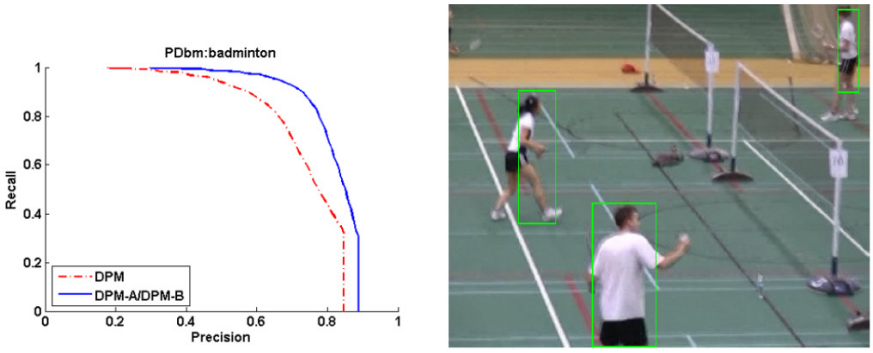


Figure 9 – The Visual Tracking Test of the System Set Two

5. Conclusion

In this paper, we conduct analysison community security big data mining auxiliary risk early warning model based on artificial intelligence and information retrieval. In the today's intelligent information technology, security systems began to use some of the modern advanced computer technology, communications technology, control technology and IC card technology, to provide users with better and more secure living environment. The proposed system is verified to be effective and in the future we will conduct the hardware implementation.

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Research on the Coal based Fischer-tropsch Fuel Atomization Model based on Time Series Model and Genetic Algorithm

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Abstract: In this research paper, we conduct research on the coal based Fischer-tropsch fuel atomization model based on the time series model and the genetic algorithm. Atomization is widely used in the various industrial processes such as the granulation, drying, humidification, surface spraying, chemical spraying and dust removal, etc. Bubble atomization is the formation of gas-liquid two-phase bubbly flow in the course of common flow of liquid and gas, and atomization of liquid through the change of bubble volume. In recent years, domestic and foreign scholars have carried on the research on atomization method and its atomization mechanism a wide range of in-depth research. With the inspiration of the genetic algorithm and the time series model, the novel methodology is proposed. The Eulerian-Lagrangian method was used to calculate the gas phase. The Euler method was used to control the gas phase and the governing equation was three-dimensional gas-phase NS equation and the liquid phase was tracked by Lagrange granule. Furtherly, the experimental result under the time series framework proves the effectiveness of the methodology. The future research schedule is attached in the end.

Keywords: Fischer-tropsch, Fuel Atomization, Time Series Model, Genetic Algorithm

1. Introduction

Atomization is widely used in the various industrial processes such as granulation, drying, humidification, surface spraying, chemical spraying and dust removal, etc. According to the requirements of liquid and the slurry properties and atomization quality, the atomization type is pressure type atomization, rotary atomization and pneumatic atomization three categories (Arienti, 2013). Utilizes in the fuel oil many is the Y spray nozzle and in mixes the type spray nozzle, still has the fuel oil to paste the question which

the wall mounts flows, needs to consummate the spray nozzle structure the design to slow down this kind of the question, however the people still could not the very good assurance spray nozzle interior flow field complex two phase current mobile mechanism (Chen, 2012; Brown, 2014). In the spray nozzle atomization process, the liquid is rended the diameter very small bubble group, enormous has increased the liquid surface area, sped up its vaporization efficiency, increased the rapidity of combustion, the atomization degree to has burnt the vital role, the atomization quality fit and unfit quality has been becoming an influence energy use important attribute.

Pneumatic atomization is the use of a certain pressure of air or steam to high-speed low-speed atomized liquid, the tear into a very fine droplets, the most common type of gas atomization nozzles are cyclone type and Y Type Y-type nozzle is a liquid and a basic high-speed air flow to Y-type intersection with impact and atomization, the structure is very simple, wide application (Huang, 2012; Desantes, 2016). Bubble atomization is the formation of gas-liquid two-phase bubbly flow in the course of common flow of liquid and gas, and atomization of liquid through the change of bubble volume. In recent years, domestic and foreign scholars have carried on the research on atomization method and its atomization mechanism a wide range of in-depth research.

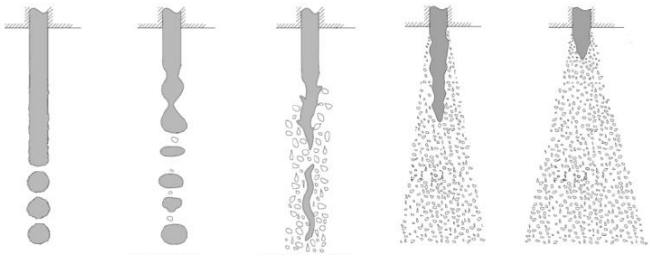


Figure 1 – The Demonstration of the Fuel Atomization Model

In the figure one, we show the sample model of the fuel atomization systems. To overcome the performance of the traditional methodologies this paper proposes the coal based Fischer-tropsch fuel atomization model based on time series model and the genetic algorithm. The remaining of the manuscript is organized as the follows. In the section 2, we introduce the properties and features of the coal based Fischer-tropsch fuel to serve as the basis of the research. In the section 3, we propose our novel fuel atomization model together with the theoretical basis of the time series model and the genetic algorithm. In the section 4, we conduct numerical simulation on the proposed model to test the effectiveness. In the section 5, we conclude the work and point out the future research schedule.

2. The Coal based Fischer-tropsch Fuel Properties

In 1923, Fischer and Tropsch discovered a process for the synthesis of hydrocarbon products using a mixture of CO and H2. 1936 first in the Germany to achieve industrialization, to 1945, in Germany, France, Japan, China, the United States and

other countries to build 16 sets of coal-based syngas as raw material of synthetic oil plants (Moradi, 2012; Koh, 2013). Early Fischer-Tropsch synthesis of products is a very wide boiling range of the mixed hydrocarbons and the synthesis gas production costs are expensive and uncompetitive in order to meet the liquid fuel and chemical raw materials demand, the world's major oil companies have invested huge human and material resources development GTL new catalyst and new technology, especially to focus on the rapid growth of demand for diesel-aviation kerosene and high value-added high-quality paraffin wax. The most striking feature of Fischer-Tropsch synthesis is a product of wide distribution, single product selectivity is low. To reduce methane generation, the selective synthesis of the target is always the catalyst development direction of the hydrocarbon. In the figure 2, we show the sample system.

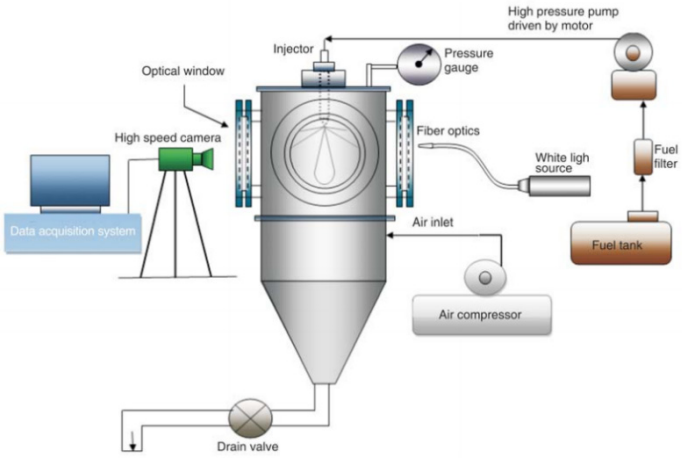


Figure 2 – The Sample System Architecture of the Fischer-Tropsch Synthesis

From the structure, the level of reaction performance, the different catalytic system has some general characteristics while the following three aspects: the composition, preparation methods and the active phase of the catalyst are summarized in this paper. The preparation method to the catalyst responded the performance, the structure and so on have the remarkable influence (Sharma, 2014). The cobalt base catalyst most commonly used preparation method is an impregnation method, but as the iron catalyst uses the co-precipitation law or the fusing law frequently. The gelatin law, chemistry sedimentation and the amorphous state alloy law also has the report, but is restricted in the preparation model catalyst to do the fundamental research.

Fischer-tropsch synthesis has a wide distribution, and large thermal effect and the catalyst particles within the diffusion characteristics obviously. In-depth analysis of these factors and look for ways to solve is the core of the research work. For the example, because the product is a function of the metal particle size distribution, and the traditional load catalyst gives a very wide particle distribution, adverse to the selective, by applying a structured porous materials as the carrier, can restrict the particle size distribution

to improve the product selectivity (Woods, 2013; Yang, 2014). The following types of Fischer-Tropsch synthesis reactors are used in or near industrial applications: Box-type reactors: Composed of rectangular tanks and internal cooling water pipes operating at low airspeed and the high single-pass conversion The tubular reactor consists of a cylindrical shell and a tube bundle which is erected in the inside of the tube. The tube is filled with a catalyst, and the tube is pressurized and saturated water, and the water is boiled and that evaporated to heat the fluidized circulating fluidized bed: fine powder catalyst The catalyst is suspended in a gas stream and reacts in a gas stream, wherein the solid catalyst is suspended in a liquid medium, the catalyst is suspended in the gas stream, and the catalyst is suspended in the gas stream, the synthesis gas was bubbled through from the bottom.

From the perspective of the characteristics of several kinds of reactors, slurry bed reactor with honors, for the removal of heat and mass transfer performance, high capacity and low manufacturing cost and become the development direction of the Fischer-Tropsch reactors. One of thick liquid condition bed reactor research fronts is the liquid-solid separation question. The settlement subsidence is the efficiency low separation method. The filtration law also widely uses in each kind of the test equipment. Looked from the separation angle that, and the catalyst has the high intensity is extremely essential, otherwise, forms stave not only the fine dust stops up the separator, the interrupt production, but also can pollute the product. The hydrodynamic behavior of the slurry bed determines the gas holdup and the mass transfer rate, which is another focus of the research work. With the combination of the atomization model, we will discuss in detail in the later sections.

3. The Proposed Methodology

3.1. The Time Series Model

In the process of time series modeling, there are generally several steps, which are model identification, model estimation, model diagnosis, model selection and the model forecasting. The model selection is the key link in establishing time series model and

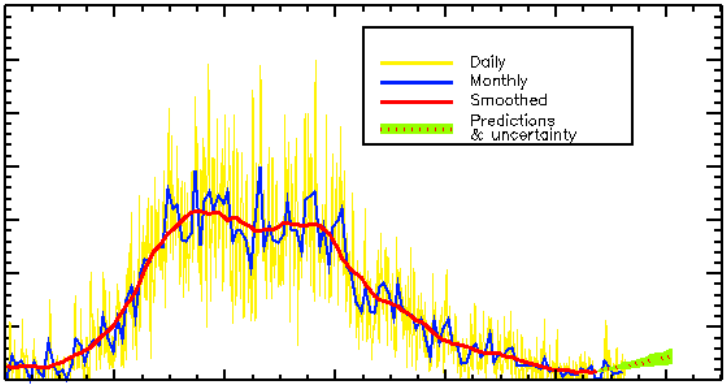


Figure 3 – The Sample Time Series Model

the key to basic model prediction success. Its usual minute two stage realization while the first stage the process serviceability examination obtains the candidate model under certain confidence from a series of models the second stage utilizes some model choice criterion to select the appropriate model. In the figure three, we demonstrate the sample time series model as reference.

Sometimes the time series observed value can receive the unusual event to disturb or the basic erroneous influence, they can create the false consequence, causes the observed value the unusual situation, so that is inconsistent with the time series majority observed values, these unusual observed values may call it the unusual value. When the intervention event occurs the time is known, may analyze using the intervention analysis method exceptionally affects. We consider the simple and basic intervention model to describe observable sequences may show anomalous values in basic practice, where the observation sequence can be described by the following model, where the α_L represents the parameter obtained.

$$f(x_1,x_2,....,x_L / \alpha_1,\alpha_2,....,\alpha_L) = \frac{\Gamma(\alpha_1 + ... + \alpha_L)}{\Gamma(\alpha_1)...\Gamma(\alpha_L)} \prod_{l=1}^{L} x_l^{\alpha_l - 1} \tag{1}$$

The classical time series autoregressive method adopts the minimum mean square error principle, namely the principle of minimum deviation, and cannot guarantee the validity of the regression model. Even if sampling least squares estimation of as a result of the existence of the variance can also lead to large mean square error. Especially under the condition of small sample, it's easy to have a minimum mean square error model fitting phenomenon, lead to sharply reduce the generalization ability. For this condition, we consider the following model.

$$\gamma(a,b)(x) = \frac{1}{\Gamma(a)} b^a e^{-bx} x^{a-1} \tag{2}$$

γ represents the fuzzy degree, fuzzy variable data is fuzzy data with fuzzy attributes of the variable data, since it is a fuzzy attribute, while thus seeking a quantitative indicator to describe the fuzzy variable fuzzy degree is necessary. A natural idea is that the normal set is unambiguous, and the number of the fuzzy degrees it marks should be zero. $\frac{1}{\Gamma(a)}$ represents the parameters that is the basis, $e^{-bx}x^{a-1}$ is then the following bias function for better estimation. Uses in the time series model choice the pessimistic association method, needs to solve the succession appraisal target system and the pessimistic interrelatedness estimation problem must accurate, reasonably select the model objectively, and on the one hand must synthesize the traditional model choice criterion the use, on the other hand also must the time series data statistical property consider comes in the listed items

$$r = \frac{SS_{xy}}{\sqrt{SS_{xx}SS_{yy}}} \tag{3}$$

$$SS_{xy} = \sum_{i=1}^{i=n} \left(x_i - \overline{x}\right) * \left(y_i - \overline{y}\right) \tag{4}$$

$$SS_{xx} = \sum \left(x_i - \bar{x} \right)^2 \tag{5}$$

$$SS_{yy} = \sum_{i=1}^{i=n} \left(y_i - \bar{y} \right)^2 \tag{6}$$

Where the $\sqrt{SS_{xx} SS_{yy}}$ represent the coefficient parameters, the support vector regression machine SVR adopts the structure risk minimization principle, and the lead person regular term can compromise the deviation and variance, especially for the small sample learning, because of the good generalization ability of SVR in the practical applications, it is widely used in time series prediction, shown as below.

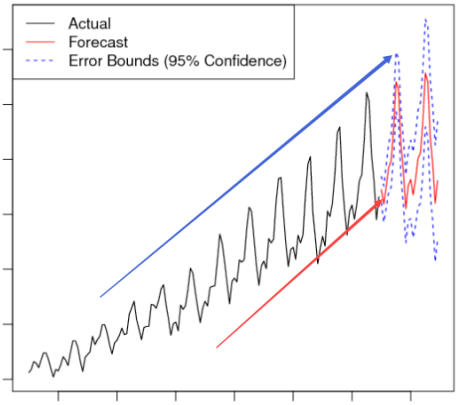


Figure 4 – The Time Series Model based Prediction

The objective world is complex and changeable and the development of things is usually not determined by a single factor is often the result of the combined effects of many intricate factors, in order to make a more realistic development of things to predict, which requires to explore the prediction of multivariate time series. In order to be able to affect the thing development the multitudinous factors to unify carries on the synthesis forecast and the correlation factor forecast analysis, after passes through studies and comparison many times, uses the multi-dimensional return the principle to establish the multi-factor time series the gray forecast model as shown in the following equations. Where the $D\left(\alpha_1^k, ..., \alpha_L^k\right)$ defines the input basic sequence for analysis, $\left(X_1, ..., X_L\right)$ is the output one, $\left(1-\gamma_q\right)\sum_{i=1,...,n} t_{ik}^q + \gamma_q \sum_{i=1,...,n} e_{qi}^k$ is the balanced form of the proposed model, $k\left(t_{ik}^{q+1}\right)$ is the prediction result.

$$P_r\left(X_1, ..., X_L\right) = \sum_{k=1}^{K} p_k D\left(\alpha_1^k, ..., \alpha_L^k\right) \tag{7}$$

$$p_{(q+1)k} = \frac{1}{n}\left[\left(1-\gamma_q\right)\sum_{i=1,\ldots,n} t_{ik}^{q} + \gamma_q \sum_{i=1,\ldots,n} e_{qi}^{k}\right] \tag{8}$$

$$k\left(t_{ik}^{q+1}\right) = \frac{p_{(q+1)k} h_{(q+1)k}\left(f_i\right)}{\sum_{r=1\ldots K} p_{(q+1)r} h_{(q+1)r}\left(f_i\right)} \tag{9}$$

In fact, the matrix is the much time series nature expression, the different time series indicated in the matrix by the different vector that manifests the similarity between the matrix value samples again through the multi-duty study in matrix value nucleation function, the later GA algorithm will integrate this property.

3.2. The Revised Genetic Algorithm

Compared with the traditional heuristic optimization search algorithm, the main characteristic of genetic algorithm is the population search strategy and the simple genetic operators. The genetic algorithm can break through the limit of the domain search and can realize the distributed information collection and exploration in the whole solution space. In the basic traditional genetic algorithm sorter code length hypothesis, mainly is carries on through the individual experience as well as the corresponding experimental result debugs repeatedly, and thus the revision genetic algorithm sorter corresponding individual code length, usually needs to spend the very long experiment as well as the debugging time and only then may realize the proper attention to both genetic algorithm sorter classification accuracy as well as the genetic algorithm convergence rate goal.

How to find out relationship between individual coding length and classification accuracy and the convergence speed in theory, and thus more effectively adjust the individual coding length of the classifier of the genetic algorithm, has become an urgent problem to be solved which can be modelling as formula 10.

$$f_{OCV-SOC} = \begin{cases} H(0)\times soc + B(0) & 0 < soc \le 10\% \\ H(1)\times soc + B(1) & 10\% < soc \le 20\% \\ \quad\vdots & \quad\vdots \\ H(8)\times soc + B(8) & 80\% < soc \le 90\% \\ H(9)\times soc + B(9) & 90\% < soc \le 100\% \end{cases} \tag{10}$$

Where the *soc* represents the length of the classifier of the genetic algorithm, as the problem types and the scale of the problem to expand, to find a solution to function optimization problem is still a common problem of a smooth genetic algorithm but for us to solve such problems provide an effective way and common framework, a new global optimization search algorithm is proposed. The multi-island genetic algorithm developed on the basis of the traditional genetic algorithm divides the whole evolutionary group into several sub-groups, which is called islands, on each island, genetic operators such as selection, crossover and mutation of traditional genetic algorithm shown as the figure 5.

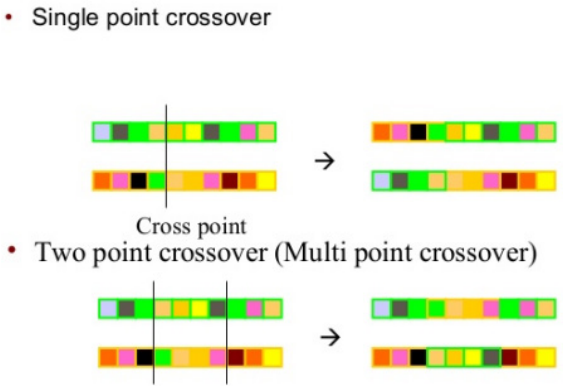


Figure 5 – The Multi-island Genetic Algorithm Architecture

The selection mechanism called roulette selection method, but in the choice of the best individual is selected from all individuals, a small child but randomly selected from individuals selected from, this allows you to copy individual sub populations, subset size is calculated according to the relative wheel size reducing the relative the wheel size will increase the random selection process, increasing the size of disk will make parent more best individual copied to the offspring as follows.

$$\bar{\Phi}(x,y) = \frac{1}{n}\sum_{i=1}^{n}\psi_i(x,y) \tag{11}$$

$$\Phi(\tilde{x},\tilde{y}) = \bar{\Phi}(\tilde{x},\tilde{y}) + \sum_{i=1}^{k} w_i \Phi_i(\tilde{x},\tilde{y}) \tag{12}$$

On the one hand introduces the partial optimized algorithm to be possible to discover each individual the partial optimal solution which corresponds under the present environment, in the order to achieve the improvement community overall performance the goal; On the other hand may carry on the next generation take performance superior new community as the foundation the heredity evolution to operate the smooth this kind the strategy which unifies with the partial optimized method while may fundamentally enhance the genetic algorithm the estimated performance, this also is one of present genetic algorithm research main questions. As shown in the 11 and 12, $\bar{\Phi}(x,y)$ and $\Phi(\tilde{x},\tilde{y})$ represent the revised model. For the encoding paradigm, we propose the following suggestions for modification.

1. **Topology optimization of continuum structure coding genetic algorithm**. Coding is one of the most important problems to be solved when using genetic algorithm and it is also a key step in the design of the genetic algorithm. So far, in the genetic algorithm mainly has 3 big kinds of code methods: Binary code, floating number code and symbolic code. The binary code is the code method which uses most early that has the code, the decoding operation is simple, overlapping, heredity operations and so on variation is advantageous for the realization, moreover is advantageous for using the pattern theorem carries on merits and so

on theoretical analysis. Speaking of the binary code and the floating number code, general binary code compared to floating number code search ability.

2. **The calculation of fitness**. Typically, fitness function is obtained by the changes in the objective function. Due to the nature of randomness, genetic algorithm in topology optimization of continuum structure often appears some discrete topology. In order to improve the situation and improve the efficiency of the calculation and drive optimization results of discontinuous area gradually eliminate or evolution as continuous area, the need to limit the number of connected domain optimization of the structure.

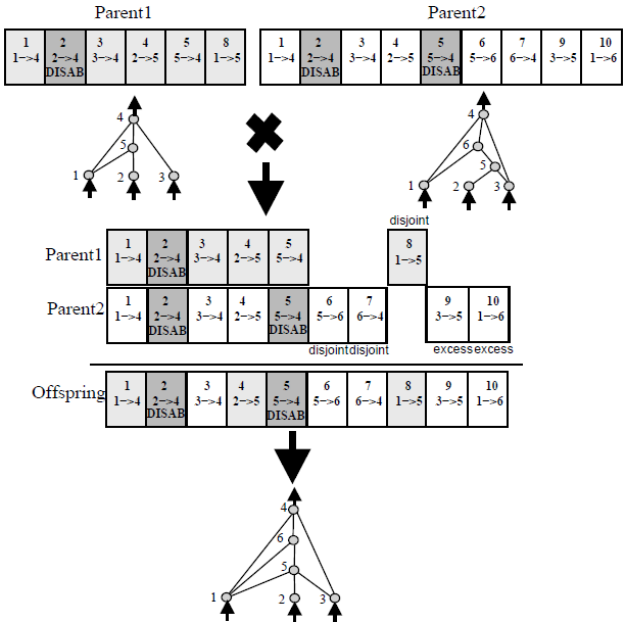


Figure 6 – The Revised Genetic Algorithm Coding Pattern

It was uses the strategy in the blending genetic algorithm choice strategy which the best individual preservation and the scale factoring unified, the genetic algorithm theory already proved that, and the use best individual retention strategy genetic algorithm depended on the probability restraining under the controlled condition. Each individual rule sufficiency accounts for proportion with this individual rule on the entire sample training regulations to assume the increasing relations, also the sample integer enough are many, namely has a sample at least in each rule. And the judgement paradigm for the issue is then summarized as the formula 13.

$$P_T(C_1) = \begin{cases} 1, & if \quad f(C_1) \le f(P_1) \\ \exp(\dfrac{-\left|f(C_1) - f(P_1)\right|}{T}), & if \quad f(C_1) > f(P_1) \end{cases} \tag{13}$$

3.3. The Novel Fuel Atomization Model

As a result of the atomization process complexity, as the atomization mechanism is not very clear, moreover it such as was mad the fluid speed, the liquid and the gas nature, breaks has fluid block the shape, atomization device factor influences and so on design is big. Along with the experimental method and the theoretical level development that is restricted in the phenomenological level not merely to the air-stream atomization research, people mechanism and rule which atomizes through the experimental phenomenon test and the general analysis revelation, then uses the reasonable mathematics physical model and the effective numerical method simulation complex atomization process, forecast each kind of factor to atomizes the performance the influence and the atomization field final characteristic.

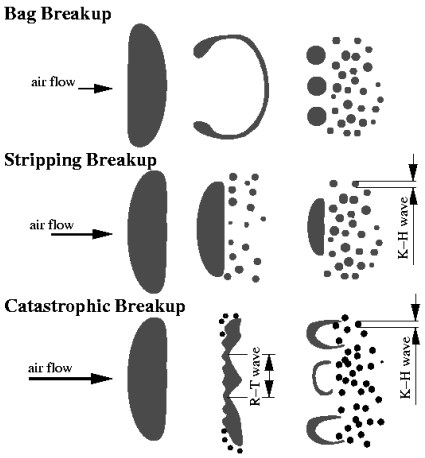


Figure 7 – The Fuel Atomization Forms and Patterns

As shown in the figure 7, the fuel atomization forms and patterns are listed. The evaluation indexes of the spray characteristics include the spray cone angle, and the liquid phase length and the penetration distance of the oil spray. The evaluation indexes of the microscopic spray characteristics are the average diameter and the characteristic of the oil droplets Diameter and droplet size of the divergence. The bubble size distribution survey technology and the atomization quality appraisal theory development is very quick, at present the most advanced measuring technique has the laser total information photograph law, high-speed photography law and the laser Doppler method. In our model, we should have the listed priors.

1. Y-type air nozzle atomization process is divided into the first split and that the second split the two processes.
2. The initial division of the resulting droplets has a certain size and distribution.
3. The second split, do not consider the droplet of the well, or to then examine the dynamic division of droplets and coalescence of the combined effect of the dynamic process.

4. Each droplet can be divided into two after the growth of a generation, the mass percentage of droplets to produce [0-1] on the uniform probability distribution.

The Eulerian-Lagrangian method was used to calculate the gas phase. The Euler method was used to control the gas phase. The governing equation was three-dimensional gas-phase NS equation and the liquid phase was tracked by Lagrange granule. The effect of liquid phase on gas phase was studied by adding the phase of the liquid phase is achieved by the gas phase parameters of the local grid of the liquid phase when the gas phase parameters are used in the calculation of droplet state, with the combination of the equation 1, 4, 6, 7, 11 and the literatures, we can then construct the proposed model, in the later section we will simulate it. Our new method can optimize the traditional approaches by the listed aspects.

1. When the liquid jet ejected from the injector, the first experience of gas-liquid mutual shear effect, and the liquid column KH wave, in the liquid column droplets continue to peel off. At this time KH wave model for the calculation of stripping droplets.
2. In liquid spray combustion chamber after a period of the time, split and broken, then can be thought of as acceleration wave which is produced by liquid column on R with the result of T wave action, the application of R-T model to calculate the fracture fluid column and broken.

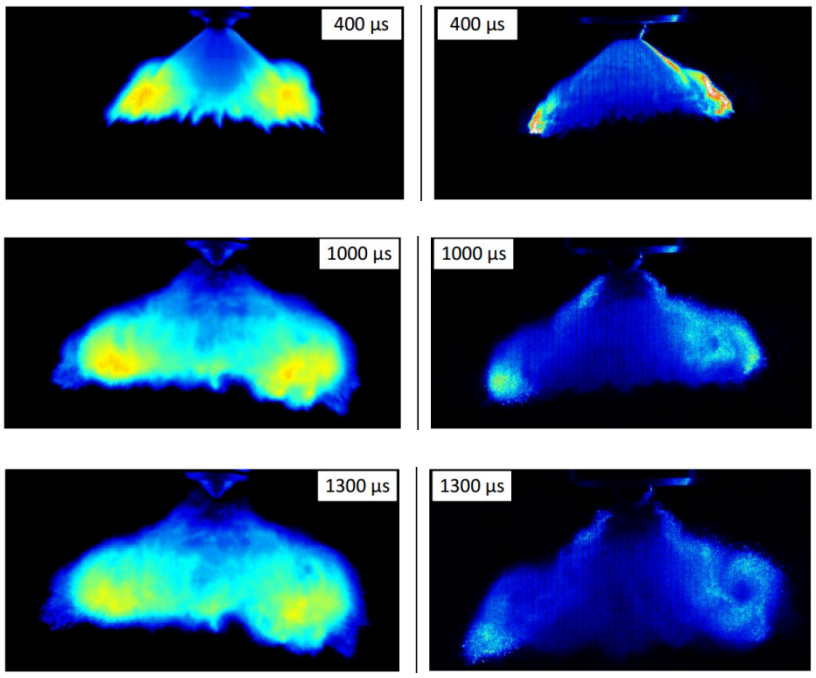


Figure 8 – The Time Series based Fischer-tropsch Fuel Atomization Model Simulation Result

4. Experiment and Verification

In this section, we simulate the proposed model. Spray cone angle is one of the important indicators of atomization quality. Excessive spray cone angle may cause oil droplets to directly reach the wall of the head of the flame tube to cause carbon deposition and ablation; while too small spray cone angle will make more oil The concentration of combustion in the central area of the flame tube combustion, the center of the oil-rich, incomplete combustion, easy to smoke, not only reduce the combustion efficiency, and increase the pollutant emissions, the most critical is to affect combustion chamber outlet temperature field distribution. The atomization causes the continual liquid to disrupt the tiny bubble, the bubble stable mainly is decided by the liquid surface tension, it prevents the bubble surface the distortion, atomizes the smallest energy which needs to be equal to the surface tension is multiplied by the liquid surface area increase; Moreover, the liquid viscosity to atomizes the bubble the size also to have certain influence. In the figure 8, we simulate the proposed methodology from the time series perspective.

5. Conclusion

In this research paper, we conduct research on the coal based Fischer-tropsch fuel atomization model based on the time series model and the genetic algorithm. As is reviewed, pneumatic atomization is the use of a certain pressure of air or steam to high-speed low-speed atomized liquid, the tear into a very fine droplets, the most common type of gas atomization nozzles are cyclone type and Y Type Y-type nozzle is a liquid and a basic high-speed air flow to Y-type intersection with impact and atomization, the structure is very simple, wide application. Under this basis, we integrate the series model and the genetic algorithm to construct the coal based Fischer-tropsch fuel atomization model, and the experiment result proves that the method can achieve the satisfactory result. In the future, our research will be more focused on the following aspects to further enhance the current method.

1. How to optim ize the proper integrate of the GA and time series model, that is, how to enhance the efficiency while keeping the effectiveness.
2. How to measure the method in other environment and other numerical simulation paradigm that will be more objective.

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Analysis of Partial Least Squares Modeling and Multiple Collinear Ability Evaluation: Theoretical Deduction and Case Analysis

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Abstract: Multi co linear refers to the phenomenon of large correlation coefficient between the explanatory variables, when using the ordinary least square method and the linear regression method; it will lead the variance of the estimated coefficient larger. In this paper, the author analyzes the partial least squares modeling and multiple collinear ability evaluation. Firstly, the author constructed the partial least squares regression model, and analyzed the solution of multiple co linearity. Through an economic model, we find that after using partial least squares regression, the root mean square error is reduced. By using partial least squares regression, we can overcome the adverse effects of multiple co linearity, and get more accurate and reliable results.

Keywords: Computer simulation, Partial least squares, Multiple collinear, Parameter estimation

1. Introduction

In the field of parameter estimation and regression analysis, multiple variables and multiple dependent relationships between variables is a very complicated problem. By using the least square method and conventional analysis methods, it is difficult to achieve the desired effect (Dai, 2013). This is because between multiple variables, multiple dependent variables often exist in multiple correlations, namely multi collinearity partial least squares regression analysis. Using the regression model to construct comprehensive screening technology information, effectively avoid the multiple problems related to the original variable (Gouder, 2015). In the regression analysis, when multi collinearity phenomenon between variables, often will seriously affect the expansion of parameter estimation, model error, and damage the robustness of model, thus eliminating multi collinearity has become an important part in the estimation of regression coefficients.

There are many reasons for the multiple co linearity; one is the limitation of the data collection. Although the resulting multiple collinearity is non essential, in principle can be solved by collecting more data, but the specific implementation will encounter many difficulties (Kolahan, 2012; Manavizadeh, 2013). Such as the experiment or production process has been completed or financial constraints could not produce new

data; although the objective can collect more data, but for more than three independent variables, is often difficult to determine how the data should be collected in order to break the multi co linearity situation, finally even collected some new data, but in order to break the multi co linearity, the data must be far away from the original number, so it may have a strong influence points, resulting in a new problem (Matusiak, 2014). The other is that the physical meaning of some variables determines the co linearity between them, which is very common in the fields of economy, technology, social science and biological science. Secondly, we analyze and evaluate the system in the process, in order to better describe and analysis system, as far as possible not to miss some important characteristics of the system, so we tend to try to select the indicators, and multi index system which often exists serious multi collinearity.

2. Least squares regression

Partial least squares regression is applied to establish the statistical relationship between the dependent variable. In the regression analysis, when the number of independent variables and the dependent variables are many, and in the independent and dependent variables are among the more serious multicollinearity, if the general multivariate regression method, the reliability analysis is very low, and by partial least squares regression analysis modeling method can well solve the problem.

In order to study the statistical relationship between dependent variables $Y=\left[y_1,y_2,\cdots,y_q\right]$ and the independent variables $X=\left[x_1,x_2,\cdots,x_p\right]$, partial least squares regression (PLS) analysis using principal component analysis tools, it first in the independent variable system X, extraction of a principal component of t, while the dependent variable Y system in the extraction of a principal component of u. Partial least squares regression analysis in the extraction of the two main components, the following two requirements:

In order to facilitate the derivation, first of all, the data do standardized processing. Note as $E_o=\left[E_{o1},E_{o2},\cdots,E_{op}\right]_{n\times p}$, $F_o=\left[F_{o1},F_{o2},\cdots,F_{op}\right]_{n\times q}$.

The first step, remember that t_1 is the first component of E_o, $t_1=E_o\ _1$, u_1 is the first axis of E_o, it is a unit vector, $u_1=1$

$\hat{\imath}_1$ Is the first component of F_o, $\hat{\imath}_1\ F\ c_1$, c_1 is the first axis of F_o, and $c_1=1$.

If t_1 and $\hat{\imath}_1$ can be well represented by X and Y data variance information, according to the principle of principal component analysis, there should be:

$$\mathrm{Var}(t_1)\rightarrow \max$$

$$\mathrm{Var}(\mu_1)\rightarrow \max$$

On the other hand, as a result of the need of regression modeling, t_1 has the greatest explanatory power to μ_1, and the correlation of t_1 and μ_1 should reach the maximum value, that is:

$$\gamma\left(t_1,\mu_1\right)\rightarrow \max$$

Therefore, in combination, the covariance of the partial least squares regression is the largest, that is:

$$\mathrm{Cov}\left(t_1,\mu_1\right)=\sqrt{\mathrm{Var}\left(t_1\right)\mathrm{Var}\left(u_1\right)\gamma\left(t_1,\mu_1\right)}\rightarrow$$

The formal mathematical formulation should be to solve the following optimization problem, namely:

$$\max E_0\omega_0,F_0c_1$$

$$\text{s.t.}\begin{cases}\omega_1^{\mathrm{T}}\omega_1=1\\ c_1^{\mathrm{T}}c_1=1\end{cases}$$

According to the Lagrange method, you can get the ingredients:

$$t_1=E_0\omega_1$$

$$\mu_1=F_0c_1$$

The $\grave{u}_1$ is the unit characteristic vector corresponding to the maximum eigenvalue of the matrix, and then the regression equation is obtained.

$$E_0=t_1P_1^{\mathrm{T}}+E_1$$

$$F_0=\mu_1q_1^{\mathrm{T}}+F_1^{*}$$

$$F_0=t_1r_1^{\mathrm{T}}+F_1$$

Among them, the regression coefficient vector is:

$$p_1=\frac{E_0t_1}{t_1^{\,2}}$$

$$q_1=\frac{F_0u_1}{u_1^{\,2}}$$

$$r_1 = \frac{F_0 t_1}{t_1^2}$$

The second step, with the residual matrix E_1, F_1 to replace the E_1, F_1, and then, please second axis ω_2, c_2 and second components t_2, μ_2.

$$t_2 = E_1 \mu_2$$

$$\mu_2 = F_1 c_2$$

Calculating regression coefficient:

$$p_2 = \frac{E_1^T t_2}{t_2^2}$$

$$r_2 = \frac{F_1^T t_2}{t_2^2}$$

Therefore, regression equation:

$$E_1 = t_2 P_2^T + E_2$$

$$F_1 = t_2 r_2^T + F_2$$

So calculated, if the rank of X is A, then there will be:

$$E_0 = t_1 P_1^T + t_2 P_2^T + \cdots + t_A P_A^T$$

$$F_0 = t_1 r_1^T + t_2 r_2^T + \cdots + t_A r_A^T + F_A$$

The regression equation can be written as the partial least squares regression equation of the original variable:

$$\hat{y}_k = \left[E(y_k) - \sum_{i=1}^{p} \alpha_{ki} \frac{S_{yk}}{S_x} E(x_i) \right] + \alpha_{k1} \frac{S_{y1}}{S_x} x_1 + \cdots + \alpha_{kp} \frac{S_{yk}}{S_x} x_p$$

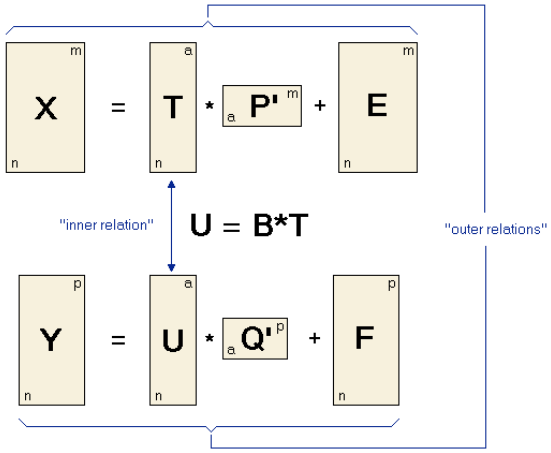


Figure 1 – Partial least squares regression

3. Multi co linearity problem

3.1. Problem statement

Multiple co linear refers to the phenomenon that there is a large correlation coefficient between the explanatory variables, and the classical Markov Gauss- to explain the hypothesis that the variables are not related to the contrary. When using the ordinary least square method and the linear regression method, the variance of the estimated coefficient is larger (Wang, 2014). In a finite sample, this may lead to inaccurate



Figure 2 – The case of multicollinearity

estimates, and t test results may be too small, which is not conducive to the verification of economic theory (Soni, 2013). In the dynamic economic model, the time series estimation, especially the distributed lag model, is very common. The existing domestic and foreign textbook interpretation of multi co linearity is basically the same, but is not complete; making the teaching of teachers and the use of econometric regression method research scholars are facing problems: how to clearly explain the effects of multi co linearity and solutions.

Other assumptions of the classical regression can be used to solve the corresponding method is very good to solve the multiple linear, it is difficult to find a reasonable solution to the theory. Although the classic method of solving the contrary assumption sometimes need large samples to get a good proof (such as instrumental variable method processing the endogeneity problem), but in small samples were also analyzed (such as simulation tool variable method under small sample properties is better than the conventional OLS methods, the results have been through a lot of simulation verified). When the sample size is sufficiently large, the result of the parameter estimation with multiple co linearity still has the characteristic of non deviation, consistency and validity. But in a finite sample, the negative effects of multiple co linearity and the solution are not verified by simulations. It can be predicted that the negative effects of multiple co linearity vary with the degree of visual linearity, and the solution should also be different depending on the situation. This situation has been well solved in the case of completely multiple co linearity, which is common in the complete introduction of dummy variables or the introduction of identity. At this point, reducing the variable is a suitable solution. In fact, although most textbooks in this way will be called the deletion of variables is probably more accurate to say the substitution variable of surplus variable coefficient of meaning is changing, the coefficient of reaction surplus variable is influence between the existing variables and omitted variables of the difference, so often to replace the variables called the reference variables.

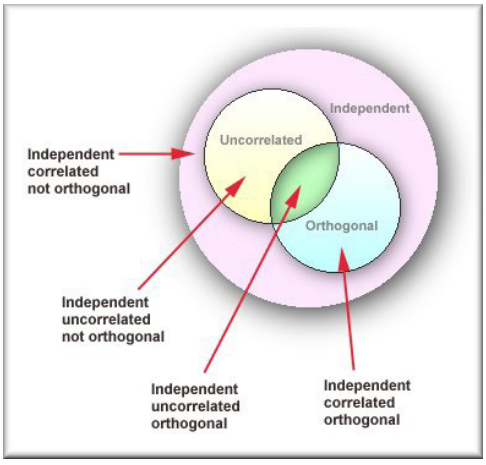


Figure 3 – The multicollinearity

3.2. Multiple co linear solution

For the description of the multi - linear solution, if the model is tested and proved to be a multi - linear model, a new method to estimate the model is developed. The most commonly used methods are as follows: rule out the multiple linear interpretation variables, the difference method, the ridge regression method and the principal element analysis method. However, these methods are not very perfect way.

If you use the method of excluding variables, first to find out the causes of multiple linear explanatory variables, and then it will be excluded, which is considered to be the most effective way to overcome the problem of multiple Co linear. According to the experience or relationship, by merging or substitution variable method, reduce the number of variables to eliminate multicollinearity, but also a way to implement this kind of way. However, this rule should be included in the variables of the model parameters will lead to model surplus variable changes, not only can not clear the effects of individual variables, and this completely multicollinearity alternative variable approach and the consequences are similar. The main difference method for time series data of the sample and to direct linear relationship model in the form of econometric model, the model is transformed into difference model is considered to be more effective in eliminating existing in the multicollinearity in the model. This is due to the linear relationship between the economic time series data increment and the linear relationship between the total amount. In the last century, the ridge regression method was developed to reduce the variance of the parameter estimation at the expense of the bias, because the main result of the multiple co linearity is that the parameter estimation has a large variance. The main element analysis method, because of multicollinearity is the strong correlation between explanatory variables caused by the original data, can generate the same number, orthogonal variable, regression coefficient re no multicollinearity estimator, but the coefficient of this situation is difficult to explain.

4. Application of partial least squares modeling in practical problems

Some methods of variable selection, in addition to the effects on the dependent variable is not significant variables can also be removed from the variable group collinear relations in the screening effects on the dependent variable of a few variables significantly, so as to overcome the multicollinearity. However, for some practical problems, even if the independent variables have a co linear problem, we still want to establish the regression formula of the dependent variable Y and the given independent variables, such as the problem of economic analysis. An economic model of a region, total annual imports of Y and the three independent variables of the total production value of x 1, residents of savings x2, the annual consumption of x3 related.

The ordinary least squares regression equation of Y is obtained by the REG procedure of SAS program.

$$Y = -9.13 - 0.103x_1 + 0.672x_2 + 0.148x_3$$

The coefficient of the variable X1 is negative, which is inconsistent with the actual situation, in order to eliminate the multicollinearity among variables, using partial least squares regression method. Partial least squares regression PLS using SAS, the output shown below.

The PLS Procedure

Cross Validation for the Number of Extracted Factors

Number of Extracted Factors	Root Mean PRESS
0	1.1
1	0.190126
2	0.149527
3	0.152327

Minimum root mean PRESS	0.1495
Minimizing number of factors	2

Figure 4 – Root mean square value of PRESS

Parameter Estimates for Centered and Scaled Data

	y
Intercept	0.0000000000
x1	0.4772086929
x2	0.2212008799
x3	0.4858706590

Figure 5 – Parameter estimation of normalized variable of regression equation

Parameter Estimates

	y
Intercept	-9.134724512
x1	0.072277080
x2	0.609409031
x3	0.106988050

Figure 6 – Parameter estimation of primitive variables in regression equation

It can be seen that in the extraction of two components, the RMS equation predicted residual sum of squares. The minimum root mean square error of partial least squares regression (RMSE=0.4685) than the root mean square error of ordinary least squares regression (RMSE=0.48887) decreased. So, in the pursuit of prediction results, we can first try partial least squares regression method to directly control the regression coefficient, is the first choice for ridge regression; and of particular interest to some factors need to fit into the regression equation, consider using principal component

regression. In addition, attention should be paid to the analysis of some special points, on the one hand, attention should be paid to eliminate the impact point of serious impact on the regression results.

5. Conclusion

In the analysis and prediction of engineering technology and economic management, multiple linear regression analysis is a very common technology, but its application is limited by many. Especially in the application of multiple linear regression, the multiple correlation between variables is very serious, but its existence is very common. The calculation process analysis of partial least squares regression method is known, there is a kind of data is not suitable for direct use of partial least squares regression method to deal with. Partial least squares regression method to select the component of the larger variance, but the correlation coefficient with the dependent variable, the regression results are generally not satisfactory. Using partial least squares regression of the extracted components, can be in a good overview of variables at the same time, the best explanation for the variable, thereby eliminating the noise interference in the system, to overcome the adverse effects of multi collinearity in system modeling, obtain more accurate and reliable analysis results.

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Research on the Economic and Social Interactive Development of Henan New Urbanization based on Internet Big Data

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Abstract: Big data is the leading edge technology in the field of data analysis, which is causing a revolution in thinking. In this paper, the author research on the economic and social interactive development of Henan new urbanization based on internet big data. Urbanization is an important symbol of modernization, reflecting the process and level of the comprehensive development of economic and social. Henan province has always set up the idea of balancing urban and rural resources allocation and promoting the integration of urban and rural areas, through the planning guidance and other measures to improve the city development space. On the basis of this, we put forward some suggestions to improve the development of urbanization.

Keywords: Computer simulation, Partial least squares, Multiple collinear, Parameter estimation

1. Introduction

Urbanization is the inevitable trend of the world economic and social development is an important part of China's socialist modernization construction. With the acceleration of China's industrialization and rapid economic development, China's urbanization level has been greatly improved (Ahern, 2013; Liu, 2015). In order to speed up the construction of public infrastructure as the carrier, to speed up the industrial agglomeration, population concentration, intensive land use, improve the efficiency of city economic development as the basic direction; promote the integration of the network development of city group of central plains. Play "two group fusion" (city agglomeration and industrial cluster fusion) superimposed advantage, relying on the industry of Henan city group gathering area and the existing industrial base, centralized planning layout and guide the construction of a number of high tech industry cluster, as soon as possible in the industrial agglomeration area to achieve the development of industrial clusters as the main form of the "two sets of fusion" does the organic integration, the development of industry clusters has been shown that created industrial parks project easy landing policy advantage, and the domestic and foreign industrial development of the core competitiveness of the amplification effect, the formation of industrial clusters more

vibrant, promote the industry level of two or three group of city of Central Plains and the grade and scale, path and industrial clusters by product easy to internationalization, paving the way for the construction of inland open economic zone of the Central Plains Industrial development of the road, so that the new urbanization of Henan more time, innovation and regional.

Big data is a more abstract concept; there is not a clear definition. Generally speaking, big data has four basic characteristics: the scale of data, data types, data processing speed, and the value of the data is low (Gómez, 2013). Big data is not only used to describe the amount of data is very huge, but also highlighted the speed of processing data (Camps, 2016). Through the ubiquitous variety of data can help us find the relationship between things, that trend and possibility happen, give us a new competitive advantage, get valuable social cognition. Massive data with time continues to generate, and constantly flow, and then spread to form a big data, and then the reorganization of various types of strategic resources. Only through the analysis of large data can be used to meet the different needs of valuable information, in order to enable the government to adapt to the requirements of the era of big data restructuring strategy resources.

2 Big data of the Internet and the construction of new urbanization

2.1. Big data thinking

Big data is the leading edge technology in the field of data analysis. Data has become an important factor in every industry and business field. This also marks the big data are triggering a revolution in thinking, big data is changing the world investigation methods, thus causing profound changes in social, economic, academic and scientific research, by constantly innovation and development thinking (Lehmann, 2015). The transfer of the traditional urbanization construction focused on the countryside to the city, more is to build roads, bridges and the construction of fixed assets investment, big data thinking is from the pursuit of the event itself, simple linear causal relationship to correlation between rich contact, this kind of thinking, attention is paid to the “City” and “the township”, “town” and “village” industry function, scale, security and other aspects of the data link based, the current state is not only the data itself reflects, is indirectly reflect the past and future.

Big data is changing the world study methods, in the era of big data, can help us establish accurate prediction of relationship between things on top of all the sample space data analysis, which will subvert the traditional way of thinking, change the traditional cognitive way, the new urbanization will involve land circulation, city function and the idea of social aspects, the traditional urbanization construction in the government’s administrative intervention from the ideological level to carry out the work, and big data emphasizes the “data” to guide the city construction and people’s behavior(Lowe, 2015). For example, the rural land circulation, land ownership, land property, land market price changes, land use period, the interests of owners and managers and other factors, these factors directly affect the enthusiasm of farmers and the price of land circulation. The land market through the analysis of economic data, some places with tons of grain

per mu of farmland in grain price instead of rent per acre, can eliminate the farmers to rent land with the city.

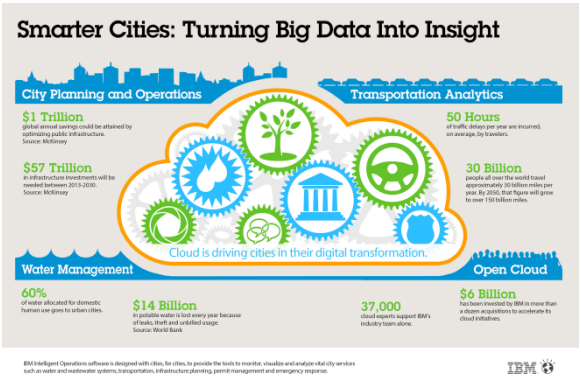


Figure 1 – Big data in urbanization

2.2. Innovative application of big data in new urbanization construction

The core of the new urbanization construction of the guiding ideology of big data driven is around the integration of all aspects of the data, from the source to contain data divided naturally or half unconsciously, to create a platform for the integration of urban operation. New urbanization is a human centered urbanization, new urbanization should establish a perfect public service system, to achieve the equalization of basic public services, promote the transfer of agricultural population of people, and let all urban citizens to enjoy a higher quality of service and life.

Citizen information resources refers to the relevant government departments for the performance of government functions and collection, processing, use of the information of each citizen and the business process in the production and formation of information resources, etc. Citizen information management system is based on the citizen's identity number for identification, collection of housing, marriage, employment, tax, social insurance and other information in an information system. The construction of citizen information management system, pay attention to the citizen to collect information and data, the formation of citizen information database, including basic information and civil marriage, employment, social security, housing and other extended information, based on the citizen information management system to help the government departments, accurately grasp the dynamic transfer of the agricultural population and urban residents have enjoyed or do not enjoy basic public service status and needs, to provide comprehensive and accurate data support for the reform of the household registration system, the implementation of specific measures, the construction of new towns and boost the reform of household registration system.

Smart city is a new city form of integration of information technology and city development strategy, is the inevitable trend of development of the city, the wisdom of the city throughout the production, circulation and consumption of the entire field, as

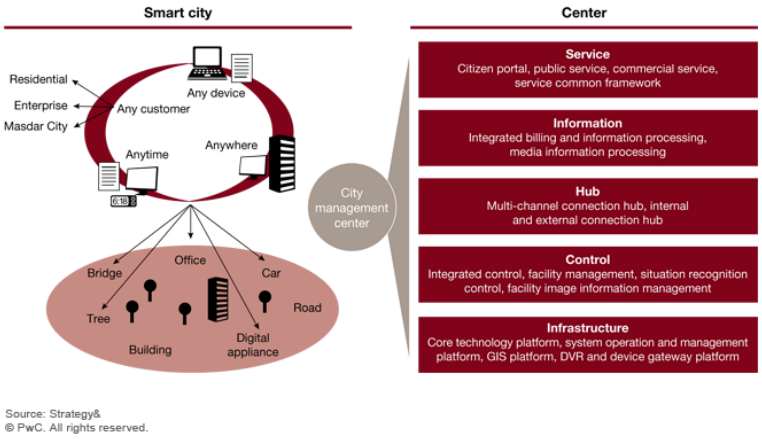


Figure 2 – The innovation of the big data applications

well as management, service, life and culture at all levels. The super computing power it makes full use of new technology, full implementation of the digital city, the popularity of Internet applications, and RFID, digital map technology, effectively realize the intelligent development, process monitoring, achieve accurate identification and directly involved in the management of city wisdom and intelligence service. The basic connotation of smart city will continue to update with the emergence of a variety of new technologies. At present, the Ministry of science and technology, the Ministry of housing and urban construction, the Ministry has in promoting the city planning and construction work of wisdom, especially the Ministry of housing and urban construction has launched the two batch of national pilot smart city, it has become an important starting point to promote the national new urbanization development. The construction of smart city has a far-reaching impact on promoting the construction of new urbanization in china. It will

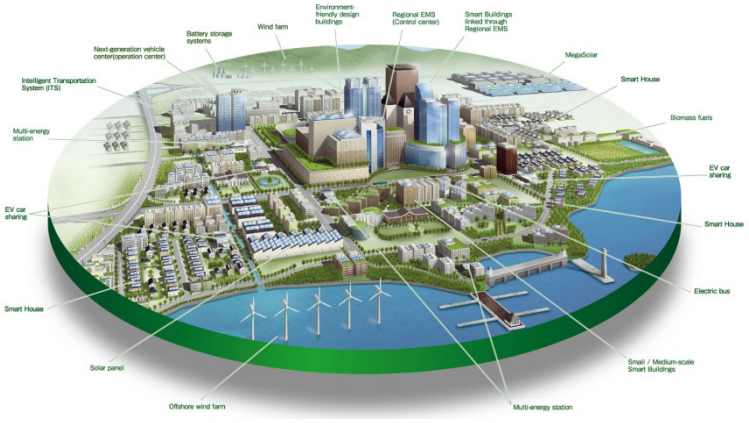


Figure 3 – smart city

comprehensively improve the level of productivity, innovation and competitiveness of the city, to enhance the general level of well-being of the public from the overall level.

In the world there are two kinds of wisdom of urban construction, one is the wisdom of the old city, and the two is the wisdom of the new city. For the construction of new cities and towns, more important is the wisdom of the new city. Traffic, weather, history, a lot of the accident rate and so on, are in the statistics of the column. Through a large number of data processing, the background of the big data can be integrated in the past, for each user to develop the most reasonable and safe route.

3. Economic and social impact of new urbanization

3.1. The connotation of new urbanization

The so-called new urbanization is the basic characteristics of the development of urbanization in the urban and rural areas, urban and rural development, City Interactive production, intensive, livable, harmonious, urbanization is the major and medium small city, small town, the new rural community development, mutual promoting. The new urbanization in Henan has different characteristics compared with the traditional urbanization and the general sense of the new urbanization. The traditional urbanization is mainly manifested in three aspects: one is the “invisible person”, planning, construction and management of urbanization will be simply equated with the city, the rural population of the city has lost the original meaning; two is “new city industrial”, city scale expansion and the function is not flat, can be effectively improved the three is heavy but not God, change neglected people’s ideas and life style, value orientation, behavior criteria, humanities spirit. And the general sense of the new urbanization, is based on the existing large city as the center, the development of small and medium-sized city and towns focus, establish city group and city zone, population concentrated to small city and towns, to achieve industry nurturing agriculture and promote rural city. Henan is also the use of this development model. However, the situation in Henan Province, large population base, the total growth of fast, densely populated even small city development together, cannot solve the problem of city large rural population. The current rate of cities and towns in Henan province is 46.6%, plans to 2020 to reach the national average (55%), to transfer 15 million of the rural population, but there are 45 million people living in rural areas, therefore, according to the reality of Henan, the Henan provincial government proposed a new way of thinking, which is based on large and medium-sized city and small town, and on the new rural community. Therefore, the new urbanization has the characteristics of the Central Plains, is to extend to the grassroots, to the rural urbanization as a breakthrough, promote urbanization to promote rural extension, some farmers to divert, alleviate the large number of rural labor transfer to urban carrying capacity is not strong and contradiction, to promote the integration of urban and rural development. This is a bold theoretical exploration and practice of Henan Province on the road of urbanization.

Henan new urbanization, the new, there are four main meanings: first, the relative to the past, the urban and rural separation, dual structure highlights the traditional urbanization, new urbanization more emphasis on urban and rural integration, urban and rural integration. Two is the traditional focus of urbanization is a single unit of the city, while

the new urbanization emphasizes the urban system, pay attention to play different levels of urban functions, so that mutual promotion. Three is to emphasize the construction of compact city, complex type city, low carbon green city and central city group development and other new ideas. Four is relative to the previous town of separation of the city, the more emphasis on City interactive, employment oriented, emphasizing the city to provide jobs and carrying capacity to determine the size and speed of farmers into the city.

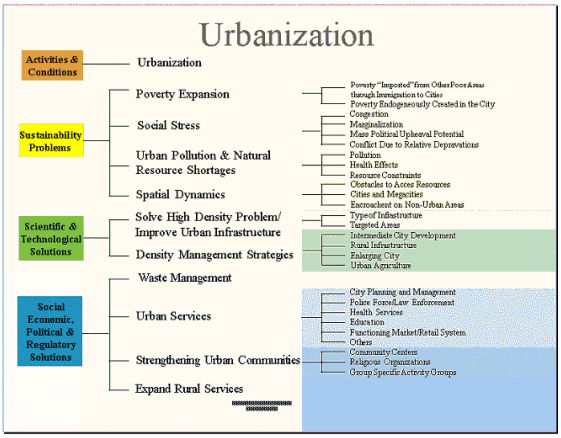


Figure 4 – A new type of urbanization

3.2. The leading role of new urbanization

Kuznets believes that in the early modernization, industrialization is the first impetus to modernization, modernization of higher stage, the urbanization rate in 30% ~ 70% stages of development, urbanization will become the driving force of modern industrialization to replace.

The so-called leading, must be able to solve the main contradiction and problems of economic development, leading the healthy development of social and economic. Henan current urbanization rate is 46.6%, entered the stage of development of the 30% -70%, and with the industrialization of urbanization has become the first driving force of the modernization of the basic conditions. In addition, from the development status of Henan "three", the theory should be coordinated development, industrialization, urbanization, agricultural modernization is inseparable, and the three are interdependent, mutual promotion and common development, a virtuous cycle. However, due to historical reasons, Henan province urbanization lags behind industrialization, under the realistic condition, low urbanization rate has become the focus of the outstanding problems and contradictions restricting the economic and social development three coordinated development of Henan province and even the restricted Henan economic and social development "bottleneck", which determines in the leading position in the development of new urbanization. So, starting from the actual situation of modernization of Henan province and the "three" development, to lead the new urbanization of Henan has become the inevitable choice based on the situation and development stage.

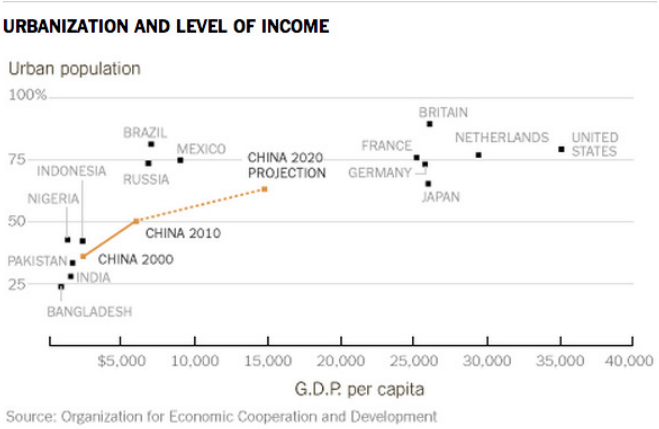


Figure 5– The economic impact of forecast of urbanization

4. Practical innovation has promoted the new understanding of the development of Urbanization

Exploration on the practice of the Henan new urbanization road, not only in theory to promote the urbanization concept of rich connotation, perfect system, expand and deepen understanding, and further enhance the understanding of the development purpose, development layout and development requirements, development method and development power of the town, which a solid foundation for the healthy and orderly new urbanization construction.

1. Enhance the purpose understanding of the Urbanization

The essence of urbanization is to make a part of farmers and farmers through the employment and income structure change, so that they can have the dignity to participate and share the achievements of city, the town's share of modern civilized life. For a long time, we promote the traditional urbanization "invisible person". Planning and construction and management of urbanization will be simply equated with the city, one-sided pursuit of the urbanization rate and the increase of city scale expansion plane neglected, change idea, life style, value orientation, behavior criteria, humanistic spirit level. Henan proposed new urbanization, always put the harmonious development as one of the basic feature, is conducive to human liberation and all-round development, is conducive to meet the people's growing material and cultural needs of diverse as the biggest pursuit, completely change the light weight construction management, production of light of life, light weight and other backward ideas to make "people" become the fundamental development of the city again, the starting point and end point, highlighting the true value of urbanization, reflects the Henan development of town regression. The improvement of cognition has promoted the development of practice. Henan always stand in the strategic height, the concept of scientific development

throughout the whole process of urbanization, more humane care in the development of the city, increase the people's livelihood elements, pay more attention to improve the living quality of the residents, especially stressed not to deprive farmers, agriculture and food at the cost of sacrifice, let the farmers become the biggest beneficiaries of urbanization, new urbanization construction has been the province and all aspects of the wholehearted support of the masses of the people, and continuously enhance the sense of satisfaction and happiness.

2. Enhance the understanding of the layout of Urbanization

The development of cities and towns in the process of urbanization is always a major problem must be dealt with in the process of urbanization. Generally speaking, the spatial distribution and scale of cities and towns are closely related to the formation of economic distribution, especially the regional economy. Since the reform and opening up, in the whole country, it has formed a multi-level urban system, which is based on the large city, the small and medium-sized city as the backbone, and the small town as the foundation. In recent years, Henan follow the economic law, and consider the layout of the economy, employment, population carrying capacity and source environment, through the planning guidance and other measures to improve the urban and rural development pattern, gradually build five urban system of state regional center of the city, regional center of the city, small city and town center and the new rural community the formation, which adapts with the land scale, distribution of resources, the development potential of the population distribution, promote the healthy development of urbanization. Especially the new rural community as a hierarchy of urban system, not only to further expand the urban areas, promote farmers to the nearest local transfer, realize the organic integration between the local urbanization and urbanization in different places, major changes and open layout of the town, the town into, scattered in the vast rural areas, mainly relying on the existing breakthrough City, county and towns urbanization ideological shackles, the formation of the urban development pattern. This innovative practice, in line with the actual situation in Henan, the test is also fruitful, is the specific embodiment of the layout of the development of urbanization and deepening of understanding.

3. Enhance the requirements of the development of Urbanization

Overall urban and rural development is a major strategic issue of economic and social development, but also the objective requirements of the development of urbanization. In recent years, Henan has always firmly establish urban and rural resources to co-ordinate and promote the integration of urban and rural areas, give full play to the leading role of radiation center of the city and county towns bearing the new rural community and to undertake strategic basis, vigorously promote the new urbanization. The new rural community as the strategic basis for urbanization, can let farmers enjoy the mutual causal relationship together to co-ordinate to solve, will improve the understanding of requirements on urbanization development to a new level, opening up a new realm of urbanization development in Henan.

4. Enhance the understanding of the development of Urbanization

Urbanization is an important symbol of modernization, reflecting the process and level of the comprehensive development of economic and social. For a long time, the traditional

urbanization in China is mainly relying on industrialization and urbanization, is taking the urbanization mode mainly depends on the development of large and medium-sized city, not only caused by agriculture and food, ecological and environmental sacrifice, and brought the city the development of rural dilapidated and farmers to the city rooted in semi urbanization and various difficulties drawbacks. At the same time, the construction and development trend of rural Henan is undergoing profound changes, including the new generation of migrant workers, rural population gradually reduce, the rural aging society ahead of the arrival of the rural land circulation; accelerated, engaged in agricultural production and labor force gradually reduced, and gradually realize the scale of agricultural production and industrialization; rural infrastructure and public service facilities gradually improvement of public services in urban and rural areas tend to be balanced development.

5. Conclusion

Large data analysis applications can bring huge economic value and social value, information technology, manufacturing and other fields more and more based on large data analysis and application results for decision-making. In addition, large data analysis applications, and promote the further development of society, has played an important role in the wisdom of Residents management, big data research results show surprising predictive ability to predict the future, big data technology will have a profound impact on the decision-making process and the life of people. In terms of the wisdom of the environment, the big data to support the prediction and can quickly respond to disasters. With the development of the Internet of things, big data across every corner of the city, mining, evaluation and correlation analysis of a large amount of real-time and historical data using big data, the depth to obtain relevant environmental data, environmental protection departments can help accurately determine environmental trends. Build a people-oriented, smart urban and rural infrastructure and public service system, improve the quality of the development of urbanization. With the importance of information technology in city development and urbanization has become increasingly prominent in the economic and social development with increasingly close integration services platform through the construction of virtual city mapping based on service and management of the city with more intensive and efficient, green, is the inevitable choice for the development of new urbanization.

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Research on the Situation and Countermeasures of English and American Literature Teaching Based on Internet Data Mining

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Abstract: In recent years, with the extensive application of database and computer network, data mining has been used in many fields. In this paper, the author analyzes the situation and countermeasures of English and American literature teaching based on internet data mining. Teaching practice shows that English and American literature has an important role in improving students' humanistic quality and basic language skills. Through analyzing the present situation of English literature teaching, the author puts forward to some suggestions to optimize the teaching mode of English and American literature.

Keywords: Data mining, English and American literature, Teaching model

1. Introduction

In recent years, with the extensive application of database and computer network, and the use of advanced automatic data generation and collection tools, people have a sharp increase in the amount of data (Carrell, 2015). The conflict between the rapid increase of data and the lag of analytical methods is becoming more and more serious. People in scientific research, business decision or enterprise management fields also hope to analyze a large amount of data. However, currently, it's difficult for the data analysis tools available to support in-depth analysis (Dai, 2012; Fannes, 2013; Gonçalves et al., 2015). Data mining is to solve the problems of traditional analysis methods, and the analysis and processing of large scale data. Data mining is the process from a large number of data to extract useful information hidden behind the data, it is used in more and more fields, and has achieved good results, and provided a great help for people's right decision.

Years of teaching practice shows that English and American literature course has an important role in improving students' humanistic quality and improving language basic skills (Guo, 2014). However, today in order to vigorously promote quality education, cultivate students' creativity and practical ability of English and American literature teaching, we need to seriously sum up its gain and loss, accumulate experience, as soon as possible to solve a series of problems in teaching (Huang, 2014; Jian, 2015). To this end, we carried out the related research work, in order to further improve English literature

teaching mode and teaching means to cultivate students' communicative ability, innovation ability, self-learning ability, analysis ability. First of all, we investigated the status quo of English and American literature teaching, so that we can make a concrete analysis according to the specific problems, so as to reform the teaching methods

2. Internet big data mining

"Big data" is a new term. It is a manifestation of mobile Internet development and prosperity, big data with wide network application and the rapid development, we have not yet big data to have a comprehensive and in-depth understanding and definition (Krstev, 2014). Now, big data is composed of a complex structure, data collection, data processing, and the application model based on cloud computing. Through the integration and sharing of data, the cross formation of intellectual resources and the capability of knowledge service has appeared. (Zhang, 2012). In view of this, a single computer can not complete the processing of large data, only the distributed computing architecture can complete this work. For massive data mining, it's based on big data cloud computing, distributed processing, distributed database, cloud storage and virtualization technology.



Figure 1 – Internet big data

Data mining is a newly hot research field for data processing. Its research aim is the effective algorithm, to discover a large amounts of existing data sets and find out the original unknown but useful knowledge, and use an understandable and concise way of showing. Data mining involves database technology, statistics, machine learning, neural network, knowledge system, information retrieval, high performance computing and visualization of multidisciplinary knowledge of complex subject, which not only has very strong theory, but also has the very strong practical significance. They pay attention to the cultivation of students' innovation ability and problem-solving. The core knowledge structure of the curriculum is the syllabus, which is also the content that students must master. Data mining must first be preprocessed before being stored in the data warehouse. Data mining tools and mining algorithm should be used according to specific circumstances. Data mining is a certain mining process, the results of which finally is displayed in visual form. Mining tools and algorithms are the key contents of teaching. For special mining tools and general mining tools, ten classical mining algorithms of

classification are important. Including clustering, association analysis, link mining, bagging and enhancement, sequence, machine learning, mining and aggregation graph mining rough set. Students need to understand the concept and representative algorithms, and also should be able to do the example analysis.

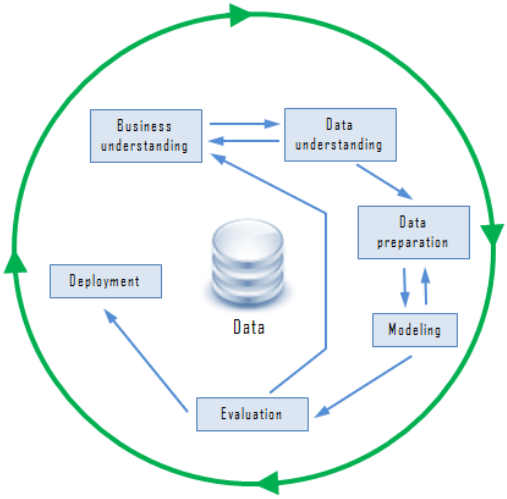


Figure 2 – Data mining

The application of data mining technology in the teaching process is mainly in the following aspects:

1. Set up a reasonable course

Reasonable curriculum refers to the reasonable structure of different courses, including the interface between the sequences of courses, and each course can make the students through the learning and training courses, to acquire knowledge and ability with a professional. After all, there is a certain relationship between each course, which is latent and not easily found. This will be able to find a reasonable basis for setting the student curriculum, timely adjust the curriculum sequence, in order to achieve the best teaching results. In short, the application of data mining technology, can quickly and accurately achieve the effective allocation of resources and the rationalization of curriculum.

2. To improve teaching methods and means

In the teaching process, teachers should use various teaching methods and means to complete their teaching tasks, and obtain the best teaching results. As for the question, what kind of teaching method is the best, from the accumulation of a large number of historical data through teaching, it cannot be answered easily. Classification, data mining techniques for the cluster analysis should be used according to different students. The method of linear regression analysis, association rules can be used to determine the different characteristics of different majors. After that, the teaching method students should take can be determined. The standard is: the range of the teaching content

and depths is appropriate; selection of teaching media is practical; whether teaching strategies are properly on time and so on. The only way to make our teaching methods change with different teaching contents and updated teaching object, is to mobilize the enthusiasm of learning, and improve the quality of teaching. By this way, we can treat teaching with the viewpoint of development, teaching means and teaching activity factors can be updated, which are used to stimulate students' interest in learning,

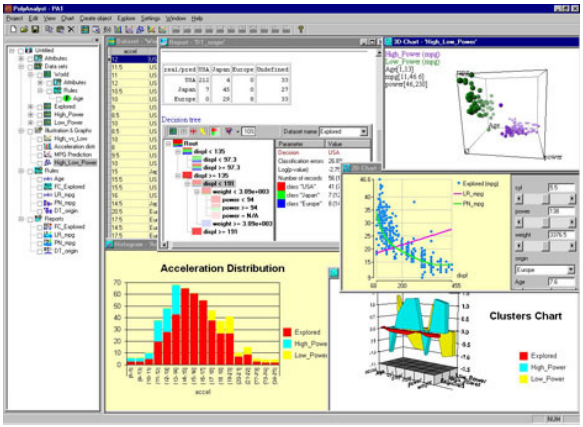


Figure 3 – Data mining analysis

3. Reasonable examination

Teaching activities is an important part, as a test of students' knowledge and ability to grasp the degree of means, the exam should also make adjustments to adapt to the needs of the development of education under the new situation. In the relationship between teaching and testing, we can not teach because of the examination, nor exam because of the teaching. The teaching content determines the content of the examination, and the teaching method determines the assessment method, so in theory, examination is just a part of the teaching content and methods of examination, it is decided by the teaching target, teaching content and teaching methods. So let the teaching and examination of this partnership to harmonious development, promote each other, use data mining technology to assist our teaching decision-making, rational exploration and effective approach to evaluate the examination questions, such as the relative degree of difficulty, students' comprehensive knowledge points of the data mining technology.

3. The present situation and optimization approaches of English and American Literature Teaching

3.1. The present situation of English and American Literature teaching

English and American literature plays an important role in the training plan and the teaching plan of College English Majors in our country. The purpose is to cultivate students' ability to read, appreciate and understand the original works of English literature, and

to master the basic knowledge and methods of literary criticism. Through reading and analysis of English literary works, promoting the students' basic language skills and humanistic quality, enhancing their understanding of the western culture, the literature course, which plays to improve students' English level of appreciation of literature, culture and the aesthetic taste of the more heavy responsibility, is an important part of quality education. The teaching of English and American literature is in a rather awkward position, facing all kinds of difficulties and problems, mainly in the following problems:

1. Since the reform and opening up, with the development of social economy, people pay more and more attention to the role of foreign language, on the other hand, they also put pragmatism quick introduction to foreign language learning. At present, the focus of college foreign language teaching in our country, including literature, translation, intercultural communication, and practical ability of language communication and application, mainly contributed to the students in their contempt and humanistic accomplishment. Moreover, it contributed to the tendency of literature at a distance.
2. Literature course has a great deal of teaching contents, so the teaching task is heavy. However, there are not enough classes for such contents. This is the reason why teachers are speeding up in classes, resulting in poor teaching effect. American literature has a long history, with many famous writers' literary works, diverse writers style, different culture and language characteristics of different times. Most teachers often feel lack of time to tell students so much in so short a time.
3. The teaching method is old and single. It can not effectively guide the students to appreciate and think. Without a large number of vivid and multi channels to transfer the dull atmosphere in the classroom, students are just passive listening, and accepting much information in the limited time. Students often feel literature classes "empty" and "difficult". This will reduce or even stifle the students' interest in learning to a large extent, resulting in fear and weariness.



Figure 4 – Textbook of English and American Literature

3.2. Optimizing the teaching mode of English and American Literature

Nowadays, the application of computer network technology and the development of English network resources have become an effective way to improve English level. Multimedia foreign language teaching research is a hot topic in foreign language field in recent years. With the development of science and technology, the application of computer in the auxiliary language teaching has been promoted, the multimedia technology and equipment are in a large scale introduced into the foreign language teaching. From the perspective of domestic and international research, the prospect of multimedia assisted foreign language teaching is broad. In foreign countries, multimedia has entered the classroom teaching, and the quality of teaching has played a huge role in promoting. A study in the United States showed that the success rate of the multi media teaching method was increased by 38% compared with the traditional teaching method. In China, many colleges and universities have used multimedia as an auxiliary means of teaching, and have achieved remarkable results.

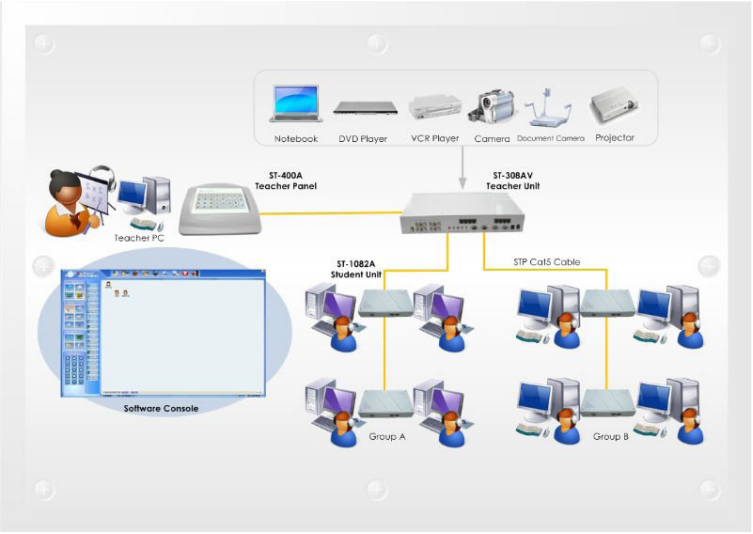


Figure 5 – Multimedia English and American Literature Teaching

The making of courseware is the key link of multimedia teaching. At present, in Colleges and universities, software development and multimedia courseware have become the basic skills for foreign languange teachers. Whether it is the collection of foreign language teaching resources, or the quality of the construction of high-quality courses, software development can not be separated from multimedia courseware. The teaching courseware is made entirely by the teacher. Selection and modification of a set of teaching demonstration system, play a positive role in promoting students' ability to better grasp the British and American literature courses. We are in the development of teaching English and American literature history. In order to achieve better teaching effect, the writer's works, literary terms, the distinct development clue of literary history, should

be shown in a vivid and easy way. The teacher should make multimedia courseware and teaching tools by themselves. The text must have prominent focus too.



Figure 6 – English and American literature ppt

Students love watching broadcasting the DVD highlights of American literature masterpieces adapted from American literature movie clips. Asked why, the reasons of the students can be summarized as follows: the visual effect is more intense, more impressive, and can effectively improve the understanding of the content of literature, interest in learning, as well as the listening etc. Thus, playing American literature masterpiece DVD highlights, not only gains entertaining, solves the problem of literary epic work "class to teach, after-school self-study difficult", but also overcome the difficulties of reading works. Although watching DVDs can not completely be replaced the traditional reading, however, as a foreign student, you can have English classic masterpiece, a relatively comprehensive and perceptual understanding of literary masterpiece.



Figure 7 – The study of English and American Literature

4. Survey results and analysis

With the method of questionnaire and interview used, the writer conducted a questionnaire survey of 20142015 English major students, issued a total of 1000 questionnaires, and recoverd a total of 856 valid questionnaires. During the investigation, the writer found that the students were not very interested in the course before formal contact with the British and American literature courses.

Factor	Not practical	It's too hard	Do not understand	Have interest in
Contact with the British and American literature courses, and what impression does the course give you ?	16.4%	32.7%	27.5%	26.8%

Table 1 – The impression of the course of English and American Literature

Through the study of the literature course, it is very important for the students to choose the English and American literature courses in the foreign language learning of English majors. The survey shows that most of the students have a deep understanding of the importance and necessity through the contact with the British and American literature courses. Hoping that in order to obtain the harvest in the course of British and American Literature study, let's see table 2.

Factor	increase the understanding	Improve the level of English language	Improve listening	Improve independent reading ability
Hope to gain from the course	57.2%	36.4%	16.2%	29.1%

Table 2 – Hope to gain from the course

From the above, survey results can be seen: most students believe that English and American literature course is necessary. Through the interviews we learn that many students do attach great importance to the American literature class, but they are passive to learn. One of the reasons is that this course is a required course, they have to learn in order to pass the exam. Another reason is that the content of this course is more and more difficult. In the process of learning, they gradually lose their confidence, thus lose interest. With the increasing employment pressure of college students, the students must grasp the market trends, many employers in the selection of graduates concerns only the students' language ability and certificates, they do not pay attention to the literary and cultural literacy. Therefore, students only pay attention to the training of language skills, while ignoring the cultivation of literary and cultural quality. All these reasons are caused by the students' interest in learning, students are only passive acceptance of the contents and textbooks of Teacher Talk on knowledge, they could not appreciate the charm of literary works. Most students hope that teachers create conditions for

students to take the initiative to participate in the issue of literature in the classroom. Survey shows that students fully express the desire to improve the participation of literature class and assure that the effect of interactive classroom teaching is very good, see Table 3, table 4.

Factor	Very much hope	Hope	Indifferent	No hope
Do you wish to participate actively in the classroom?	17.5%	63.2%	19.3%	5.4%

Table 3 – Students' attitude towards classroom participation

Factor	Effect is very good	General effect	No effect	I do not know
What do you think of the effect of interactive classroom teaching on learning?	54.2%	27.6%	1.6%	3.7%

Table 4 – Interactive classroom teaching effect

5. Conclusion

With the help of rational use of multimedia technology, Internet aided teaching of English and American literature can make up for the traditional teaching means. It also helps to realize the large capacity, high density and fast rhythm of literary classes, thus greatly improves the efficiency of teaching. But multimedia teaching has its drawbacks and limitations. Through this investigation, we understand the students' attitudes towards British and American literature teaching. These problems must be reflected on the teaching reform of British and American literature. Teachers can design various and colorful classroom activities, such as drama, classical masterpiece movie dubbing, poetry readings, classroom discussions, which greatly increase the interaction between teachers and learners, and between groups. The process and results are summarized and evaluated by the teachers or the students themselves.

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Short-term Interval Prediction Modeling of Photovoltaic Power Plant output power based on combing Least Squares Method and Weighted Markov Chain

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Abstract: The paper examines a new method for photovoltaic power plant output power forecast modeling, in order to adapt to the impacts of new energy penetrated power system, realize the grid planning and operation of photovoltaic power generation system. It expands on the condition classify of photovoltaic power plant output power by taking full advantage of the matched curve of Least Squares Method, it builds the Markov chain model, and calculates the coefficients and weights of each order autocorrelation, it carries on the weighted Markov chain forecast modeling by means of combining the correlation analysis and Markov chain. The numerical results of Liaoning Jinzhou 3MW PV plant indicate that, the state interval division is reasonable, predictive analysis is accurate. The interval forecast of photovoltaic power plant output power supplies reliable basis for interval optimization modeling of uncertain variables after new energy into the grid. The method is easy to implement, it is more efficient use of time, and provides a broader outlook.

Keywords: Least Squares Method; Weighted Markov chain; Interval forecast; Autocorrelation coefficient; Interval Optimization

1. Introduction

The analysis and calculation of the power system is confronted with more uncertain factor after new energy into the grid. The traditional power flow calculation can't satisfy the calculation of grid parameters, so uncertain power flow calculation emerges including the fuzzy flow calculation, the probability flow calculation and the interval flow calculation. It becomes the research central issue how analyze the influences after new energy into the grid. The fuzzy flow calculation supplies the variable distribution based on fuzzy theory set and result analysis, but remains further treatment by actual experience. The probability flow calculation summarize statistical law of uncertain system variable by analyzing the large amount historical data, determines the probability density distribution of the variables utilizing Monte Carlo simulation, point estimation

and other method. The interval flow calculation gets the upper and lower boundary of uncertain variables by interval calculation, it has been widely used. (BaoHaiboetc., 2015). The paper puts forward interval trend optimization, which uses interval variables instead of the dot variable, and realizes the reaches of global optimization problem. The paper expand on the interval optimization method, it changes uncertain variables into interval variable including new energy power and node load power, carries out interval boundary constraints and new energy into the grid operation.

The paper examines the forecast modeling method of Least Squares Method- Weighted Markov Chain to realize the interval prediction of photovoltaic power plant output power. (Ding Mingetc., 2016). The paper classified the condition by the single factor weather condition. (Yuan Xiaolingetc., 2016). The paper carried out short term forecast of photovoltaic power plant output power using weather type exponential function. The paper gets on linear fitting of the solar radiation and photovoltaic power plant output power. It determines the state interval; it partitions the raw data of the PV power plant output power by a number of parallel lines using predict curve as the center of symmetry; it models the Markov Chain, and calculates the coefficients and weights of each order autocorrelation, completes the weighted Markov chain forecast modeling, realizes the interval forecast of the PV power plant output power. Liaoning Jinzhou 3MW PV plant data is used to verify the method, the output power of photovoltaic power plants matches with the interval optimization of the grid power, achieves a flexible grid-connected of photovoltaic power plants.

2. Realize the partition status of photovoltaic power plants output power

2.1. The research on the characteristics of photovoltaic power plants output

The paper studies on PV power plant operational data, which chooses data from January 4, 2015 under weather conditions. Sampling time precision is 10 min, the study period was 7:50 ~ 15:40 totaling nearly 9h, the data is processed as follows: (Xie minetc., 2016). The skein value of PV power plant output frequency histograms is 0.648, its kurtosis value is 0.767, it follows Normal distribution by the Kolmogorov-Smirnov test. The fluctuation curve of the output power and solar irradiance shows in Figure 1. The output power of photovoltaic power plants in the morning appears upward trend, it emerges downtrend in the afternoon. The influence is not controllable, which environmental factor does with photovoltaic power plants output power including solar irradiance, temperature, wind speed and wind direction, therefore PV power plant output power appears fluctuated. That is there are differences between the current time value and the next time value of photovoltaic power plants output power. But the fluctuation of output power is the same as solar radiation, it illustrates the output power of PV power plant is linear correlation with solar radiation. The 16 days dates select from January 6 to 23 days of power generation and solar irradiance, (Excluding 5 and 28, there are faults). Therefore, it is necessary to take into account the fluctuation in the planning operation and performance evaluation when new large-scale energy into the grid.

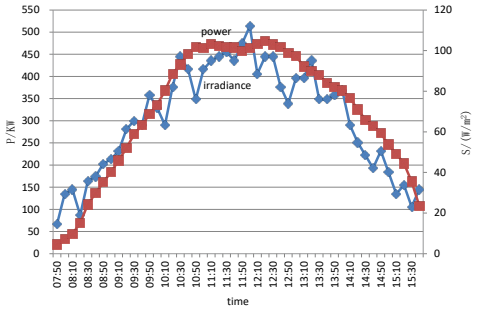


Figure 1 – Characteristic curve of PV power Plant output power and solar irradiance

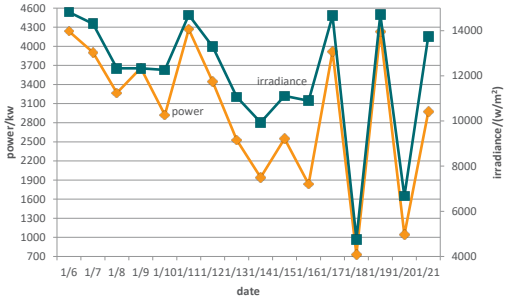


Figure 2 – fluctuation curve daily output power of PV power plant and solar irradiance

2.2. Realize the partition status of photovoltaic power plants output power making use of Least Squares Method

Least squares method is a seeking the best approximation point method, which consider the Euclidean distance as the error metric, which generated vector space by the variable coefficient matrix. In space $L(W,P)$,the dependent variable is $Y:P\to R$ and independent variable is $X:W\to R^n$,the sum of squared errors is defined as the objective function, namely photovoltaic power plants output power is defined as response variable, solar irradiance as prediction variable. The purpose is going to find the function $y=F(x)$,the sum of squared errors of any value y_i between the predicted value $\hat{y}=a_0+a_1x_i$ is the minimum in space, it satisfies the formula.

$$\min\sum_{i=1}^{n}[y_i-F(x_i)]^2=\min\sum_{i=1}^{n}[y_i-(a_0+a_1x)]^2 \quad (1)$$

According to the sample data, we obtain the sample mean $\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$ and $\bar{y} = \frac{1}{n}\sum_{i=1}^{n} y_i$, and the sum sample squares $S_{xx} = \sum_{i=1}^{n}(x_i - \bar{x})^2$ $S_{yy} = \sum_{i=1}^{n}(y_i - \bar{y})^2$,and the sum of cross multiplication $S_{xy} = \sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})$, the results are as follows:

$$a_0 = \frac{1}{n}\sum_{i=1}^{n}(y - a_1 x)_{\cdot} = \bar{y} - a_1\bar{x} \quad a_1 = \frac{S_{xy}}{S_{xx}} \tag{2}$$

The 16 days dates selecting from January 6 to January 23 of total daily generation of photovoltaic power generation system are classified. The solar irradiance is defines as independent variables, and the output power of photovoltaic power plants is defines as dependent variables, they implement fitting a straight line utilizing Least squares method, that is achieve Least-squares linear fit curve photovoltaic power plants output power and solar radiation.

Such as $\hat{y} = a_0 + a_1 x$, it calculates using the formula (2), $a_0 = -1377$, $a_1 = 0.36$, Thus obtains fitting curve equation $\hat{y} = -1377 + 0.36x$,Therefore, we can obtain the predicted value table of least square method prediction model, shown in Table 1.

number	Original value	Predicted value	Relative error	number	Original value	Predicted value	Relative error
1	4235.5	3996.8	-5.64%	10	2549.0	2650.6	3.99%
2	3904.8	3809.7	-2.44%	11	1836.7	2574.4	40.17%
3	3266.7	3093.3	-5.31%	12	3917.3	3937.7	0.52%
4	3659.5	3093.3	-15.47%	13	734.6	352.3	-52.04%
5	2921.9	3069.0	5.03%	14	4234.6	3956.9	-6.56%
6	4268.4	3950.7	-7.44%	15	1040.5	1041.6	0.10%
7	3443.5	3441.3	-0.06%	16	2972.4	3609.6	21.44%
8	2528.4	2633.9	4.17%	18	4082.3	4206.7	3.05%
9	1941.5	2225.3	14.62%	19	3269.9	3164.3	-3.23%
						Average relative error	-0.28 %

Table 1 – The predicted value table of least square method prediction model

The average relative error is $-0.28\% \in [0.01, 0.05]$, the accuracy class is one and two level, and it meets the requirements.

Least squares linear fitting curve becomes the center of symmetry, we partitions the raw data of the PV power plant output power by a number of parallel lines, the raw data is divided E_1 E_2 E_3 E_4 four partition status:

$$E_1 = [\hat{y}(k+1) - 0.3\overline{y}, \hat{y}(k+1) - 0.15\overline{y}] \qquad E_2 = [\hat{y}(k+1) - 0.15\overline{y}, \hat{y}(k+1)]$$

$$E_3 = [\hat{y}(k+1), \hat{y}(k+1) + 0.15\overline{y}] \quad E_4 = [\hat{y}(k+1) + 0.15\overline{y}, \hat{y}(k+1) + 0.3\overline{y}]$$

The numbers of the partition status E_1 indicate $M_1 = 2$, the numbers of the partition status E_2 indicate $M_2 = 2$, the numbers of the partition status E_3 indicate $M_3 = 7$, the numbers of the partition status E_4 indicate $M_4 = 7$, the parallel partitions of raw data is shown in Fig.3, partition status are shown in Table2. So PV power plant output power realizes the parallel partitions by Least squares linear fitting curve. The least squares method is superior to the ordered clustering method, which is the traditional method. So it makes the partition status at a glance.

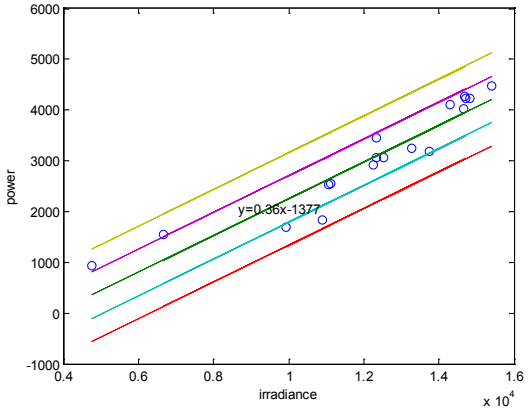


Figure 3 – raw state parallel partitions of photovoltaic power plants output power by Least squares method

interval	state
<1600	1
1600～2500	2
2500～3400	3
>3400	4

Table 2 – The partition status

3. The modeling of Short-Range Prediction for photovoltaic power plant by weighted Markov Chain

The tradition Markov chain is Markov process, which is continuous time and discrete state, its transition probability is independent of the initial status, also known as there is homogeneity. The photovoltaic power plant output power is closely relevant to the amount

of solar radiation. The process of photovoltaic power plant output power is stochastic process. Photovoltaic system is regarded as an overall in the process of Markov chain modeling. It realizes the Prediction for the daily generation photovoltaic power plant, according to the transition probabilities of PV power plant output at different times, and forming the status by PV power plant daily output trends. The weighted Markov chain describes the strength of the relationship among the status in each step length; it carries out weighted sum of autocorrelation coefficient according to each step length, it determines the partition status by "Maximum probability" prediction principle. Specific steps are as follows:

1. The method realizes the partition status of photovoltaic power plants output power (use paper 1.2), the raw data is divided E_1 E_2 E_3 E_4 four partition status.
2. It solves Pearson linear correlation coefficient r_k

$$r_k = \frac{\sum_{i=1}^{n-k}(x_i - \bar{x})(x_{i+k} - \bar{x})}{\sum_{i=1}^{n}(x_i - \bar{x})^2} \tag{3}$$

r_k represents the k-th (hysteresis k period) autocorrelation coefficients: x_i indicates the i-th period PV power plant output power; $\bar{x}$ represents the average output power, n represents the length of the PV power plant output sequence.

3. It normalizes the each step length autocorrelation coefficient, that w_k regards as various lag time (step length) Markov chain weight (m is the maximum order).

$$w_k = \left| r_k \right| \Big/ \sum_{k=1}^{m} \left| r_k \right| \tag{4}$$

4. It calculates different hysteresis (step length) Markov chain transition probability matrix.
5. It respectively regards as the initial status in the output power of a photovoltaic plant period, combines with the corresponding transition probability matrix to predict the status probability for the period output power of PV power plant.

$$p_i^{(k)} \ i \in E \ \text{ k is the hysteresis step}$$

6. The predicted probability is the sum of each prediction probability-weighted in the status, namely

$$p_i = \sum_{k=1}^{m} w_k p_i^{(k)} \ i \in E \tag{5}$$

$\max\{p_i, i \in E\}$ Corresponding to the status is the PV power plant predicted value. After the status determines that the power output of photovoltaic power plants, it is added to the original sequence in predicting repeat the above steps,

it carries on the next time period the output power predicting of photovoltaic power plants.

4. Case study

The data of the output power of the photovoltaic power plant is divided four states, according to the historical data of photovoltaic power plant. In table 3, photovoltaic power plant output power corresponds to the partition status.

Date	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Power	4235.5	3904.8	3266.7	3659.5	2921.9	4268.4	3443.5	2528.4
State	4	4	3	4	3	4	3	3
Date	14	15	16	17	18	19	20	21
Power	1941.5	2549	1836.7	3917.3	734.6	4234.6	1040.5	2972.4
State	2	3	2	4	1	4	1	3
Date	22	23						
Power	4082.3	3269.9						
State	4	3						

Table 3 – comparison table of output power and partition status

Calculate the various steps of the transition matrix as follows:

$$p^{(1)} = \begin{bmatrix} 0 & 0 & 1/2 & 1/2 \\ 0 & 0 & 1/2 & 1/2 \\ 0 & 1/3 & 1/6 & 1/2 \\ 2/7 & 0 & 4/7 & 1/7 \end{bmatrix} \quad p^{(2)} = \begin{bmatrix} 1/2 & 0 & 0 & 1/2 \\ 1/2 & 1/2 & 0 & 0 \\ 0 & 1/6 & 2/3 & 1/6 \\ 0 & 0 & 1/2 & 1/2 \end{bmatrix}$$

$$p^{(3)} = \begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 1/5 & 1/5 & 2/5 & 1/5 \\ 1/6 & 1/6 & 1/3 & 1/3 \end{bmatrix} \quad p^{(4)} = \begin{bmatrix} 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 \\ 0 & 2/5 & 1/5 & 2/5 \\ 0 & 0 & 5/6 & 1/6 \end{bmatrix}$$

According to Section 2 Method establishes Weighted Markov chain model. There are four step length transition probability matrixes. After calculation, Sequences of photovoltaic power plants output power has each order autocorrelation coefficient (taking four orders according to the status), the second row of the table 4 is shown; the weight of each order autocorrelation coefficient after the correlation coefficient standardizing, the third row of the table 4 is shown.

k / r_k and w_k	1	2	3	4
r_k	0.21692	-3.10563	-0.11227	0.18915
w_k	0.05986	0.85697	0.03098	0.05219

Table 4 – Autocorrelation coefficient and weight of each order

According to the 16 days of historical data, On January 24th the predicting output power of PV power plant is shown in table 5.

data	status	hysteresis	weight	1	2	3	4
January 23	3	1day	0.05986	0	1/3	1/6	1/2
January 22	4	2days	0.85697	0	0	1/2	1/2
January 21	3	3days	0.03098	1/5	1/5	2/5	1/5
January 20	1	4days	0.05219	0	0	0	1
				0.1033	0.0261	0.4509	0.5168

Table 5 – The predicting value on January 24th

It is shown that, $\max\{P_i, i \in E\} = 4$,at this time $i = 4$, the status of the output power for photovoltaic power plant on January 24 is four, it is satisfied $x > 3400$, the daily output power of PV power plant is 4647.5 kW on January 24.

The 24th state added sequences of output power for photovoltaic power plant. On January 25th the predicting output power of PV power plant is shown in table 6.

Data	status	hysteresis	weight	1	2	3	4
January 24	4	1day	0.05986	2/7	0	4/7	1/7
January 23	3	2days	0.85697	0	1/6	2/3	1/6
January 22	4	3days	0.03098	1/6	1/6	1/3	1/3
January 21	3	4days	0.05219	0	2/5	1/5	2/5
				0.02227	0.29191	0.1978	0.1826

Table 6 – The predicting value on January 25th

It is shown that, $\max\{P_i, i \in E\} = 2$,at this time $i = 2$,the status of the output power for photovoltaic power plant on January 24 is two, it is satisfied $2500 < x < 3400$, the daily output power of PV power plant is 2698.7 kW on January 25.

5. Conclusion

In this paper, the new method is provides for short-range prediction modeling of photovoltaic plant by the least squares method- weighted Markov chain, it is verified by the PV power plant data of Liaoning Jinzhou area:

1. It achieves a linear fit that PV power plant output and the amount of solar radiation utilize the least squares method to determine the classification standard state, it intended to partition by bunch parallel straight line, and achieves the status partition of power output of photovoltaic power plants, the method should be more adequately considered the sequences data structure of PV power plant output power, so as to effectively depicts the distribution of PV power plant output sequence, so that the status partition of the output power for photovoltaic power plants is in a more reasonable range.
2. According to the weight of each order autocorrelation coefficients, it achieves the weighted Markov chain modeling. It surpasses the tradition method of Markov chain modeling; it takes advantage of effective information, and integrates the Markov chain theory and autocorrelation analysis; it calculates the boundary data distribution of PV power plant output power, and implements the efficient qualitative analysis and accurate quantitative calculation.
3. After calculated the status probability, it will combine the partition criteria of initial status to determine the upper and lower boundary value of the output power of the PV power plant. It will meet the interval power flow optimization of the node parametric variation after the new energy into the grid, so that supplies theoretical support for resources coordination resources and reasonable proportional allocation in the future.

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Multimedia Network Assisted Instruction and Youshui Valley Waving Dance Inheritance and Development

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Abstract: Multimedia technology can combine the visual function with the computer's interactive function, and it has a profound impact on the dance teaching process. In this paper, the authors analyze the multimedia network assisted instruction in Youshui valley waving dance teaching. Multimedia technology has the characteristics of fast speed and large amount of information, which can stimulate students' learning desire, thus forming a continuous and effective learning motivation. At the same time, we analyzed the origin, form and characteristics of Youshui valley waving dance, and provided some advice on cultural heritage and development of waving dance.

Keywords: Multimedia teaching, Network assisted instruction, Waving Dance, National Sports

1. Introduction

With the rapid development of the global science and technology revolution and the profound impact of information technology, multimedia technology has been developing rapidly, and it has been applied in various aspects of business, education and national economic and social development (Chen, 2011). Therefore, some scholars believe that multimedia technology will change the teaching mode, teaching content, teaching methods, teaching methods, eventually leading to a fundamental change in the education thought, teaching theory and educational system (Jiménez, 2015). The multimedia computer interactive audio-visual features and computer TV is combined to produce a new illustrations, rich and colorful way of human-computer interaction, and can get immediate feedback. Multimedia technology has become the latest means of dance teaching, greatly reducing the difficulty of the teaching of dance. Multimedia technology has a profound impact on the dance teaching process because of the function of human-computer interaction (Liu, 2011). It can make students in the learning process of learning a strong interest in learning, stimulate students' learning desire, thus forming a sustained and effective learning motivation. For the dance teaching, the introduction of multimedia technology, it will break the traditional dance teaching methods and teaching methods, and guide the development of the field of dance teaching reform have the fundamental (Zhou, 2013; Xiong, 2014). Dance is the dance most loudest reputation

and large-scale spread of Tujia people and is also one of the Tujia art is different from other ethnic art symbol, because of its important value in the inheritance of Tujia culture, 2006 was included in the list of intangible cultural heritage in china. The research shows that the Tujia Baishou mainly distributed in Hunan, Xiangxi Long Shan Youshui River Basin of Yongshun, Guzhang, four Baojing County, Enshi city and Chongqing Laifeng County, Youyang, Xiushan 2 autonomous counties east, in the regional investigation records recorded "Baishou" activities and waving hall site, the main in this paper the Youshui River, Youshui Valley Waving Dance as the research object, focus on the investigation of the current situation and development path of the hand waving dance of Tujia ethnic traditional sports culture.

In social life, Tujia people to lyrical narrative reasoning, entertainment, worship to dance, dance is an important part of the spiritual life of Tujia people, dance embodies the essence of Tujia folk culture, has become the important collective language of Tujia social life. Tujia hand waving dance into song and dance and folk sports and entertainment in a body, is the most representative of the Tujia traditional culture(Chen,2012). In the course of history for two thousand years, has been with the hand waving dance of Tujia people in the age of the solar term and year after year cycle of festivals, into every Tujia people's heart, casting their ideology, values and national character (Ma, 2004;Li, 2011). In the modern social environment, the cultural heritage of Tujia Waving Dance is faced with new problems brought about by the social changes, how to explore the traditional sports activities in the deep folk culture and the national spirit and cultural characteristics, to explore with the needs of modern society and the mode of thinking, inheriting the national aesthetic taste and values, the Tujia hand waving dance nation sports culture development path, is the main purpose of this study.

2. Multimedia technology

With the traditional slide projector or video, today's multimedia technology is a computer center, voice processing technology, image processing technology, audio-visual technology is equal to one, the voice signal and image signal into a digital signal integration, storage, processing, control, edit and search for them. The multimedia computer interactive audio-visual features and computer TV is combined to produce a new illustrations, rich and colorful way of human-computer interaction, and can get immediate feedback. Multimedia technology has become the latest means of dance teaching, greatly reducing the difficulty of the teaching of dance (Zhao, 2014). Multimedia technology has a profound impact on the dance teaching process because of the function of human-computer interaction. It can make students in the learning process of learning a strong interest in learning, stimulate students' learning desire, thus forming a sustained and effective learning motivation. In the dance teaching in the traditional process, everything is set by the teachers, teaching content, teaching strategies, teaching methods, teaching steps and even students do exercises, teachers are pre arranged, the students only has instilled in the state. But the multimedia technology is adopted, so that the students in the interactive learning environment, can follow their own learning basis, learning interest to choose their own learning content, you can select the appropriate level of their own practice, can really play the initiative of students, for students to play the main role cognition has created excellent conditions.



Figure 1 – Multimedia technology

Multimedia technology has super text function, so it can be the most effective organization and management of dance teaching information. The so-called hypertext (Hypertext) refers to a kind of advanced technology, which is based on the way of thinking of the human brain, and can be organized and managed in a non-linear way. In the course of teaching, if the information of the teaching management includes text, graphics, image, sound, and so on, it needs to use the hypertext function to organize and manage the teaching information. According to hypertext information can be restructured according to the semantic relations between information, also can according to the wishes of the students or teachers, from any of the free entry of information, to watch or read. According to the study of cognitive psychology, human thinking has association features, often because of the association from a concept or subject to another related concepts or themes. So, according to the nonlinear hypertext management information, and according to the



Figure 2 – Multimedia network platform

linear order of the traditional text management information compared to the former is obviously more in line with the characteristics of human thinking, but also for teaching to provide more convenient and efficient to help in the process of teaching dance.

Because of the integration of the image, music, video, text and other forms of information, multimedia technology has a good teaching function. Because of the diversity, richness and rapidity of the teaching function, it is possible to challenge the leading of dance teachers in classroom teaching. Dance teachers in the classroom is a teaching, organizers and managers, but because of the attraction of multimedia technology and led to the decline of the role of dance teachers. This makes the students in the classroom teaching to become a loyal audience of multimedia technology, and the lack of teaching and emotional communication between teachers and students, the lack of effective interaction between teachers and students, students and students. Multimedia technology has the characteristics of high speed and large amount of information in the transmission of teaching information. But this feature can also be a double-edged sword, on the one hand can save teaching time, improve teaching efficiency, greatly accelerate the teaching process and increase the teaching content; on the other hand, may also cause the teaching speed too fast, the teaching content, make it difficult for the students to accept. In fact, dance is based on human action as the main means, through the human body language to express the behavior of art. In order to improve the teaching quality, dance teaching must ensure that students have enough time to practice, and truly understand the mystery and skills of body language. Multimedia Assisted Instruction speeds up the teaching rhythm, increases the density of classroom information dissemination, but it may also squeeze the teacher's leading time, squeeze the students' practice time, and increase the difficulty of the students' learning.

Multimedia technology is the perfect coordination of hardware equipment and software equipment, through their cooperation in order to fully demonstrate the advantages of multimedia teaching. However, we must see that the dance teaching is concerned, the current lack of adequate quality and diversification of the teaching software, there are

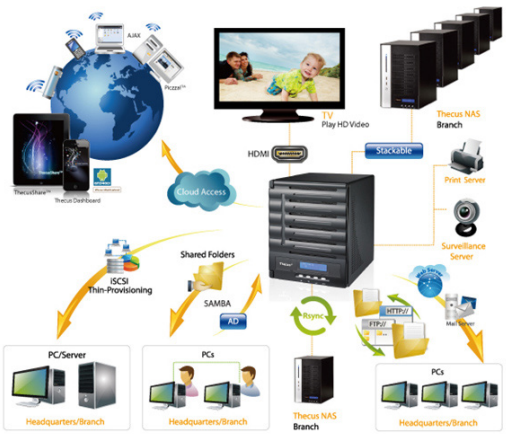


Figure 3 – Multimedia hardware devices

the contents of the old concept of the dance dance, dance behind many of the drawbacks of teaching software; most dance teaching software is cured products, did not provide the technology platform for processing, editing and development, makes the dance teachers unable to need to use their own teaching software; at the same time, many dance teachers due to the lack of a certain technology, and multimedia cooperation is often difficult to achieve the ideal effect. The curriculum teaching goal setting must be scientific and regular, the multimedia technology is difficult to coordinate with each goal of the dance teaching, may cause the teaching goal to become increasingly blurred and the confusion.

3. The origin, form and characteristics of Youshui valley waving dance

3.1. The origin of Youshui valley waving dance

The origin of the "Baishou dance", research is very numerous, but inconclusive. Can be summed up as "hunting origin", "war", "ritual blessing", "folk dance" of [2], in addition, many scholars believe that the "Baishou dance" originated in the Tujia ancestors "its". In Han Dynasty, composed of Tujia people's army as the Han Army pioneer, they managed to fight while dancing, no, said the "Bayu dance dance". To the Wei early renamed Zhaowu Bayu dance dance". Xuanwu dance after the Jin dynasty". Then gradually evolves into today's "hand waving dance". Tujia Waving Dance is mainly because of its own dance and its original image features, produced the original worship witch dance said. Although this argument is based on the theory, but some, in addition to witchcraft, waving dance also includes "hunting", "reflect farming" and "folk", "Military" and other important content of dance. Therefore, whatever the origin, the original Tujia Waving Dance is a set of song, dance, sorcery (worship) and a body, is a product of multi culture fusion, "Tujia ancestors in" totem worship "and" ancestor worship "and" soil Wang Chongbai "and waving worship and other activities, are strongly show to the ancestor worship and admiration. Tujia people in this dance form to achieve the purpose of God and self entertainment and entertainment".

3.2. Youshui Valley waving dance form

Youshui Valley Waving Dance of Tujia live forms according to different regions, different family and production methods differ, but the overall form of common characteristics. According to the main performances of the form, content, sacrifice and public participation scale, mainly divided into large and small hand waving. The performance of human origin, ethnic migration, regional foreign aggression and farming activities, generally every three years, at least a few thousand people, many thousands of people waving; small activities smaller, mainly to worship, to the old prince Peng master officer, Tian. And around the king, performing hunting and fishing, slash-and-burn cultivation, production, daily life and other agricultural activities, usually once a year, as the family name of God worship, as dozens or hundreds of people, can at any time, not subject to site constraints, in the fields, the ancestral temple yard and so on can be made. According to the action form of waving dance can be divided into single pendulum, double pendulum and swing pendulum three. "A series of Tujia Waving Dance, it is a living history of Tujia nationality."



Figure 4 – Waving Dance form

Jiaqing inscription reads: "self husband Baron since the ancient temple was built to serve his support, hundreds more. At the fifteen day of the first month into the temple, seventeen yen powder. Men and women gathered at the shrine, drumming bells dance, called hand, that God is joyous, people love it". waving dance ritual activities mainly in the "year" (Spring Festival), it is clear, "Yongshun's history" volume ten: the village of Tujia waving hall, also known as the ghost hall, that is late tuguan Yin Department, every year at the beginning of the month is three to seventeen days, night and beat gongs and drums. Together, dance songs, "said waving" 7 big waving ceremony is divided into eight parts, usually a complete sacrifice will last for three days. According to the "Chinese folk dance ensemble Hunan volume" records, from "a row move", "rush driving into the hall, to commemorate the eight ancestor", "sister married" and "migrated" and "building homes", "self defense against the enemy", "Saul sent driving hall".

The scholar Zhou Qianling pointed out that "in the Waving Dance ceremony, by repeating the ancestors of the ethnic groups to enhance the achievement of" history "(not necessarily true) common memory." Waving Dance of Tujia history as a "living fossil", we can find the development and change of Tujia culture from. Just as the human scientist Geertz pointed out in the book "cultural explanation", "ceremony" is a kind of meaning pattern, the ritual and social change is the interaction between the society and the culture. In this sense, the research of Tujia waving dance form change, which can analyze the relationship between Waving Dance of the national traditional sports cultural activities and cultural inheritance.

3.3. The characteristics of Youshui Valley Waving Dance

The author of the existing feature of Waving Dance of Tujia nationality research data were retrieved and summarized, the results showed that the results of previous studies are from anthropology, cultural studies, folklore and other different perspectives, which provides effective data analysis for our multi angle observation and analysis of the characteristics of Tujia waving dance. Duan Xuguang (1984) proposed three characteristics of Waving Dance on the basis of the difference between the content and the Bayu dance Waving Dance: "one, extensive content. There is entertainment, Ji

Zuxian, for the prosperity and harvest of hunting, military etc. Second. Various forms. A double pendulum, swing, swing, swing, flower ring inserted, pendulum swing. At the same time, large and small hand waving dance waving dance. Third. Huge scale. More than ten thousand people, less then hundreds. Drums, singing, footsteps, laugh together, form a beautiful folk music, but also set off a moving scene waving dance." Li Wanhu (2011) through the perspective of sports cultural characteristics of Tujia Waving Dance is summarized, put forward with "Baishou dance production and living, diversity and blending, education and inheritance, communication and entertainment" four characters. Chen Tingliang, Chen Aolin (2011) from the angle of folk culture of folk culture characteristics of Tujia Waving Dance, that contains the Tujia Waving Dance of religion as a folk cultural phenomenon and social forces, and caused great effects on the Tujia people, reflects Tujia people's way of life and production, the psychological structure and the ability of thinking, folk features of Waving Dance reflects the cultural characteristics of natural worship, reproduction worship and ancestor worship. The literature on the basis of previous studies, we on the characteristics of Waving Dance summarized in the following four aspects:

The religious people are generally Youshui valley when the harvest or jump dance festival, because they believed that this year's harvest is obtained under the protection of the ancestors, then came to where the ancestral temple is the ancestral tablets, waving hall, with the fullness of the golden rice, corn and other crops, will this year's harvest show in front of the ancestors, thanks to ancestors for their blessing.

Custom display: Youshui Valley Waving Dance from people's daily life, it is a reproduction of the life world, whether it is pre war Military Dance, dance, or ancestor worship or labor dance, reflect the history of people living from the scene, waving dance image, we can see the drum dance elements provided morale, war bow sword brave, tough, can also see the pious worship, ancestor worship, can also be seen waving hoes, throwing seed farming and so on all of these activities have been impressive, conventional, mostly arranged in the slack time: good, harvest festival, wedding congratulations, leisure entertainment and so on, all of this is to show people's life that is the original real life folk culture.

The expression of the ceremony: Waving Dance is in the ceremony to the body's rhythm, subtly strengthen a common memory of the body, and the common physical memory will often make the participants of this group mind identity, consciously or unconsciously into this group or local area cultural environment. For example, his team (usually by manual swing) of the Tujia nationality, Peng Tian, and tan, Gong, Wang, Jean, song "eight surname", mainly is to commemorate the eight surname ancestor. Therefore, as the hand waving dance of Tujia unique dance, in the form of expression is characteristic of the ceremony.

The carrier of culture: expression of this ritual, the waving dance become the carrier of Tujia culture, and Tujia itself as a nation without words, many outstanding national historical and cultural preservation in the ceremony of the "Baishou dance", through the ritual expression of Tujia folk farming fishing and hunting, encourage reproduction, fear God, the younger generation, martial arts and other education shows the cultural content.

4. The status quo of waving dance under the environment of modern society

Youshui Valley is located in Hunan, Hubei, Chongqing three provinces. One thousand years ago, living in this region of the Tujia people in daily life gradually formed the custom of Waving Dance jump. Every dance Waving Dance season, people will gather in the waving hall, came to his club, in the sound of firecrackers, the first ritual, and then in the supervision under the command of young men and women together, advance and retreat, all follow the team dance Waving Dance, vast teams can be used to describe the continuous. After thousands of years of Waving Dance of Tujia, known as "living fossil" and spread so far, it has ups and downs, eventually did not disappear in the social transformation and social change of the tide of the times, in the national cultural development and prosperity in the background, as a national intangible cultural heritage protection and inheritance to. But the inescapable reality is that with the development of modernization, the traditional culture has been a hitherto unknown impact, Youshui Valley Tujia Waving Dance Culture of the living environment is deteriorating, heritage protection and there are many problems, the survival status in the modern social environment condition, worthy of further investigation and analysis.

4.1. Youshui Valley modern existence of Waving Dance

1. Festival folk ceremony

Waving Dance is the celebration held in Youshui valley the most spectacular show for the scene, as a historical and cultural legacy, spontaneous folk, into the local folk customs, is a family of culture, while the action is thrown with the hand, but the structure is simple, easy to learn to use, is a etiquette activities of local people to offer sacrifices to the ancestors and to celebrate the harvest time, gradually evolved into a collective folk sports recreation, physical fitness as a whole. Now, in the large national games, campfire, etc. state celebration of the festival, you can see the mighty hand waving dance scene.

2. National tourism development brand

In late twentieth Century, with a hand waving dance of Youshui Valley eco cultural tourism area tourism ace, sounded the horn. Its main body is the integration of the original culture, added the modern elements, such as the original color of the sacrificial ceremony was diluted, the transformation of integration into the modern tourism industry system. Where many tourist attractions, waving dance performances are almost any cultural performances cannot be replaced. The waving dance clothing, souvenirs, musical instruments, food and other characteristics as the theme of the products by the majority of tourists preferences, waving dance performances become a display of folk culture, but also to promote the development of local economy.

3. Integration into school physical education and health education curriculum

With the gradual deepening of the reform of physical education, school physical education content to change the previous single competitive sports skills teaching, toward the direction of fitness, entertainment, fun. Waving Dance with its unique charm, quickly attracted many primary and secondary schools like. Open hand waving dance sports course in the school, to facilitate the interaction between teachers and students, can not only stimulate students'

enthusiasm for learning, but also for the development of students' creative thinking has a positive effect, let students understand the cultural connotation, when young, industrious and courageous qualities can be tempered, has important practical significance for the inheritance of ancestor worship culture and cultivation of excellent quality.

4. National fitness square dance

With the deepening of the national fitness, people to strengthen the self health care consciousness, physical exercise has been paid more attention to, select the appropriate physical exercise has become the focus of attention, people began to selectively participate in fitness activities. Waving Dance as a typical project of national traditional sports, its action is easy to learn, moderate exercise intensity, the special requirements of the body quality is not high, not everyone can participate, not space, time limit, project limitations has the advantages of fast response, widely. Waving Dance as a personal or collective project, can enhance the emotional communication between people, play a social communicative function.

4.2. The modern plight of Youshui Valley Waving Dance

Ma (2004) by using the method of anthropology, conducted field research on the history and evolution of Waving Dance in Hunan province cloud Shun county Shuangfeng Village waving hall by decline to promote the change of history, which refers to survival in the modern society of Waving Dance environment:"..... Shuangfeng Village Waving Dance not like that only in the new year began to jump, but can be performed at any time. Sacrificial activities in the "ladder" (Witch), but the old people can be presided over. Tujia Shuangfeng Village do not wear clothes for many years. The county is now accompanying villagers waving show wearing national costume, these down the line from the style of the clothing is not the headdress are: men and women, old and young three foot long black headband, wrapped in a "herringbone", blue cloth, sleeve edge, and on the side of the pants are inlaid at the front woven lace one inch, foot wear shoes. All of this is no doubt that it is not the tradition of the past, but the tradition of the invention." This prompted human scholars earlier on the reflection on the traditional way of waving dance culture resides. Chen Tingliang, Zhang Lei (2008) survey of Xiangxi Tujia and Miao Autonomous Prefecture of intangible cultural heritage protection and heritage status, discovered family waving dance in modern society under the environment of the national language is on the verge of extinction, resulting in Endangered Baishou song Baishou dance heritage is "to the vast art", Waving Dance is excluded the school compulsory education system of the new generation of block inheritance, and serve the tourism development or cater to the superficial mass fashion taste for Waving Dance original ecological protective destruction and survival dilemma. Chen Tingliang, Wang Qing and other 5 scholars (2012) to study the intangible cultural heritage protection and inheritance Countermeasures of non minorities in Xiangxi, once again pointed out that the protection of Waving Dance of Tujia nationality "living" and "authenticity", and waving dance in modern society under the environment of cultural heritage must be "cultural space" (Culture Space) problem. Based on the analysis of previous research literature related to the survival of the status quo of Waving Dance material, combined with the observation of the national traditional sports culture reality, the author carried out the following refining and summarized on the modern survival dilemma of waving dance:

1. The deterioration of the cultural ecology of folk dance environment.

The Waving Dance and waving hall in the modern environment gradually alienated as an example, the traditional sense of the Tujia folk tune ", is a fixed place in one to fifteen months of each year at the beginning of every single day in the evening, the Tujia waving hall held the copycat, which includes singing the song Waving, Waving Dance, jump Maogusi play, along with the change of modern society waving hall" inevitably decline, and gradually go hand waving dance skirt hall, on the square dance square and serve the tourism development to commercial stage, behind the Waving Dance by decline to promote social phenomenon, increasingly development predicament of modernity show the Waving Dance increasingly lose its ecological culture space.

2. The original ecology of Waving Dance as historical and cultural information of human destruction

The global economic and cultural integration and modernization of the Tujia Waving Dance of the original ecological impact and digestion situation is very grim. The impact of cultural diversity and heritage declined, the national language endangered, tourism settled, industrial culture influence, the agricultural population outflow, immigration and worsening environmental threats, as well as the intangible cultural heritage protection "destruction", the original ecology of Tujia Waving Dance faded out. For example, in order to meet the needs of the public, the original ecology of waving dance according to the modern fashion aesthetic interest free superficial adapted into popular square dance, on the surface, it seems is the protection of traditional culture is the essence of prosperity, cultural form and connotation of the Waving Dance simply to "culture" is a fundamental stripping damage on the original ecological dance as a historical and cultural information.

3. Waving Dance living cultural tradition of the difficulties

According to Chen Tingliang et al is known as "the first village of Tujia China" dam Township Yongshun County Shuangfeng Village field survey found that the total population of the village of 321 people, to 2008 when the investigation has been reduced to 268 people each year, the number of migrant workers nearly 100 people, the village is only 160 people left behind at home, and a large part of the elderly and children, in addition to Baishou dance heritage field Renxin old man is singing several Tujia Tujia folk songs, performing Waving Dance with the Tujia language, other young people do not understand basic Tujia language, also cannot completely show the dance of tujia. In the cultural globalization and modernization under the impact of Tujia young people out of their homes to the traditional national culture gradually lost confidence and even had a blind sense of inferiority; living state of Waving Dance heritage for NPC has been high, and gradually reduce the defects; in addition, because of the current education system, the school under the entrance the rate of pressure, not the hand waving dance of Tujia Nationality in the school of education, actually blocked the Waving Dance of this traditional cultural heritage, the heritage of Houjifaren, waving dance living cultural tradition frontage modernity inheritance difficulties.

4. Sports and fitness culture connotation of Waving Dance lack of excavation

Waving Dance of Tujia culture as a unique subject of sociology, anthropology, ethnology, communication scholars attention and research in recent years, but from the National

Traditional Sports Culture on the view of research results is still rare, Lu (2010) of soldiers Shemi Laifeng County in Hubei province from the perspective of lake of waving dance. Li (2012) conducted field investigation of Shemihu Waving Dance, on the social function of folk sports in the process of socialization of village people in the case of the investigation which relates to the content and participants of waving dance activities motivation specific fitness needs. In addition, the author retrieved from the perspective of sports science research results of Waving Dance most of the origin, form and characteristics of Waving Dance overview of research data. From the existing literature, the waving dance research results from the national traditional sports culture of the fitness value of practical investigation and Empirical Study of the lack, is also unfavorable factors restricting the development of modern dance.

5. Conclusion

As modern society shows more and more characteristics of accelerating globalization, more and more people in the world will be influenced by the social transformation. The traditional or quickly disappear, or to change to obtain a new living space. Youshui Valley Waving Dance as an important mode of integration of daily life and traditional culture of Tujia society, has been included in the national intangible cultural heritage "is protected by the state. Needless to say, with the hand waving dance of the transformation of modern society continuously in the dynamic changes in the face, action is lost, the deterioration of the environment, culture and living cultural tradition fade and other modern development difficulties, in the loss of some of the original meaning at the same time, it is a new form, new contents and the new culture function.

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Analysis of Industrial Organization Reform Based on Network Economy

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Abstract: With the development of economy and Internet technology, more and more enterprises will be the core content of Internet technology into the development of the enterprise. How to use the Internet in the new era to promote the development of China's economy becomes the focus of attention of scholars in china. At the same time, the development of the Internet economy, but also to the global economy and industrial structure has been a huge change. Under the condition of Internet economy, the change of the competition between enterprises is becoming more and more prominent, which will seriously affect the efficiency and competitiveness of the industry. Facing the development of network economy, our country should make full use of the advantages of the network economy, and reorganize the industrial structure of our country to make it more competitive. In this paper, the development status of the Internet economy, the change of industrial organization in the economic conditions of the Internet to carry out specific analysis and discussion, and hope to provide some reference for the reform of China's industrial organization.

Keywords: Network Economy; Industrial Structure; Organizational Structure; Discussion

1. Introduction

Network economy is the product of economic development in the new period. At the same time, the network economy and the traditional economy have different operation rules and development characteristics (Cai, 2000). The most obvious characteristic is that the network economy has strong network externality, and the development law of marginal revenue is the basic development. Beyond this, there is no limit to the boundaries and time and space that is unparalleled in any economy in the world (Gan, 2002; Du, 2016). This kind of operation there is no time limit, is a new era of rapid development of the economy, it realizes the global development of the day, is the world's new economic development model of the real. At the same time, it also has innovative economy, platform based economy in the title of the economy. Network economy is the main direction of the development of industrial organization. So that, when the network economy has changed, then the change of industrial organization will have inevitable trend.

External environmental factors	Changes in the macroeconomic environment of the whole society	The influence of scientific and technological progress	Influence of resource change	Changes in competition
Internal environmental factors	Requirements fortimely adjustment of organizational structure	To ensure the smooth flow of information requirements	To overcome the low efficiency of the organization	Requirements for quick decision making

Table 1 – The reasons for the change of industrial organization under the network economy

March 2015, China hosted the three session of the twelve National People's Congress, the first national prime minister Li Keqiang Internet + action into the national economic development agenda(Hong, 2009). The plan put forward, caused the strong reaction of society, all walks of life scholars have carried out relevant research and discussion. Internet + is a product of the development of Internet technology in the new era, it is the extension and development of Internet technology. Network economy as a new product of the world, its unique advantages will promote the new industrial revolution in the world.

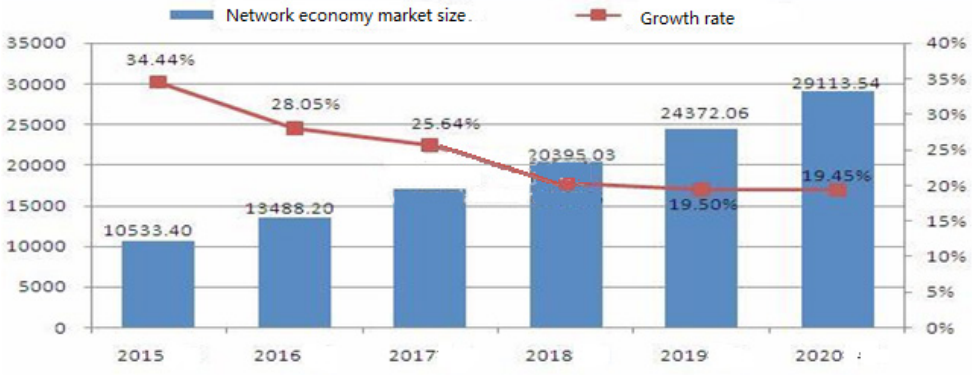


Figure 1 – Market development in the context of network economy

2. The main embodiment of the industrial organization reform under the condition of network economy

2.1. Changes in market monopoly and competition

Each industry organization is the foundation of the market development, and the monopoly and the industrial organization structure are the main contents of the market development. Depending on the degree of market monopoly, the theory of industrial organization will be divided into different markets, such as completely monopoly market, oligopoly market, monopolistic competition market and perfect competition market.

The formation of market monopoly is mainly about the size of the product market share. The main focus is on improving the concentration of the market (Liu, 2005). And based on the enterprise, to obtain a higher market share, we must reduce the cost of enterprises, improve the enterprise development strategy, and improve the overall efficiency of enterprises to achieve. Of course, administrative power plays an important role in the formation of market competition (Li, 2006). The monopoly of any market cannot be separated from the government or the relevant departments of the executive power of the support; In addition, when the market monopoly enterprises to develop high price market monopoly, it will cause important influence on the lives of consumers, so the government should be based on the anti-monopoly law of market regulation and management of the kind of monopolistic behavior.

Under the condition of network economy, the competition of enterprises is no longer the competition mode of traditional enterprises. The focus of competition is mainly embodied in the competition of technology, standard and industrial ecosystem (Sun, 2001). The establishment of new production technology and high standards of production system is the dominant factor of production and competition, the traditional enterprise production cost based pricing price has been far cannot meet the development needs of the current network economy. The composition of technical factors has become the main factor of the current network economic monopoly (Liu,2001). At the same time, technology is changing the basic elements of the market monopoly and competition form. It effectively promoted the enterprise's independent innovation, and then formed a kind of "market monopoly formation - being broken - the formation of a new market monopoly" fast frequency cycle (Yuan, 2002). Compared with the traditional monopoly enterprises, the monopoly market of the network economy is a constant change, and the monopoly enterprise must keep the innovation and advance with the times to ensure the monopoly position of the enterprise. Once other companies with high technology, then the high standard of technology and beyond the monopoly enterprises will occupy its monopoly position. Therefore, the traditional monopoly of the market is difficult in the network economy under the conditions of long standing, and the market monopoly enterprises to change the frequency of accelerating.

2.2. Cooperation becomes the basic market behavior pattern, which is related to competition and monopoly.

Monopoly and competition are the two most basic forms of development in the traditional economic development, cooperation, although the basic market behavior, but competition and monopoly in the market behavior compared to the proportion of the relative weakening. In the traditional industrial conditions, some enterprises due to price or production and cooperation, but this is not the provisions of the law of the monopoly. In this regard, the government will be on the behavior of cooperation to fight the postindustrial economic development, the cooperation between enterprises continue to emerge, become a common phenomenon in this cooperation, the cooperation between enterprises become the basic mode of market. Even under the condition of network economy, the cooperation of enterprises has become the model of market development. In the context of the development of network economy, the cooperation of enterprises is also called "cooperative economy". And the reason why the network economy will enable

enterprises to grow and spread, the main reason is because the internal and external causes of the two factors together. From the internal perspective, the development of the network economy itself is an intertwined community, leading to enterprise cooperation is inevitable. From the external point of view, the network economy compared with the traditional industrial economy has undergone tremendous changes, the sovereign consumer market has been formed, the customer first is the main purpose of enterprise development, customer demand is different, the single enterprise is very difficult to meet the needs of different customers, so in the design of the product specialization and personalization all aspects need enterprise cooperation. In addition, the production of a business product to sell many links, not an enterprise itself can be completed, cannot do without the cooperation of enterprises. Network economy has injected vigor and vitality into enterprise cooperation, and the development of network economy also provides a strong technical support for enterprise cooperation.

2.3. Production mode from mass production to mass customization

Since the beginning of the second world industrial revolution, the birth and popular large-scale production, initially by the introduction of the production line by Ford began. Mass production is a major turning point in the manual revolution to machine production in the world, and it is the beginning of mass production. In the period of industrial economy, the enterprise is based on mass production to achieve the goal of minimizing the cost of the enterprise. Under the conditions of the new revolution, especially in the period of network economy, the mode of enterprise production has further shifted to mass customization production and service manufacturing, as shown in the following table.

	Application Technology	Mode of Mode of production
The first industrial revolution	The invention and application of steam engine	Manual production turn to machine production
Second industrial revolution	Electrical technology invention and Application	Machine production to mass production line
Third industrial revolution	The invention and application of information technology	Mass production line production shift to mass customization and service manufacturing

Table 2 – The technological revolution and the change of the scale of production

Large scale production effectively promotes the enterprise to minimize the cost, and meet the needs of different customers. It is a new trend in the development of industrial organization. In the network economy, relying on the third industrial revolution, the production of digital, networked and intelligent technology, can effectively promote the transformation from traditional mass production to production to personalized and intelligent. And the production of personalized customization has become the

main goal of the German development strategy, China manufacturing 2025, etc. According to the German strategic planning, its main goal is to rely on the Internet and the Internet of things and computer and powerful advantage to build a large database of products and services, highly flexible digital production mode. At present, our country has gradually begun to apply and promote the production of personality development, through practice, has achieved good results. Such as China's red group through the clothing data system is built to meet the personalized, more than a million billion combination design, personalized design of the coverage rate reached 99.99%. Customers only need red group according to kinds of data from different parts of the body, the version and the design can easily access their own personalized. With the industrialization process to achieve the production of personalized, only need to spend more than 10% of the cost can make the overall efficiency of enterprises increased by 2 times.

3. Under the condition of network economy, the change of organizational structure is the inevitable trend of the development of our country.

New era of industrial revolution, as well as the development of global network economy, industrial organization reform has become the main content of the world revolution. It is the important direction of industrial restructuring in China. The new industrial revolution not only provides development opportunities for China's industrial organization, but also brings a great challenge for the development of the industrial revolution in the future. According to the new requirements of network economy in the new period and the current development of China's industrial revolution, China needs to develop, we must constantly adjust the industrial structure, accelerate the transformation and optimization of the industrial structure. Concrete from the following several aspects: First of all, to re construct the competitive market, restrain the monopoly of the enterprise market, strengthen the share of the market structure of cooperation. In particular, we focus on the suppression of foreign multinational enterprises in the Chinese market monopoly of the industry, the formation of local competitive market, in order to enhance the structure of China's industrial organization and market competitiveness. In addition to introduce high-end professional and technical personnel, to cultivate a competitive industrial clusters and industrial ecosystem, this will enhance the value of China's industry. Secondly; relying on the Internet and format of new technology to reform traditional industry, promote the transformation and upgrading, facing the situation of excess current production, speeding up the implementation of the "Internet +" action plan is the inevitable future. Chinese in the condition of network economy changes in industrial organization size. Again, to promote the adjustment of enterprise organizational structure, to create a competitive network type enterprise organization. Actively relying on the network platform, fully with the network's big data, intelligent information, the development of mass customization of personalized production.

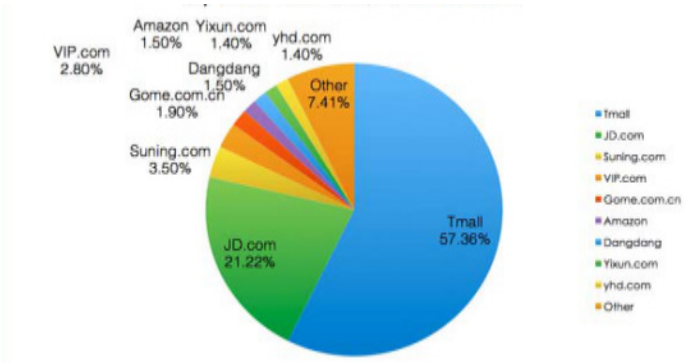


Figure 2 – China Top B2C Websites Market Share by Total Transactions

In the context of the network economy, China's future development prospects are excellent, the network economy is expected by 2016, China's network economy market size will exceed 1 trillion and 348 billion 800 million yuan. The main reason is that China is a country with a large population of the country, Chinese netizen number larger, which led to the needs of the industry to a certain extent, has laid a solid foundation for the development of new forms of Internet industry. In addition, China's Internet industry's business model has matured. Such as Internet advertising, search engines and electronic commerce, the emergence of these new services, and gradually accepted by the people. Major Internet Co by virtue of the advantages of enterprises, continue to penetrate into the field, and effectively promote the market competition, and further stimulate the development of the Internet industry.

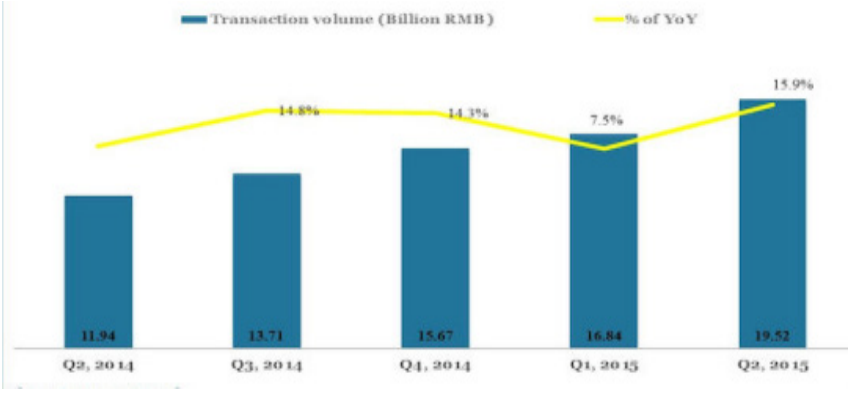


Figure 3 – China Qnline Accomnodations Booking Market in Q2 2015

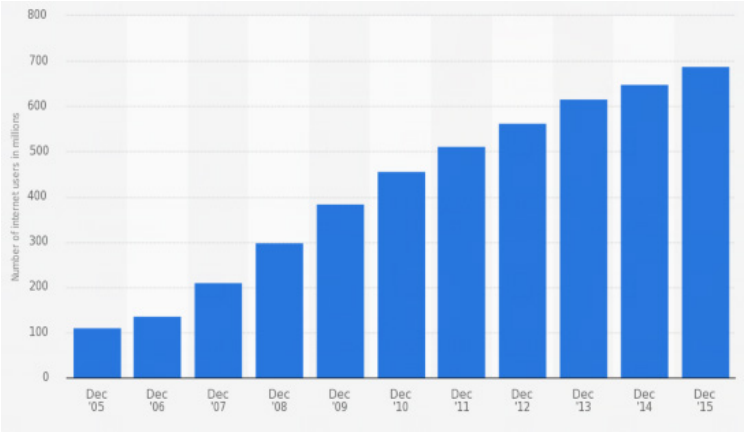


Figure 4 – Number of internet user in china from December 2005 to December 2015

China has achieved a sound network infrastructure, 3G development of the Internet and the introduction of the relevant policies of the national network economy has effectively highlighted the good momentum of the development of China's network economy.

4. Conclusion

The main trend of economic development in the future will be development of the network economy, the development of a trend which cannot be halted. The development of network economy prompted the change of industrial organization, which is not comparable to the traditional industrial economy. But the network economy, because of its own characteristics, is also completely break the traditional development of the monopoly of the organization. Therefore, in the new period to achieve the development of industrial organization, we must continue to master new technology, new production methods, the only way to enable enterprises to go further in the context of the network economy.

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Wireless Sensor Network Data Collection Method Based on Regionalized Compressed Sensing

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Abstract: Wireless sensor network technology is widely used in various fields, and it is based on the information processing system integrating data collection, processing and analysis, but due to the prominent energy consumption of the central region. Although the application of compressed sensing technology has solved the issue of energy consumption to some extent, in order to make information transmission accurate and stable, this paper mainly uses compressed sensing technology to analyze the wireless sensor network data collection method and influencing factors after the regionalization of wireless sensor network so as to reveal the relationship between nodes and wireless sensing network.

Keywords: regionalization; compressed sensor; wireless sensor network; data collection

1. Introduction

With the widespread application of wireless sensor network technology, there are more and more usage and researches of wireless sensor technology, such as in the fields of environmental testing, geological exploration and even military information transmission, in which wireless sensor network technology is dominant (Gong, 2011). However, its performance in medical, radar, pattern recognition and image processing fields has been the focus of attention in many fields. Although it's theoretical research is still at the initial stage, its performance in the field of medical treatment, radar, pattern recognition and image processing has gained people's attention (Gu, 2015; Jiang, 2014). Wireless sensor network to meet all the ideas for the transmission of information, which has a low cost, wide range of radiation, equipment, small size and ease of deployment and disassembly and flexible features. Although the wireless sensor network technology has the advantages of this or that, but in the actual information transmission process, large-scale wireless sensor network technology, there are energy consumption problems, which restricts the application of wireless sensor network technology And promotion, which has become the shackles of the development of wireless sensor network technology, and its energy consumption is mainly caused by the central area of large consumption of energy consumption, and thus affect the wireless sensor network information processing results(Jiang, 2015). In order to ensure the information transmission is reasonable and accurate, based on regionalization using compressed sensing technology to solve the problem of network transmission process.

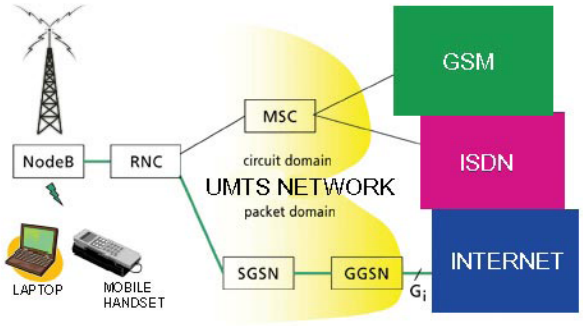


Figure 1 – wireless sensor network

2. Employment Network Information Service Platform

The emergence of wireless sensor is the result of the development of wireless communication technology and electronic device production technology. Its main structure consists of RF transceiver, D/A converter, A/D converter and baseband processor and application program interface (Wang, 2015). Therefore, wireless sensor network has the sensor and micro-electromechanical and wireless communications in one of three technologies (Yang,2016). The information is collected from the monitoring area and transmitted to the node through wireless communication. After many small nodes are gathered, the signal is transferred to the network or satellite, and the user can use the satellite as the relay station of signal transmission.

The following picture is the classic network structure of wireless network (WSN group).

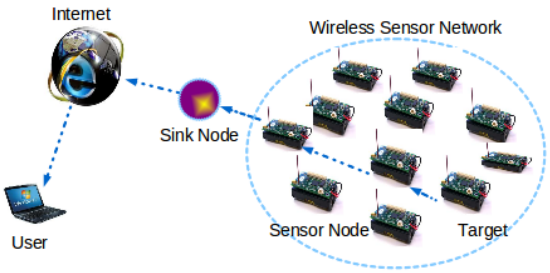


Figure 2 – Network structure of wireless network

It can be seen from the figure that the wireless sensor network is large in scale and high in density, which can provide guarantee for obtaining precise information and weaken the accuracy of single sensor node on the other hand. Wireless transmission node based

on the collection and collation of information, but the nodes of the energy consumption of the superposition of information transmission, and it will cause information congestion and hysteresis. The sensor node is an important part of the wireless network, the node mainly has the battery, the sensor unit (responsible for monitoring the original object information collection), data processing unit (the original information processing analysis, based on infinite sensor network radiation range, information data of the processing task is large), transceiver devices (information receiving processor, the infinite sensor network information, information send and receive the most arduous work), GPS and mobile devices.

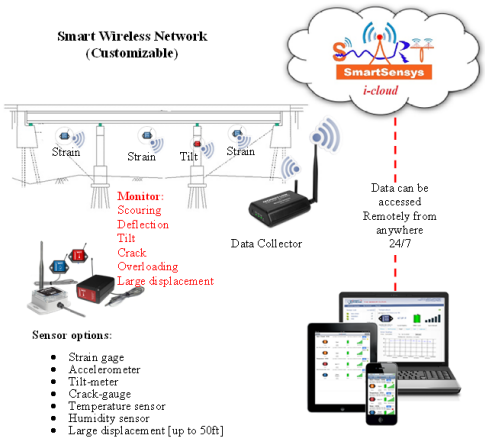


Figure 3 – The sensor node work structure diagram

Because wireless sensor network has energy consumption and technical barriers of bottleneck nodes, large power consumption of nodes, limited communication capacity as well as computing and storage capacity.

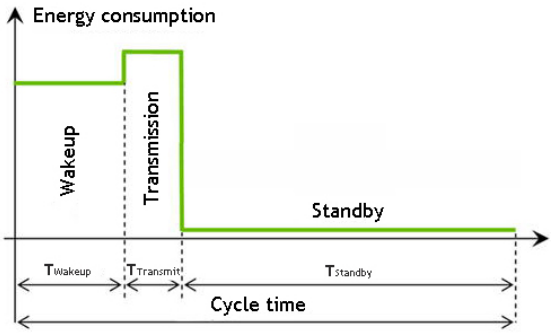


Figure 4 – Sensor node power consumption equipment

It can be seen from the figure that sensor node equipment's power consumption is relatively serious, especially at the sending, receiving and idle stage.

Wireless sensor network architecture can be divided into planar routing and clustering routing. This kind of route operation is simple and good expansibility, do not maintain to the network structure. But because the network does not have the management node to the communication management cannot carry on the resource optimization. Cluster routing roommate cluster nodes in each cluster, by cluster nodes in the cluster of reasonable control, in order to achieve the purpose of saving network node energy. As the picture shows:

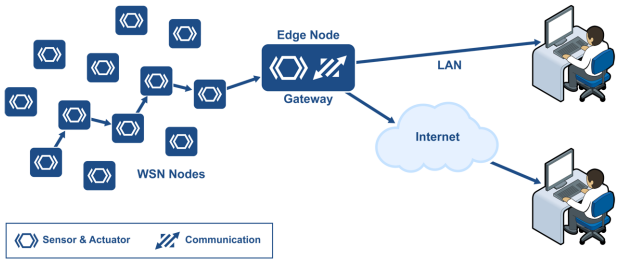


Figure 5 – Cluster routing roommate cluster nodes

3. Function of Compressed Sensing Technology

3.1. The Concept of Compressed Sensing

Compressed Sensing (CS in short) is a kind of compressed data information based on the rise of computer network technology, which reduces data transmission and node energy consumption. The basic idea is to acquire the information by non-adaptive projection method, and to reconstruct the original signal with a little measurement value. Signal conditioning samples can be made in specific areas. Compression-aware technology can reduce the energy consumption of transmission and fusion mainly because it can reduce the huge energy consumption in the central area of the network. However, for the practical application effect of CS technology, the advantage of compression sensing is to realize energy-efficient data communication transmission strategy.

Although the wireless sensor network can reduce the energy consumption of the central area through some special transmission methods, the energy consumption phenomenon still appears in the actual operating environment, and the performance of the sensor has high dependence on the actual operating environment and conditions. In order to achieve the maximum effective transmission of energy, the research in this paper is mainly based on regional compression sensing wireless sensor network, to talk about data collection methods.

3.2. Comparison of CS Technology and Traditional Signal Collection and Processing

As can be seen from the chart, in the signal acquisition and processing and signal acquisition conditions, CS technology is superior to traditional signal processing and

processing technology. To meet the actual environment of the signal acquisition and recovery needs.

	Traditional signal processing	CS technology
Steps	Traditional signal collection and processing can be divided into five steps: original signal, sampling processing, quantization coding, transmission storage coding and signal recovery	Raw signal, compressed sampling, finding sparse solution, signal reconstruction and recovery signal
Sampling Rate	The traditional sampling stage signal broadband in 2 times the purchase guarantee signal acquisition is perfect	CS technology is a sparse sampling method

Table 1 – The traditional technique of signal processing and CS contrast figure

4. Data Collection Based on Regionalized Compressed Perception

Regionalized compressed data is abbreviated as RCS. Firstly, the network topology is randomly divided into several regions. The partitioning principle is independent of the characteristics or relevance of the collected data. Then, each region is selected to select a regional center node to be used to compute the data. And then receives the sampled values of other nodes. Subsequently, the central nodes of the area use the CS method to obtain the regional measurements; finally, these nodes send them to sink nodes for data reconstruction.

4.1. Principle of Regionalized Compressed Sensing Data Collection

Regionalized compression-aware network technology has three regions, and any one region contains the central node and the regular node.

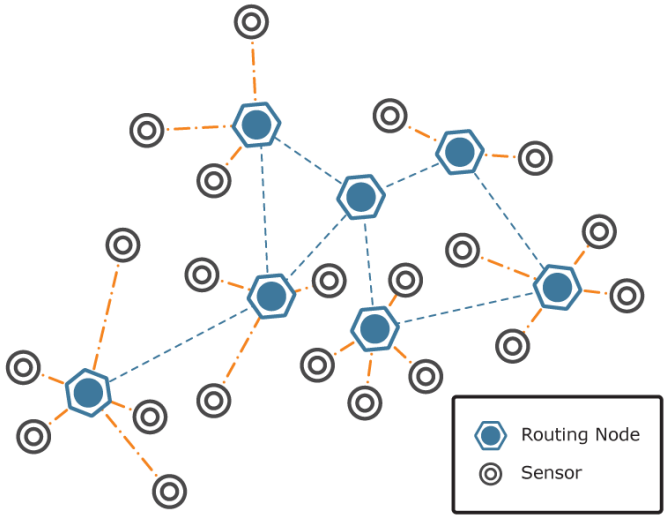


Figure 6 – Regionalization of compressed sensing network three regions

Figure: each node in data transmission, the packet transmission and distributed compressed sensing combination to reduce the transmission energy consumption of the transmitter. The whole network node using the non-CS method One divides into two. Half of the other part of the use of CS, still cannot avoid the huge areas of the energy center in the network data collection process, so it is better to be the traditional transmission mode and the advantages of CS based network life extension.

4.2. Principle of Regionalized Compressed Sensor Data Collection

1. Principle of Regionalized Measurement Matrix Design

From the CS theory, it can be seen that the random matrix has a large probability satisfying and the signal sparse base is irrelevant, and it is also used as a compressed perceptual measurement matrix. The characteristic of the measurement matrix is easily destroyed by the wireless network structure. Therefore, the area measurement matrix of the RCS method should reduce the required storage space by avoiding the repeated transmission of the regional measurement value when the regional center node makes the regional measurement value under the premise of satisfying the compression sensing theory.

2. Sampling- Stop Principle

In the actual information sampling process, once the signal recovery result reaches certain accuracy or reaches the preset threshold, the sink node can stop the sampling work, to avoid the network to produce redundant energy waste. In short, the regional measurement matrix design principles and sampling stop principle is practical, can guarantee the sampling accuracy, while effectively reducing network energy consumption. Especially when the network is large, it can reduce more unnecessary transmission energy consumption and prolong the whole network life cycle.

4.3. Basic Idea

In different regions, regional compressed sensing is implemented to disperse the load of the central area to save the energy consumption of the whole network.

4.4. RCS Method Data Transmission Process

- ***Initialization:*** Randomly regionalize the entire network so as to obtain several regions R, and then allocate central node C of corresponding region after determining several regions R.
- ***Collect Regional Data:*** Transmit the data collected within the region, and for each region and normal node, they can be directly transmitted to the central nodes to collect samples and for reading.
- ***Generate Regional Measurements:*** e regional center node generates the area measurement matrix, the data received in the same and the vicinity, and calculates the regional measurement value.
- ***Measurement Value of the Transmission Area:*** All the regional center node to the sink node transmission of other regional measurements and complete a complete measurement.

- ***While Number of samples, perform data reconstruction:*** Reconstruction accuracy does not meet the sampling stop rules to re-generate regionalized measurements.

In the regional division and the choice of the central node on its impact on network transmission energy consumption, as network data packets continue to node aggregation, CS transmission of the advantages of small scale gradually reflected. The design of regional measurement matrix should also consider the appropriate sparse matrix and then based on the matrix to make the theory of reconstruction accuracy after listening out the sampling stop principle.

4.5. RCS method guarantees

The regional center node needs to weight and sum the received data values using the area measurement matrix to produce an area measurement. As the network size increases, the measured value will be larger, increasing the storage load of the regional center node. At the same time, the generated packets may exceed the maximum payload allowed by the communication protocol, causing the packet to be split into two or more transmissions. Therefore, it is necessary to design an appropriate area measurement matrix to limit the storage and packet length of the central node.

In actual environments, the complexity of sampling objects leads to the number of measurements required is difficult to predict in advance, so the specific number of samples should be based on the original signal reconstruction accuracy. In other words, the sink node does not need to make any further measurements when the reconstruction accuracy is already high enough or the expected requirements are met. In order to avoid unnecessary network transmission of measured values, a decision rule needs to be considered to determine when the sampling process can be terminated.

5. Data Analysis of RCS Experiment

In the data collection process of wireless sensor network, the traditional transmission mode will make the relay node close to the sink node receive and send large amount of data, and form a sink node as the center area. Compared to other nodes, the energy of the sensor in this area will be exhausted faster, resulting in the entire network load imbalance.

5.1. Network node settings

Because RCS uses regionalized transmission, DT and CS are adopted in each area. With the expansion of network size, the performance advantage of this method is more obvious. When the number of nodes is greater than 800, the number of RCS transmission curves begin to become smooth, which means that the number of transmissions based on the RCS method will not increase drastically as the network nodes continue to increase.

5.2. Node forwarding energy consumption

As the data packets of each node are increasing, resulting in the energy consumption of the intermediate nodes to increase dramatically. According to the compression sensing

theory, as long as the sensor serial number is set in advance, the sink node can receive enough measurements to accurately recover the sampled value of each sensor.

5.3. Node and Data Transmission Amount

As the number of nodes increases, the growth trend of RCS traffic volume tends to be flat, and its growth rate is stable. Suggesting that nodes and data transmission have a certain relationship may show positive growth.

5.4. Matrix Design

Since the number of transmissions needed for one measurement is not less than the number of nodes in the network, to further reduce the transmission energy consumption, we can consider increasing the matrix value to reduce the length of the packet. By comparing the number of Gaussian random matrix, uniform random matrix, Bernoulli random matrix and other matrices, it is concluded that the larger matrix value may not produce sufficient projection, resulting in insufficient reconstruction accuracy. Therefore, in the choice of matrix, we must take into account the projection and reconstruction of clarity.

6. Conclusion

As information technology and network technology has provided great convenience for people's life, the development of wireless sensor technology and electronic devices makes wireless sensor network technology develop rapidly. After introducing compression sensing and wireless network sensing technology, this paper establishes the principle of information sampling by sensing node resource and compression sensing technology. Analyze the experimental data to explain the theory, to solve the wireless transmission network technology information transmission dilemma.

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Application of Computer-Aided English Teaching Mode in College English Education based on Multimedia Online Platform

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Abstract: In recent years, the development of information technology has promoted the reform of education. With the increasing popularity of computer multimedia technology in university teaching, the role of multimedia in college English classroom is obvious. In this paper, the author analyzes the application of computer-aided English teaching mode in college English education based on multimedia online platform. The effects of computer in improving College English teaching can be seen, as computer and multi-media teaching is constantly expanding, it has profoundly changed College English teaching modes. While seeing the achievements, we should also be aware of the problems, and take some measures to improve multi-media College English teaching.

Keywords: Computer network, Multimedia platform, College English, Teaching mode

1. Introduction

With the increasing popularity of computer multimedia technology in university teaching, the role of multimedia in college English classroom is obvious, but for the multimedia English teaching to combine the traditional teaching elements to meet the needs of college students in the reform of learning according to the specific teaching practice to set a new teaching model of multimedia ideas (Deng, 2007). With the computer in English teaching in the frequency and the proportion gradually increased, the use of computers for the completion of auxiliary English teaching tasks should be affirmed (Ma, 2008). However, the computer-assisted teaching process to bring huge amounts of English teaching content, but also to the English teaching methods have brought about great changes. In some cases, this change is too large to cause changes in English teaching mode. And gradually change the traditional mode of teaching English, in dealing with multimedia use, classroom-led and the main body and classroom knowledge link to the cause of college English teachers in the thinking, in the computer network teaching, how to balance knowledge and interest in computer teaching to reduce the network of teachers (Panikhina, 2012; Wang, 2013). The status of the dominant position of the

impact, and then explore a combination of computer-assisted teaching and classroom teaching of the combination of independent innovation.

2. Status Quo of Computer-Aided English Teaching

2.1. Computer-Aided English Teaching

In understanding the concept of multimedia-assisted English teaching, first of all, we will think that computer-assisted teaching of English teaching is a secondary measure, that is, college English teaching activities to assist its role in today's highly developed educational technology environment, Computer-aided teaching and teaching media has been widely used in teaching (Zhou, 2009). Combining with the teaching of various new media is the stimulus to human organs such as vision, hearing and other organs. Thereby it will effectively improve the efficiency of teaching, especially in the teaching process, so combined with a variety of interactive teaching sites, the use of computer network resources.

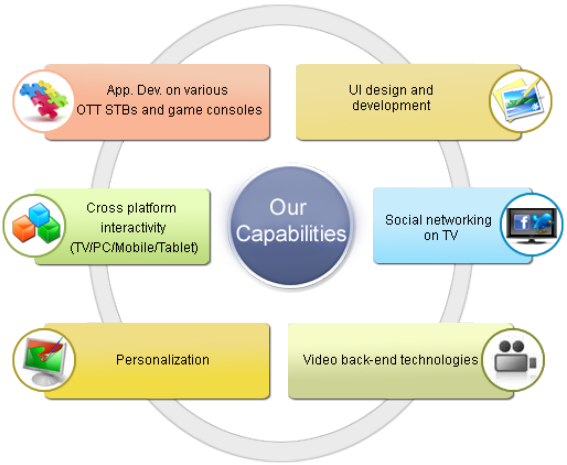


Figure 1 – Computer-Aided English Teaching

English courses in the university curriculum in public courses, will be based on different professional and selective English courses for non-English majors in sophomore and sophomore students, mainly to open reading and writing as the basic training content Basic English Learning. Non-English major junior and senior students of the so-called professional English learning, for example: the popular network Mu classes and ESP courses to learn. English for the school to learn more is to develop professional English and vocational English learning. With the increasing frequency and proportion of computer in English teaching, the use of computers should be affirmed for the completion of English teaching tasks. However, in the process of computer assisted instruction, it brings massive content to English teaching and brings great changes to English teaching. At some point, this change is so great that it causes changes in the English teaching

model. To gradually change the traditional English teaching mode, in the processing of multimedia classroom use, and leading subject and classroom knowledge link, to arouse the College English teachers' thinking, in the teaching of computer network, how to balance knowledge and interest, reduce the network computer teaching dominant position on teaching status of the impact, and find a combination of independent the innovation of computer assisted instruction and classroom teaching combination.

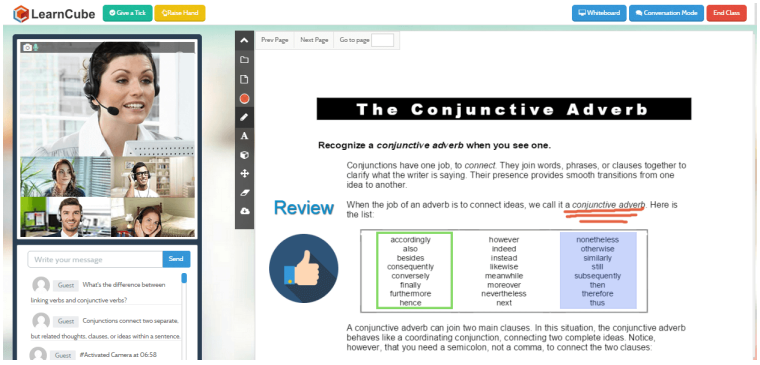


Figure 2 – Online learning platform

2.2. Principles of Computer Aided English Teaching

Although the computer assisted instruction by College English teaching mode toward scientific, systematic direction, but whether the computer in English teaching mode to change, stability must be established the following principles for the development of English Teaching in Colleges and universities and correct.

- **Take Students as the Teaching Subject:** No matter what form of English teaching model, they cannot get rid of the objective of teaching, college English teaching is the main body of college students, the emergence of any new teaching model must be consistent with the development of students 'knowledge and ability to develop students' and inquiry learning.
- **Multimedia Design is Closely Related to Textbooks:** We have to admit that in the process of college English learning, the introduction of computer network multimedia technology will help English teaching, but for multimedia teaching content set and choice must be completed by teachers to avoid the learning content is too fancy lack of practical application of the suspect. Therefore, multimedia teaching in college English teaching content must make multimedia design and teaching and teaching materials close.
- **Principle of Generalizing Daily Application:** Although some colleges and universities adopt computer network in the English classroom teaching, but just a mere formality and not in the daily teaching of universal use, there has been a computer teaching English teaching as a slogan.
- **Combination of Traditional Teaching Elements and Multimedia:** Traditional teaching elements are chalk and blackboard, blackboard in the multimedia did not appear before the knowledge to explain and demonstrate the

function of the prompt board, multimedia teaching in English teaching to solve the traditional teaching content is not rich, and save a lot of writing time. However, due to multimedia, the formation of perceptual knowledge and instantaneous memory is not conducive to the consolidation of teaching knowledge. The role of traditional teaching in consolidating knowledge and rational thinking is obvious, so multimedia teaching should be combined with traditional teaching elements in order to better promote students' knowledge and form a system of knowledge.

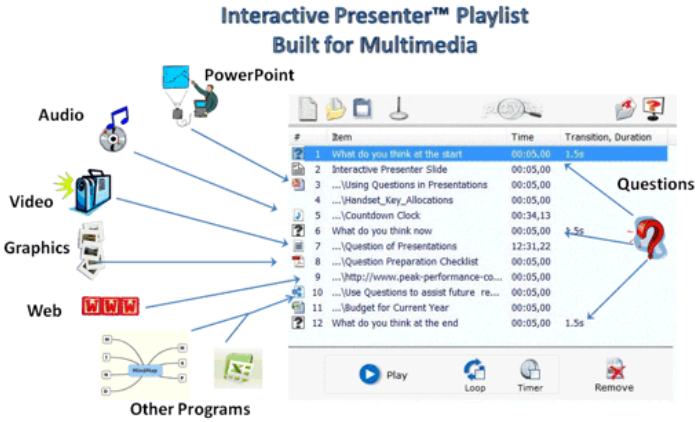


Figure 3 – Multimedia platform

3. Problems of Computer-Aided College English Teaching

In the media computer network learning; on the one hand, it fully mobilizes the enthusiasm of students to learn, on the other hand, it is also new challenges to the teaching authority of teachers. Idealized media computer network teaching should be the arrangement of teachers and students to solve the problem of thinking methods, students through the teacher to lead the problem-solving ideas, access to relevant knowledge in the case of books, students online access to find information and find way of solving the problem.

However, there are still many problems with computer-aided multimedia college English teaching.

1. In multimedia teaching, multimedia does not have satisfactory teaching results, and students are passive to learn and urged by the teachers.
2. Previous teaching is demonstrated on the blackboard without actual operation, thus making students feel bored and dull.
3. The traditional computer network is very old, the computer network is backward, the level of multimedia production than the new media production level is low,

and in use, the computer parts are not good enough, courseware content and other aspects is not Novel, the same is not rich.

4. In combination with the new media classroom teaching, these basic teaching will be carried out in the room, he will reflect the interaction between teachers and students, as well as teachers of the students.
5. While investigating students, we can know whether students are serious and willing to learn during the process. In multimedia courseware, little textbook knowledge is reflected, and in teaching, if multimedia is not well combined with textbook, students can only grasp the key contents but not textbook information.

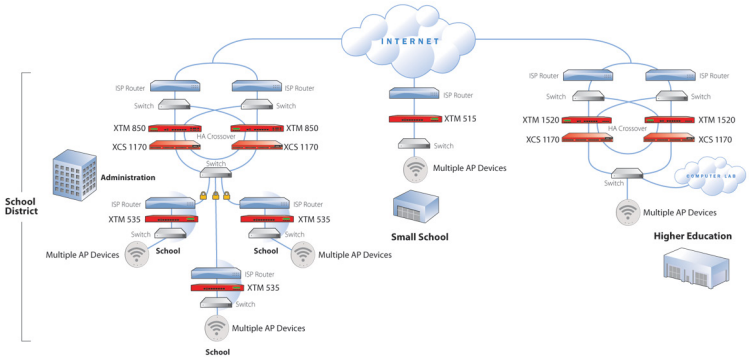


Figure 4 – multimedia college English teaching system

4. Roles of Computer-Aided English Teaching Mode

4.1 Massive Information Advantages

The amount of information searched by the network media is not comparable to that of the paper medium, the paper media is not as good as the network information in carrying the information volume, on the other hand, the paper media spreads slowly and the cost is much higher than the network information, especially for those who are extremely eager for knowledge of the students, that is, the great help of the course.

	Multi-Media Classrooms	Traditional Classrooms
Advantages	Novel and flexible teaching forms, intensive teaching contents	High consolidation effect of teaching contents, and students think from actual operation
Disadvantages	Teaching can be easily adhered to forms without properly dealing with teaching goals and keys	Dull contents, not conducive to arouse students' interest, and teachers have massive teaching tasks

Table 1 – Comparison of Multi-Media Classrooms and Traditional Classrooms

4.2. Multimedia Sensory Stimulation

People can accept multi-sensory information, such as video, pictures, text and other new modes of network communication. The amount of information received by multi-senses is larger than that received by single senses. At the same time, information is more colorful, usually in the teaching of the network, students are tired of a single sensory to accept information, then the sensory stimulation of multimedia in line with modern young people for new things curious psychological, students interested in learning. With the correct guidance of teachers, it can better improve classroom teaching.Multimedia operation platform is based on the visual and auditory combination, refers to the picture of multi-media hardware operation platform.

4.3. Rapid Speed of Updating Knowledge

The knowledge of the Internet age appears explosive growth, knowledge update speed, people acquire knowledge is the main way network, network knowledge acquisition speed, to meet people's thirst for knowledge. In the course of daily teaching, students through the network anytime, anywhere on the Internet to find the knowledge they want, so as to complete the class under the self-learning.

4.4. Improve Students' Interaction Ability in Classroom Teaching

Interest is the direct impetus for students to learn, to attract students to the classroom, is to increase student participation in classroom teaching. Interactive classroom teaching In addition to interaction between teachers and students, as well as student-student interaction in the new media teaching activities, there is an interaction between students and activities outside the classroom, this interaction is mainly through the network distance learning. For example: students in the discussion of related topics, you can connect with the network of experts and scholars direct dialogue. This interaction moves the classroom from the classroom to the forefront of academic research. In addition, part of the network of communication systems, teachers and students can also make classroom problems at any time analysis.

4.5 Active Atmosphere of Classroom Teaching

Because there is no fixed teaching mode, the active atmosphere of the classroom to a certain extent, can arouse students' enthusiasm for learning, the application of new media courseware changed the traditional classroom interaction between teachers and students less classroom atmosphere of dead class situation. Teachers in the classroom to play the role of guide, give full play to the advantages of new media so that students in the Internet to find appropriate information and literature. Through the multimedia elements and interactive classroom to join, full use of network images, video and other aspects of the new media content point of view, can show the classroom active atmosphere. At the same time, information is more colorful, usually in the teaching of the network, students are tired of a single sensory to accept information, then the sensory stimulation of multimedia in line with modern young people for new things curious psychological, students interested in learning. With the correct guidance of teachers, it can better improve classroom teaching.

In short, in combination with the media classroom teaching, the information on the Internet is very rich in the teaching process, combined with a variety of teaching sites and computer network resources and the use of computer network equipment can be further improved Students' interests and so on, so that will achieve a good teaching effect. The teacher arranges the task, gives the student to solve the question the train of thought method, the student through the teacher leads the solution question the thought, when inspects the related book knowledge situation, the student self-accesses the net to search the material, and finds the solution problem method. In the course of daily teaching, students through the network anytime, anywhere on the Internet to find the knowledge they want, so as to complete the class under the self-learning. Finally, in the use of media teaching methods, computer teaching reference, to the city and application of high-quality personnel training orientation.

5. Measures of Computer-Aiding to Promote the Emergence of New English Teaching Mode

5.1. Media Teaching is a Supplement to Traditional Teaching Modes

In the application of computer network teaching, the traditional teaching method is indispensable; the use of book knowledge and multimedia projection and blackboard with the combination, in the basic knowledge of teaching plays an important role. As the amount of knowledge in the new media is very adequate, teachers can arrange appropriate tasks to students in the teaching process, so that students understand the joy of learning. This teaching method is more conducive to students to accept new knowledge, coupled with the evaluation of teachers, so that the course will be teaching a good teaching effect.

5.2. Pay Attention to Students' Sense of Innovation during the Process of Media Teaching

The more knowledge gained in the new media, the richer the problem of students, teachers in the evaluation process should pay attention to the problems raised by students, in particular, some creative problems.

5.3. Reorganize Curriculum Structure and Improve Teaching Plan

The combination of traditional multimedia and practice in the teaching method, the teaching of computer network application curriculum, they will be divided into two parts theory and practice, theory class is in the multimedia classroom, practical lesson but in the room teaching.

5.4. Pay Attention to Assigning Extracurricular Tasks to Students

Appropriate extracurricular tasks should be assigned to students so that students can learn at the electronic reading room and other places with access to the network, thus improving the efficiency of teaching courses.

6. Conclusion

With the increasing popularity of computer multimedia technology in university teaching, the role of multimedia in college English classroom is obvious. In summary, we should see the role of computer-aided English teaching from two aspects. On one hand, we should indeed see the positive role of computer aiding in college English teaching; on the other hand, we should promote the integration of multi-media English teaching and traditional teaching factors. With the computer in English teaching in the frequency and the proportion gradually increased, the use of computers for the completion of auxiliary English teaching tasks should be affirmed.

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Research on Currency Substitution in Developing Country Based on Multiple Motivations and Big Data Analytics

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Abstract: In recent years, with the rapid development of Internet big data, the information society has entered the era of big data. The economy of the world is more and more complicated in this Post-Crisis Era that effects to Developing Countries along with the economic globalization, so that they suffer a lot and currency substitutions could be happened in these Countries. China is in a critical period of financial reform, which can make our financial system more perfect, more effective and healthier. But it also may result currency substitution and revert currency substitution because of the timing of the reform, the policy discontinuity and so on. And that will bring us currency crisis. But there are few people looking into the generalized currency substitution and the relationship between currency substitution and currency crisis which are more important in developing Countries. A new currency substitution model is put forward base on multiple intentions to describe the process of Currency Substitutions in this paper and it also gave some advises to China and other Developing Countries.

Keywords: Big data, Currency substitution, Financial crisis, Post-Crisis era

1. Introduction

In recent years, with the rapid development of the Internet, networking, cloud computing, network convergence and IT communication technology, the rapid growth of data has become a serious challenge faced by many industries and precious opportunities, so the information society has entered the era of big data. The emergence of big data is not only changing the operation mode of enterprise and people life and work, and even caused a fundamental change in the pattern of scientific research (Bu, 2012). Generally speaking, big data is not in a certain period of time by conventional machine hardware and software tools on the perception, acquisition, management, processing and service of the network data set. Big data shows more and more huge effect is changing people's life and work.

As the world entered the post crisis era, the world economy and financial markets become more complex, from the second half of 2015, commodity prices, global stock prices have fluctuated sharply, bring great impact on developing countries, Russia, Brazil and other

countries have the currency by selling the currency substitution phenomenon, resulting in the currency exchange rate fall, a serious impact on the economy (Fan, 2008). As the world's largest developing country, China's economic and financial market will inevitably be affected, once the exchange rate change radically is China's; 13th Five-Year start in year 2016, it is a crucial year for the reform into the deep water area, in the international economic background of unprecedented complexity, how to hold regional systemic risk to the bottom line "as one of the key issues to ensure the reform does not occur, and because the currency substitution phenomenon is easy to occur in developing countries, it will weaken its monetary policy effect, caused by exchange rate overshooting, reduce government seigniorage income, squeeze the fiscal policy space(Feng, 1997), in extreme cases, one of the reasons causing the currency crisis or currency substitution the cause and influence of developing countries so the study of currency substitution factors can better prevent the occurrence of serious currency, to create a more stable environment for China's reform and development.

2. Currency substitution and big data

2.1. Currency substitution

Currency substitution was first proposed by Chetty in 1969, but its concept has not been unified. The international authoritative definition from the World Bank three level definition: (1) alternative valuation standard, medium of exchange and a store of value function; (2) the domestic financial system or the government holds a large number of foreign currency debt; (3) using a foreign currency as legal tender. The definition is the most representative by Jiang and Yang Huai (1999), they think that currency substitution, refers to a country's residents lose their confidence on the stability of local currency or currency assets, income is relatively low when the mass exchange of currency, and currency in terms of value, medium of exchange and storage standard currency functions fully or partially substitute currency. It not only describes the phenomenon of currency substitution more comprehensively, but also explains the causes of currency substitution. But for different scholars "large-scale" standards are different, so in fact there is no uniform definition of the standard. This paper argues that currency substitution refers

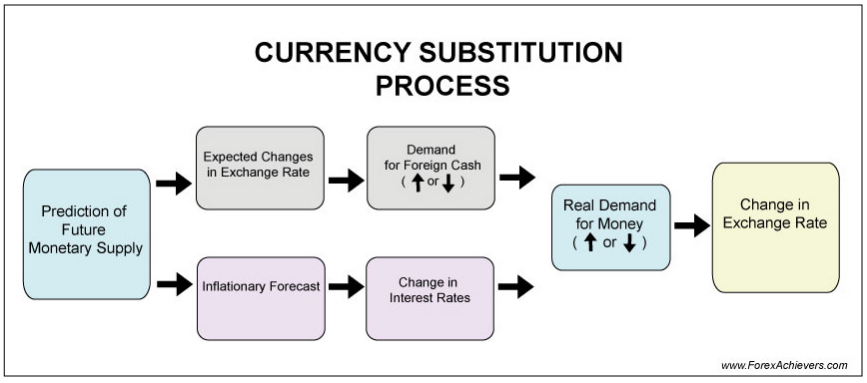


Figure 1 – Currency substitution

to a country's residents for the transaction motive, precautionary motive, portfolio motive (i.e. hedging and speculative motivations) one or several of the increase in foreign currency assets ratio, so that the foreign currency in the medium of exchange, price units, storage and other monetary value functions in all or part of the phenomenon of currency substitution. In addition, most of the current literature research is the narrow currency substitution is not earning replacement of assets, and the main form of many developing countries including China's foreign currency substitution in the storage means is the function of currency substitution, therefore this paper studies the residents in developing countries in the multiple motivation of the currency demand change mechanism this, the factors affecting the mechanism of generalized currency substitution, and puts forward the prevention of serious currency substitution policy recommendations.

2.2. Big data analysis

Network data mining, deep large-scale use is emerging industry foothold. Even the research for big data has not yet established a complete theoretical system, but also the lack of processing, analysis and mining of efficient and fast algorithm. Big data is the next generation of innovation, competitiveness and productivity of the pilot, large data network can create great value for the world economy, improve the enterprise and public sector productivity and competitiveness, and create huge economic benefits for consumers, large data network faces from the aspects of the challenge. But from the view of research, fundamental challenges because of its complexity, uncertainty and emergence. The study of the 3 basic characteristics determines the research progress and application prospect of development trend, big data network. Network data storage, analysis, mining and other aspects of the difficulties caused by the complexity, the complexity of network data mainly includes the complexity and inherent mode data the complexity of data structure and the data types.

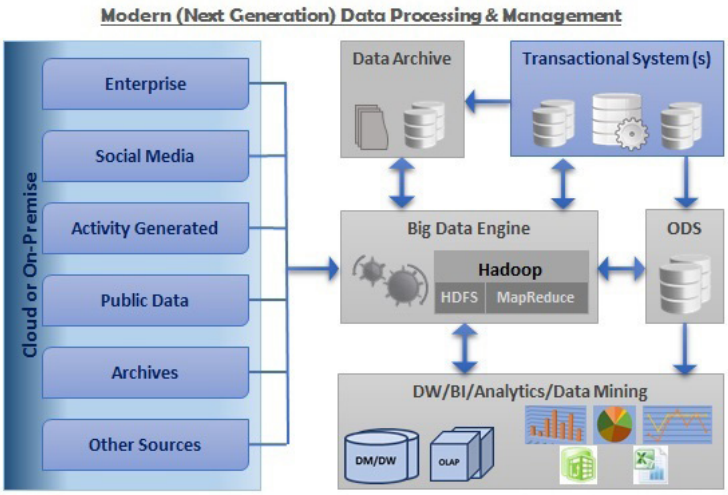


Figure 2 – Big data system framework

1. The complexity of data types. The development of information technology makes the way of data generation increasing, the data type continues to increase, accordingly, we need to develop new data acquisition, storage and processing technology.
2. The complexity of data structure. Data processing is a traditional structure, can be stored in relational database. But with the diversification of data generation methods, such as social networking, mobile computing and sensor technology, unstructured data has become the mainstream form of big data.
3. The complexity of data model, with the increase of data scale, the characteristics of describing and describing data will increase, and the data intrinsic model will grow in exponential form.

3. Monetary substitution mechanism based on multiple motives in developing countries

Liquidity preference depends on the demand for money in Keynes's general theory in three motives: the transactions motive, the precautionary motive and the speculative motive. Because the nature of currency substitution is the rise of foreign currency demand and the decline of the demand of local currency, the reason for the change of foreign currency demand is the same as the reason of money demand. Based on Keynes's liquidity preference theory of money demand, this paper argues that the demand for foreign currency of a country's residents is motivated by transaction motivation, prudence motivation and portfolio motivation. Transaction motivation here refers to the two foreign currency exchange period for the purpose of life or production operations needed to hold foreign currency, such as the purchase of foreign products, travel abroad, study abroad, such as the required foreign currency. The precautionary motive refers to the favorable opportunity to purchase suddenly having to pay for accidental and unexpected cash holdings of foreign currency and foreign currency. Portfolio motives include speculative motive and hedging motives, the former is the public to hold foreign currency in order to obtain speculative gains and assets; the latter is the public in order to keep the assets held by the purchasing power or value while holding foreign currency. As part of a cautious motive of the foreign currency requirements in order to cope with the sudden appearance of transaction demand, the other part is to seize the sudden emergence of favorable investment opportunities, so the precautionary motive were combined with the transaction motive and portfolio motives, discuss foreign currency demand and portfolio transactions and cautious motivation and prudent motive of the foreign currency demand.

3.1. Currency substitution under Trade and Prudential motives

Under these two motives, people hold the foreign currency in order to consume their own products and foreign products to obtain their own utility. Consider a two period iterative model, assuming:

1. Each person can survive two: Youth and old age; everyone is homogeneous.
2. Young people earn wages through labor and use part of their wages to purchase foreign currency assets, which are represented by foreign currency bonds;

the remainder is cash in foreign currency for consumption of domestic and foreign products.

3. The elderly through the youth from the investment interest to the consumption of domestic and foreign products.

The total utility function of a person is: $\mathrm{U} = \mathrm{u}m_1, m_1^* + \frac{1}{1+\rho}\mathrm{u}m_2, m_2^*$

m_1 and m_1^* were young when the consumption of domestic and foreign products; m_2 and m_2^* respectively for old age consumption products at home and abroad; ñ is the time preference, ñ is larger when young people tend to consume more, in other conditions unchanged, young people in the consumption of the foreign currency will increase, increased from the young of the foreign currency demand will be vice versa. Moreover, in any period, the currency used for consumption will not be greater than the difference between the total wealth and the transaction cost of the foreign currency assets. The so-called foreign currency asset transaction costs, is that people in order to obtain foreign currency, and the use of bonds or currency (foreign currency) to exchange the cost of the time to pay. Then there are constraints:

When young: $\mathrm{m}_1 + m_1^* + b + b^* = \omega - TLC_1$

When old: $\mathrm{m}_2 + m_2^* = (1+\mathrm{i})b + (1 + i^* + \mathrm{s})b^* - TLC_2$

Among them, $\mathrm{s} = \mathrm{s}(I^o \mid I, IB, DA, e)$ b and b^* are held in the foreign currency bonds; I and i* are the interest rates of the foreign currency bonds, TLC_1 and TLC_2 are young and old when the cost of the transaction of foreign currency assets; s is expected depreciation rate of local currency, sb* is an additional income from the devaluation of the currency obtained. I^o and I. I^o and I represent the factors associated with the political, institutional, policy and other information, namely the political situation, system reform, policy trends and other information; I said the current information available, I^o said the forecast of future information, $I^o \mid I$ said the prediction on the future of information in the existing information; IB said the international balance of payments, when the country's international balance of payments continued to deteriorate, expected currency depreciation or devaluation will have pressure, vice versa; DA said a foreign debt accounted for the ratio of foreign exchange reserves, when the index is too large, people worried that the country is unable to repay the debt, which is expected this devaluation; e said inflation rate. In old age, old people can only rely on the young to buy bonds and consumer interest, because this is the last one, so he will all run out of property. Then first all the bonds will change the cost of foreign currency cash, and then adjust the proportion of foreign currency in cash to achieve its maximum consumer utility purposes; combined with the above assumptions and constraints can get Lagrange equation:

$$\mathrm{L} = \mathrm{u}m_1, m_1^* + \frac{1}{1+\rho}\mathrm{u}m_2, m_2^* - \lambda_1\left(m_1 + m_1^* + b_1 + b_1^* - \omega + TLC_1\right) - \lambda_2\left[m_2 + m_2^* - (1+i)b - \left(1 + i^* + s\right)b^* + TLC_2\right]$$

Because here is the transaction and prudent motive of the demand for money that is narrow currency substitution, the interest earning assets to join them, so will the $\mathrm{m}_1 \perp m_1^*, \mathrm{m}_2 \perp m_2^*, b \perp b^* \lambda_1 \perp \lambda_2$ obtained a derivative and simultaneous equation, too:

$$m_{\tau} = m_{\tau}\left(\rho,\omega,s,I^{o} \mid I,e,i,i^{*}\right)$$

$$\mathrm{m}_{\tau}^{*} = \mathrm{m}_{\tau}^{*}\left(\rho,\omega,s,I^{o} \mid I,e,i,i^{*}\right)$$

The ô =1,2 for each generation of survival in two phase t+1, at the same time there are old age and was born in t+1 t was born in a person young period, each period of the two generation of the foreign currency demand can be obtained by adding each period of the foreign currency demand:

$$m = m\left(\rho,\omega,s,I^{o} \mid I,e,i,i^{*}\right)$$

$$\mathrm{m}^{*} = \mathrm{m}^{*}\left(\rho,\omega,s,I^{o} \mid I,e,i,i^{*}\right)$$

3.2. Currency substitution under portfolio and Prudential motives

The purpose of the portfolio and Prudential motives is to maximize net income, net income = return - liquidity transaction costs. At the same time, assuming that people hold the foreign currency and foreign currency bonds, can gain: 1 currency cash without interest, income is 0; 2 foreign currency cash without interest, but by the devaluation and the extra benefit of S, where s is the expected depreciation rate of 3; local currency bonds interest rate is I, can get IB of the interest income; 4 foreign currency bonds interest rate, currency expected depreciation rate of S, $i^{*} + \mathrm{s}$爭b^{*} (the return can be obtained. Therefore, holders of foreign currency in cash and foreign currency bonds total proceeds available for: $\mathrm{T} = \mathrm{s}m^{*} + \mathrm{ib} + (i^{*} + \mathrm{s}$爭$b^{*}$, the resulting net income function: $Ð = \mathrm{s}m^{*} + \mathrm{ib} + (i^{*} + \mathrm{s}$爭$b^{*} - \mathrm{TLC}$; the formula on the $m \perp m^{*}, b \perp b^{*}$, and simultaneous equations available:

$$m = m\left(s,I^{o} \mid I,e,i,i^{*}\right)$$

$$\mathrm{m}^{*} = \mathrm{m}^{*}\left(s,I^{o} \mid I,e,i,i^{*}\right)$$

$$b = b\left(s,I^{o} \mid I,e,i,i^{*}\right)$$

$$\mathrm{b}^{*} = \mathrm{b}^{*}\left(s,I^{o} \mid I,e,i,i^{*}\right)$$

3.3. Analysis of influencing factors of currency substitution in developing countries

Through the above analysis can be found in the transaction and the precautionary motive, precautionary motive and asset portfolio, and the number of people the factors people hold foreign currency time preference, expected income, the devaluation rate of future political situation, inflation, interest rates and other relevant domestic and abroad:

1. When the time preference of ñ is large, and the precautionary motive for the transaction, people tend to early consumption, so the young consumer products at home and abroad have increased, in other conditions remain unchanged, the young period of the foreign currency demand increases at the same time, and the old period of the foreign currency demand at the same time reduce, so the currency substitution rate remained unchanged.
2. When the income level of ù decreased, and the precautionary motive for trading people at a young age will also reduce consumption of domestic and foreign products, at the same time decrease the foreign currency demand; while people choose bonds, for portfolio and the precautionary motive of local currency bond ratio will be reduced, this is because the social average income decline in economic means recession, people, in their own country and weaken the confidence of the global currency devaluation pressure, while foreign currency bonds can also be obtained from the devaluation of the currency gains, so instead of broad money point of view, the income slowdown or recession will make people less on currency and the currency asset demand, resulting in currency substitution.
3. Currency devaluation expectation rate of S is larger, due to the transaction and the precautionary motive, when t+1 young people expected devaluation, the future purchase of the same currency needs more foreign goods, and thus for the purchase amount of domestic products decreased, total purchase amount is also reduced, which leads to reduction in trading and utility, so people will be cautious motivation some foreign goods (such as ahead of consumer durable goods, travel abroad, study abroad), the period of rising foreign currency demand; while in other conditions remain unchanged, in the portfolio and the precautionary motive, s more young people to some foreign currency and foreign currency assets can obtain more depreciation benefits, so they tend to increased holdings of b* so as to obtain more foreign currency in old age; therefore the expected devaluation will lead to a rise in foreign currency assets and foreign currency demand, currency substitution is produced Like. While the presence of the first t generations at this time in the elderly, they are not sensitive to the devaluation of the next phase of the currency, but their money demand in the current period is affected by the expected impact of the previous devaluation of the currency. If the T generation is also expected to depreciate in the future as a young age, they will increase foreign currency demand and b* purchases during the t period. From which we can see that in a currency exchange rate continued devaluation of the country or region, foreign currency demand will rise generation by generation, that is, the degree of currency substitution will continue to increase, such as the Latin American countries in 1980s. Finally, according to the above assumptions, the balance of payments situation, external debt scale and other factors will affect the expected devaluation of the currency, so it will have a more serious impact on currency substitution.

4. Domestic and foreign bond yield level I and i* higher, in other conditions unchanged, the young period for domestic and foreign commodity consumption of currency is reduced, and for the purchase of foreign currency bond currency increase. Because higher interest income can consume more goods in the future, increase total utility. When the domestic income rate relative to foreign yields down, first in the portfolio and the precautionary motive, if net income excluding trading liquidity costs holding foreign bonds or greater than holding domestic bonds, foreign bonds will increase people's needs; from the transaction and the precautionary motive, in other conditions remain unchanged, the young will to hold more foreign currency bonds b* to hold more purchasing power in the elderly, which will cause currency substitution. Review on the 80s century of Latin American countries and Southeast Asian countries in 90s and Russia's currency substitution and its influence factors of the changes can be found in these countries have a high level of interest rates. Taking Thailand as an example, in Figure 2.1 and 2.2 show, the real interest rate in Thailand from 1980 to 1986 to maintain the central level of around 10%, while the central U.S. real interest rates remained at around 5%, in this case, Thailand's currency substitution rate from 1980 to 1986 is the continuous decline when 1987; ten years to 1997, the central Thailand real interest rates fell to 5%, compared with the United States was essentially flat, we can find that Thailand's currency substitution rate also has the rise.

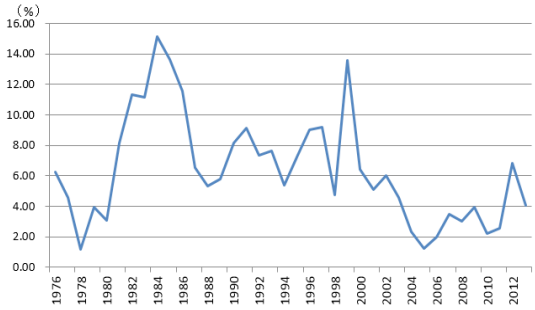


Figure 3 – Thailand real interest rates (data sources: CEIC database)

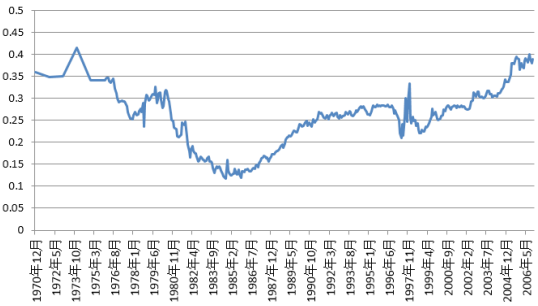


Figure 4 – The Thai currency substitution rate (source: CEIC database, Thailand's central bank)

5. Judge $I^0|I$ on the political situation, system, policy and other factors will also affect the confidence of people in their own country and currency, resulting in currency substitution or anti substitution, this factor is the meaning of people to judge the future evolution of the political situation, the system according to the present understanding of the changes of information policies, improve or change these. Determine expectations for their economic, social, political and other aspects, and also about the confidence in the currency, finally due to changes in confidence will make appropriate investment decisions, namely, selection and combination in the local currency and local currency and foreign currency assets and foreign currency assets. On the one hand the factors affected by the expected depreciation rate to influence the foreign currency demand, on the other hand it also have a great impact on confidence, thus affecting the foreign currency demand, specifically has the following effect:

A country or region politics more unstable, such as the election situation is unknown, leaders, the frequent replacement of armed conflict, the coup, even international wars, people hold the currency in the country or region and asset risk is too large or the short of the currency in the country or region can obtain excess returns, thus selling local currency assets foreign currency assets, resulting in currency substitution; for example, some hedge funds in local commercial banks to borrow money, sold in the foreign exchange market to sell the currency, the currency demand caused by the country or region, reduce the foreign currency demand increase, currency substitution; on the contrary if the political stability of a country or region (especially when other countries political instability), it will become the capital haven, rose, and the currency demand of foreign currency demand, currency substitution rate, currency Anti substitution phenomenon. From 70 to 90s last century, the political situation in Argentina is very unstable, frequent replacement of leaders, military coup occurred, with the British war, as shown in table 2.1. Each event occurs, the currency substitution rate will be significantly improved, if the ratio of foreign currency deposits and M2 to measure the degree of currency substitution is shown in figure 5.

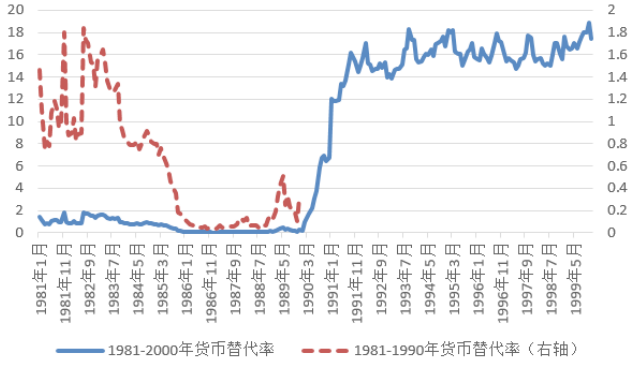


Figure 5 – Argentina currency substitution rate (data source: CEIC)

Date	Event
March 1976	A military coup that overthrew Mrs. Peron's government and set up a military government.
December 1981	Replacing finance minister, Alemann took over
April 1982	With the outbreak of the Malvinas War
February 1983	Radical government to replace junta
January 1984	Alfonsin became the new president
July 1989	Alfonsin resign in advance, Menam became the new president

Table 1 – List of political events in Argentina in 1976-1990

Similar situations also occur in Mexico and russia. The peasant uprising of 1994 New Year's Day Chiapas Mexico Town, in March 23rd of the same year, the ruling Institutional Revolutionary Party presidential candidate Louis Donaldo - calosso assassination, political instability makes Mexico's currency substitution rate had increased substantially, as shown in table 1. In the middle of 1998, Russian President Yeltsin and the Russian Duma despite opposition, insisted on the appointment of the more than and 30 year old Kiriyenko became Russia's new prime minister Kiriyenko, then in term of less than 150 days again, despite the opposition of cold Huanshuai, cause the public to lose confidence in the Russian government and the ruble, currency substitution rate greatly increased, as shown in table 2 shown. Local military conflict occurred in 2014 between Russia and Ukraine have the same effect, because the Russian military action against Ukraine will not only increase the Russian military spending and fiscal deficits, but also attracted European countries economic sanctions, Russia's currency substitution rate continued to rise sharply again, as shown in table 3.

Date	Currency substitution rate of growth (%)
January 1994	3.26
February 1994	-5.06
March 1994	15.35
April 1994	46.44
May 1994	-5.17
June 1994	4.29

Table 2 – Mexico currency substitution rate growth rate

Date	Currency substitution rate of growth (%)
February 1998	2.64
March 1998	6.33
April 1998	1.49
May 1998	-2.02
June 1998	5.97
July 1998	2.49
August 1998	12.75
September 1998	60.68

Table 3 – Russia's currency substitution growth rate in 1998

Date	Currency substitution rate of growth (%)
January 2014	13.13
February 2014	3.72
March 2014	1.87
April 2014	-2.38
May 2014	-1.85
June 2014	-3.64
July 2014	4.58
August 2014	0.48
September 2014	5.99
October 2014	13.51
November 2014	10.33
December 2014	7.97

Table 4 – Growth rate of Russian currency substitution rate in 2014

Similar cases have occurred in Asian countries including Thailand, Malaysia and South Korea. For example, in Thailand 97 years before and after a year to replace the 3 prime minister and 6 Minister of finance, politics frequent unrest, confidence in the baht suffered a serious blow, currency substitution rate increased significantly, as shown in table 5. In addition to the extreme unstable situation, such as world war or the outbreak of a severe global economic crisis, almost all credit money will no longer be trusted in

the portfolio and the precautionary motive, people tend to hold gold and other precious metals, which is actually a form of currency substitution, namely gold in the money the function of re substitute credit currency.

Date	Currency substitution rate of growth (%)
June 1997	14.21
July 1997	-10.78
August 1997	20.56
September 1997	16.43
October 1997	-17.96
November 1997	18.83
December 1997	13.88

Table 5 – Thailand currency substitution rate growth rate

4. Conclusions and policy recommendations

Through the above analysis we can see the currency substitution is actually caused by changes of the demand for foreign currency phenomenon, which have motivated the transactions motive, the precautionary motive and portfolio motivation, motivation can change these about the foreign currency demand, its core is behind the change of people in their own country and currency confidence, and factors such as interest rate the exchange rate, inflation, and policy can influence the currency substitution, by affecting the confidence thus, in order to avoid the occurrence of serious currency substitution, and on its exchange rate stability, the effectiveness of monetary policy and fiscal policy space impact, the government should make reasonable policies to stabilize the interest rate, inflation rate, exchange rate and keep the economy healthy growth, so that people maintain moderate confidence in the domestic currency and foreign currency, to prevent the emergence of the sharp rise in demand Currency substitution phenomenon. In view of this, this paper proposes the following policy recommendations:

1. Supply side reform while ensuring macroeconomic stability. The stable macroeconomic situation of our country is to maintain market confidence and fundamental of RMB; with the deepening of the reform of the supply side, the economy is facing downward pressure is huge, and the liquidity to stimulate economic investment will cause inflation expectations, in addition to the complex world economic environment in China has also increased the volatility of the exchange rate, these factors the common effect of the devaluation of the renminbi is expected to exacerbate the degree of currency substitution, therefore we must implement an appropriate monetary policy and fiscal policy on the supply side reform at the same time, to ensure the smooth transition of macro economy;
2. Prudently promote financial opening and internationalization of rmb, while guiding the exchange rate expectations, to avoid the formation of unilateral

exchange rate expectations downward. In developing countries, the financial system is relatively weak and not perfect, the initiative to rush to complete the financial opening will lose control of the situation in the country and the currency when confidence is low, so that the loss of confidence in the further, currency substitution will further intensify; and because the currency substitution will cause increased exchange rate overshooting , if not to take appropriate measures to guide the market for currency exchange rate devaluation of the currency it is easy to form a consensus, the currency exchange rate volatility; offshore RMB plunged more than and 700 basis points in early 2016, the 1997 financial crisis in South East Asia and Europe in the 1993 currency collapse are typical examples.

3. Control the scale of foreign debt; optimize the structure of foreign debt. The massive stimulus after a weak dollar, many enterprises in order to reduce the debt service pressure and borrowing dollars debt; with the increase in the U.S. economic recovery and the Fed rate hike expectations, the dollar gradually strengthened, the RMB against the U.S. dollar devaluation pressures lead to these companies face higher debt service pressure; on the other hand, foreign investors withdraw funds or in advance do not consider the debt rollover, thereby increasing the pressure of RMB sell-off, strengthened the devaluation of the renminbi is expected to borrow in dollars; foreign enterprises, because there are still RMB devaluation expectations, they are more inclined to early return of the debt, so in the short term may be RMB focus on sales, which leads to the rise of currency substitution and capital outflow and foreign exchange significantly reduced, which will further undermine confidence in the currency, can be Can cause more serious panic and sell. Therefore, we must control the expansion of the scale of foreign debt, optimize the structure of foreign debt.
4. Maintain social and political stability. Review of Latin American and Southeast Asian currency substitution rate rising period, we can find some of those countries is in a period of social unrest, some political situation is not stable, people worried about social and political change will cause damage to their assets while the loss of local currency and local currency assets confidence; Thailand frequent military coups, farmers in Mexico the Argentina uprising, the political turmoil, Russia before changes in leadership makes people lose confidence in local and local currency, although the political and social unrest may not be the last straw for the currency, but it plays an important role in which. Therefore, maintaining social and political stability is also an important link to prevent the intensification of currency substitution.

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Theoretical Frontier and Applied Innovation of Financial Risk Contagion Effect Measurement based on Copula Method

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Abstract: the aftermath of the U.S. financial crisis and sub-prime mortgage crisis has not gone away yet; the world economy is still faced with many adverse factors, such as political turmoil in the European Union, rise of anti-globalization trend of thought, etc. In such case, it is necessary to measure the international contagion effect of financial risk scientifically and reasonably, which is especially essential for governments, enterprises and academic circles. The paper respectively organizes and summarizes the latest progress of Copula method in the theory and application of measurement of financial risk contagion effect based on dual Copula model and vine Copula model, and discovers that the future development tendency of Copula model will lie in theoretical innovation of model in diversification and dynamic on one hand, and focus on comprehensive practical application between Copula model and other research methods based on its expansibility on the other hand.

Keywords: Copula method, Financial risk contagion, Dual copula model, Vine copula model

1. Introduction

The sub-prime crisis in the United States which broke out in 2007 not only caused a slump in asset prices in financial markets, sharp shrinking in liquidity shrank and plastering in the financial system, but also involved the entity economy, increased the number of unemployed persons, and caused shrinking product demand, economic depression and other phenomena. Along with the financial entities have been closed down, the U.S. Sub-prime mortgage crisis quickly spread to other countries in the world, resulting in global financial markets and financial institutions subject to different degrees of impact. And then it was evolved into the world's worst financial crisis and economic depression since the great depression, showing unprecedented systemic characteristics of financial risk contagion. European countries affected by the financial crisis fell into debt crisis, and Iceland, Greece and other countries even approached the edge of the "national bankruptcy". Thus it opened the prelude to the European debt crisis and more countries were affected to a deeper level. The world economy also fell into a long slump. At present, although the impact of sub-prime crisis and the European

debt crisis on countries seem to have gradually subsided, the global financial market volatility caused by "Britain out of Europe", "Italy Referendum defeat" and other Black Swan events gave a wake-up call for the world: Financial risk contagion has always existed, the future financial risk contagion situation may be more severe. In this case, the scientific and reasonable measurement of the international contagion effect of financial risk is particularly necessary for governments, enterprises and academia.

Copula method is a natural method to measure the correlation between random variables. It can captures nonlinear correlation and contains the tail information of random variables. At the same time, the forms of this function are very flexible, and its multivariate distribution can reflect the different tail dependence. Thus, it is an important method to study financial risk relevance and financial contagion. In this paper, the theoretical frontier and application innovation of Copula method in measuring the International Contagion Effect of financial risk in recent years are summarized and the future development tendency is anticipated.

2. The frontier and innovation of dual Copula model in financial risk contagion effect measurement

2.1. Copula model

The dual Copula model has been established for a long time, and it has been developed and applied in academic and practical circles for ages. The current innovation of the model mainly focused on formal choice and tail relevance measurement of Copula function, constraint of conditional information set, design of dynamic function and measuring the risk contagion in the financial crisis.

Copula function had many forms, and its tail correlation was different. In empirical studies, it was essential to select form of Copula function according to the characteristics of special financial time sequencing and the problems investigated. Overall, scholars usually choosed the Archimedes family Copula function model in order to fit the asymmetry of financial time series correlation. Empirical evidences show that Gumbel Copula is optimal to conduct the tail correlation analysis of Shanghai Composite Index and Hang Seng Index and better the reflect upper tail dependence, and the quantitative correlation can predict the change of stock market (Yue, 2006). Two professors researched maximum likelihood method based on order and estimated the parameters of Copula function. Supposing the marginal distribution of Minsheng Bank and Shanghai Pudong Development Bank is subject to the empirical distribution function and combining with the common four classes of dual-parameter and asymmetrical BBx-Copula function, they conducted empirical analysis on the tail correlation of shares of these banks. The results show that BB1-Copula function may better depict the high tail correction of two shares in downturn period (Xianling, 2008). It also could be proved that Archimedes family functions represented by Clayton Copula function and SJC Copula function may reflect the asymmetric correlation structure of markets. Therefore, when fitting stock market data, they effect also were better than t-Copula and Gaussian Copula (Kan, 2013).

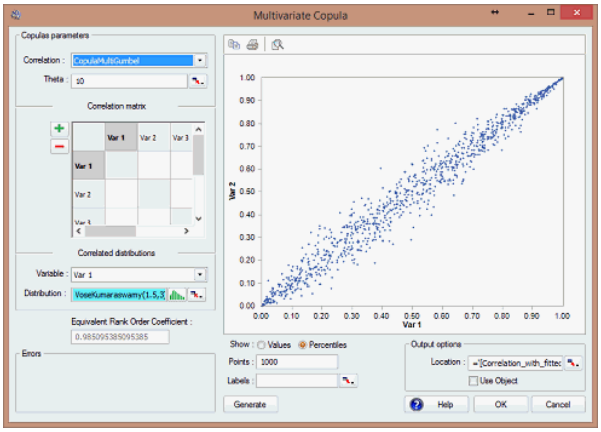


Figure 1 – Copula function

The application of conditional information set of Copula model mainly is realized through introducing GARCH model into the marginal distribution. The conditional Copula was proposed to bring in the information set, namely each distribution in multivariate distribution is (0, 1) even distribution based on the information set. The key point of Sklar theory and conditional distribution is that all marginal distribution and Copula should base on the same information set. Some scholars applied the dynamic Copula-GARCH model to analyze the condition correlation between Index return series in Shanghai Stock Exchange (Yanhua, 2006). Other professors also took the similar strategy and used Copula-GARCH model to research the dependence of European stock market (Andrew, 2006). Conditional Copula also was used to research the contagion effect of sub-prime mortgage crisis. The empirical results showed that in the sub-prime crisis, the correlations were extremely strong between Canada, Japan, Italy, France, England and U.S. Emerging markets also exhibited certain infectious features (Hotta, 2008). In order to make rational use of conditional information set, some scholars have modified the GARCH model. Nonlinear and non-symmetry NAGARCH model was used to correct Conditional variance and “leverage effect” existing in stock index series (Xu, 2016). An academic team set the residual error of GARCH model as the form subject to GED (Generalized error distribution), and constructed GARCH-GED model to optimize the fitting effect of characteristics of financial time series, such as time-varying volatility, obvious peak, oblique structure, fat tail and other distribution characteristics (Huiming et al., 2016).

In order to make Copula function fit with the time-varying characteristics of risk contagion better, scholars used dynamic copula function to simulate market related structural changes. Dynamic copula functions are mainly divided into time-varying copula function and variable structure copula function. The introduction of Copula-GARCH can better reflect the nonlinear correlation under the assumption of non normality, B-GARCH (1, 1) Copula form:

$$H_{i,t} = c_i + a_i \varepsilon_{i,t-1}^2 + b_i H_{i,t-1}$$

$$H_{f,t} = c_f + a_i \varepsilon_{f,t-1}^2 + b_f H_{f,t-1}$$

$$z_t \sim C(u_{i,t}, u_{f,t})$$

$$h_t^* = \frac{\mathrm{cov}(r_i, r_f \mid \Omega_{t-1})}{\mathrm{var}(r_f \mid \Omega_{t-1})} = \frac{H_{ift}}{H_{ft}} = \rho_t \frac{\sqrt{H_{i,t}}}{\sqrt{H_{f.t}}}$$

Joint density function of model residuals:

$$f(z_{i,t}, z_{f,t}) = c(u_{it}, u_{ft}) f_i(z_{i,t}) f(z_{f,t})$$

Log likelihood function:

$$\log f(z_{i,t}, z_{f,t}; \theta_c, \theta_i, \theta_f) = \log c(u_{it}, u_{ft}; \theta_c) + \log f_i(z_{i,t}; \theta_i) + \log f_f(z_{f,t}; \theta_f)$$

Estimated Copula density function parameters:

$$\hat{\theta}_c = \arg\max \sum_{t=1}^{T} \log c_t(z_{i,t}, z_{f,t}; \hat{\theta}_i, \hat{\theta}_f, \theta_c)$$

2.2. Contagion effect of financial crisis

Parameters of time-varying copula function change with time. Time-varying structure Copula method was used to research Dependence structure change of Chinese mainland, America, Japan and Hongkong, then it was found that the tail dependence between China and US increased at first and then decreased after sub-prime crisis with smaller changes, and the stock market in USA, Japan and Hongkong stock have high risk overflow effect on the stock market in Chinese mainland (Jilin, 2010). A research team described the dynamic dependence of stock index return rate with time-varying SJC Copula, and analyzed the risk linkage of stock market in Chinese mainland, U.S., England, Japan and Hongkong between January 2000 and November 2010. It was found that the upper tail correlation between mainland stock market and each market had been low, and the lower tail correlation with Hongkong stock market was significantly higher than those with other markets since 1997, which indicated that the tail correlation may be related to the degree of market openness (Yongqiao, 2011). For the parameter estimation, scholars usually used the maximum likelihood estimation method to estimate the volatility model, but this method was stricter for the overall distribution and thus was not suitable for all financial sequences. In this regard, some scholars calculated the nonparametric kernel density of each sequence which was less demanding for the general distribution, and then replace the original sequence's edge distribution from the integral transform kernel density

function value. Because the sequences of these values obeyed the uniform distribution of (0, 1), the time-varying parameters were more accurate. Different types of time variation Coupla functions established based on this improvement method were used to research contagion effect of American financial crisis in 2008 (Kan, 2013; Wuyi, 2014).

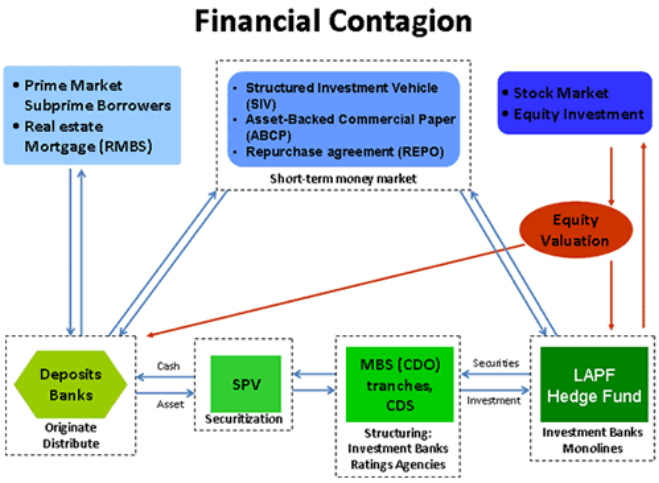


Figure 2 – Financial contagion

Variable structure Copula function emphasizes the change of function structure. It might regarded as the mixed Copula function. Thus its parameters depicted tail dependent variable structure according to the changes of Markoff conversion model with the time, and the serial variance subject to SWARCH model of Markoff process was introduced to determine the marginal distribution (Juan, 2007). Another academic team constructed Copula model based on Markov regime switching and verified the mechanism transition and asymmetry of credit risk correlations in domestic industries (Changqing, 2014). In addition, because the impact of partial risk events on sequence correlation changes was short and irregular, it caused changes that Copula function could hardly capture. Therefore, some scholars directly structured the sequence edge distribution by variable structure. The same team established Copula model based on the Jump process of sequence correlation to research inter-industry credit risk correlations in domestic (Changqing, 2014).

In addition to the above three hot issues, some scholars focused on the measurement of Risk contagion in financial crisis and sub-prime mortgage crisis using Copula function. The observation time of scholars' studies gived priority to financial crisis in U.S. in 2008. Previous studies focused on market dependence. Some professors studied the financial contagion effect of capital market in developed countries caused by American sub-prime mortgage crisis, and concentrated the contagion effect of financial crisis between Canada, Japan, Italy, France, Germany, Japan, Portugal and the United Kingdom. They

found that there were obvious contagion in Canada, Japan, Italy, France and the United Kingdom, especially in Canada, while the correlation between Germany and USA is relatively low. Then, they used a similar approach to analyze the dependence structure of U.S. and Belgium, France, Norway and Portugal securities market before and after sub-prime crisis. Studies confirmed that contagion effects do exist. There was no significant difference in contagious intensity between the U.S. stock index and the overall index of these countries, so securities markets of these countries were impacted by sub-prime crisis in the United States. And the same degree of contagion to the financial and industrial sectors indicated investors had early expectation of this contagion before the reaction of real economic (Paulo et al., 2009). The impact of sub-prime crisis on mainland China stock market also was investigated. The results show that the U.S. sub-prime mortgage crisis not only directly hit the mainland stock market, but also indirectly spread the financial crisis to the mainland market through the Hongkong Market (Pu, 2009). The changes of three financial markets before or after Asian financial crises in 1997 and sub-prime crisis in 2007 also were compared, so that the contagion effects of financial risks could be analyzed. The results showed that, before and after the Asian financial crisis, the correlations between the three markets were not significant. However, before and after the U.S. subprime mortgage crisis, the correlation between the three markets increased significantly, thus confirming the existence of contagion effects. The main cause of this result was that after the Southeast Asian financial crisis, economic tie between China and the United States was further strengthened. Thus, U.S. financial crisis could affect China through international trade and financial channels (Ping, 2011). It was found that the infectious effect of sub-prime crisis on different countries or regions varied. To sum up, the losses in Japan and Korea were the severest, and the effects on China and England were the smallest. They believed that China had a strong sense of risk and strict capital controls, thus it was not directly affected by the sub-prime crisis (Wuyi et al., 2014).

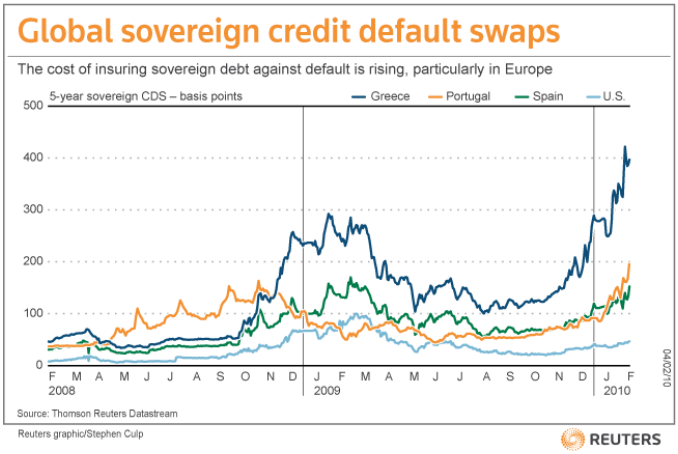


Figure 3 – American financial contagion

3. The front and innovation of vine copula model in financial risk contagion effect measurement

Although dual Copula function might describe the degree of risk contagion between two markets well, it would produce errors to some extent when researching the fluctuation influence relationship of multiple financial markets. Thus, scholars focus their attention on multivariate Copula functions. It was pointed out that any N-dimensional joint cumulative distribution function might be decomposed to N marginal cumulative distributions and one Copula function. The theory was an important basis for the decomposition and construction of multivariate Copula functions. In early, there were many methods of constructing multivariate Copula model, but no one was praised highly because they did not take the differences of risk correlation between different assets into account.

With the deep study of scholars, vine Copula function had begun to be popularized. The four points of requirements in constructing multivariate Copula function were summarized, and vine Copula functions were considered to meet all requirements. Therefore, it was essential to describe the relevant structure of multiple financial markets (Aristidis, 2012). At the same time, with the deepening of the basic theory research, the difficulties of applying the method also reduced. A graphic model named after 'Regular Vine' was proposed, which was used to organize the possible decomposition formula of vine Copula function and simplified application difficulties of Vine Copula (Tim, 2001; Roger,2002). The concept of regular vine function also was proposed, namely using pair Copula function as the node of vine to construct multivariate Copula, and the vine Copula function might select different dual Copula functions on each node. Thus, regular vine Copula function may reliably depicted the relevant structure of multiple variables, especially for tail relevance (Guobin et al., 2013). Some scholars discovered two special regular vine structures-Canonical Vine (hereinafter referred to as C vine) and D vine, and they might be constructed easily through simple conditional recursion. This simple conditional recursion was often applied to modeling time series, which further improves the popularization of regular vine in the financial fields (Panagiotelis et al., 2010). On this basis, pair Copula function and Bayesian network model were combined to construct the actual network of financial crisis transmission, and the application of this combination was further expanded to multivariate Copula functions (Ziping, 2014).

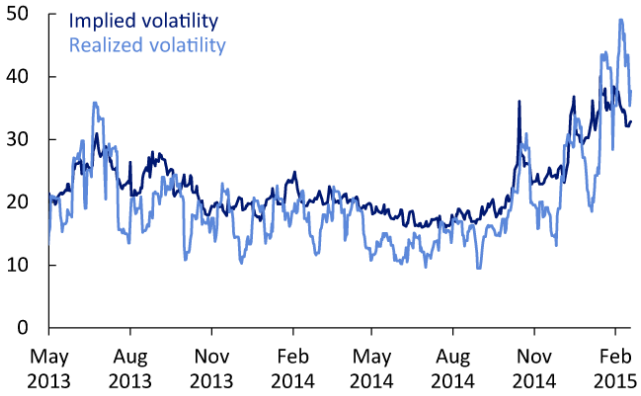


Figure 4 – Volatility of financial markets

At present, the vine Copula function has become an important tool of constructing multivariate Copula model, and many scholars have studied it deeply. The application of it related to financial risk contagion focused on two aspects: On the one hand, the demonstration, optimization and innovation of market related modeling methods; On the one hand, the model structure of global exchange rate and stock index correlation.

Scholars began to demonstrate the advantages of vine copula modeling method from 2011, and then continuously optimized the model on this basis. Some professors researched and proved that Vine copula might deduce more accurate value at risk than traditional Copula methods (Hofmanna, 2011). It also was found that vine Copula model constructed based on the regular vine method had better effect when capturing dependent structures (Chaofeng et al., 2014). As for model selections, it was pointed out that as with dual Copula function, AIC rule is a reliable selection standard for multivariate Copula function. In addition, some scholars also conducted innovative model settings. Different from the general scholars in independently selecting the optimal function form as for each Pair-Copula, an academic team unified Copula as the mixed mode of Gumbel Copula and Clayton Copula, and the weighted parameters were dynamically selected at each node by variable structure settings (Qingping, 2013). Some scholars constructed Copula-SV model based on SV (stochastic volatility model) to avoid the defects of GARCH model related to nonlinearity of financial time sequence (Chaoqun et al., 2013). Others also proposed GJR-GARCH model to depict leverage effect which traditional GARCH models could hardly fit (Hengyu et al., 2016).

Empirical Study on international risk of vine copula risk mainly concentrated in the stock and foreign exchange two markets. In the matter of stock market researches, many professors selected the model mixing C vine structure and Clayton Copula function and set U.S. market as root node when researching the dependence of main stock market indexes (Jiang, 2013). On the contrary, it was discovered that the tail dependence of D vine structure is obviously higher than C vine structure for almost the same markets (Feng, 2015). In addition, other scholars researched the traditional BRIC stock markets and discovered that the overall influence of Brazil is the largest, thus set Brazil market as root node (Lu, 2015).

In the research of foreign exchange market, there was divergence between professors on structures of vine.

Some scholars tend to using C vine structure. It was used to research the exchange rate between USD, EURO, YEN, WON and RMB, and the exchange rate between EURO and RMB was regarded as its root node (Hanling, 2013). Some professors tried to research the exchange rate between USD, HKD, YEN, EURO and RMB, and discovered C vine structure with USD and RMB exchange rate as the root was more fit the reality (Ziping, 2014). Others also drew the same conclusion from the research between the exchange rate of USD, EURO, POUND, YEN, CAD, AUD, HKD and RMB (Hengyu, 2016).

Some scholars praised D vine structure. They found that when researching the dependence of income rate between RMB and USD, YEN, HKD, EURO, the fitting effect of D vine structure is better than C vine structure (Chaoqun, 2013).

Some scholars insisted the fitness precision of C vine and D vine structure was inferior to R vine regardless of easily application. A research team took use of the exchange rate data between RMB and EURO, USD, YEN, RUBLE, POUNDS, CAD, RM, AUD to construct R vine model, and discovered the exchange rate between RMB and EURO was central rate (Guofu, 2015). Similarly, another team researched the effective exchange rate of RMB, USD, POUNDS, YEN, EURO and HKD, and constructed R vine model to discuss the tail dependence and linkage of six kinds of exchange rate before or after 'First exchange reform' in China. The research discovered that the dependence structure of exchange rate between RMB and other five currencies changed, and the dominant currency in linkage changed to RMB from USD, but it could also be described with the similar R vine Copula structure (Genhua, 2015)

The other scholars believed that different R vines have different transfer attributes, thus comprehensive evaluations with various R vine structures were helpful to analyze the dependence of exchange rate market. They researched the fluctuation of exchange rate between EURO, USD, RMB, HKD and YEN, and discovered that although the exchange rate between EURO and USD was different from other three currencies, it could be used as the root node to construct C vine structure, while D vine structure has better fitness. The specific research results also were different under different vine structures because C vine structure emphasized one-way transmission and D vine structure focused on two-way spread, therefore it does not indicate the better one (Baisheng, 2011).

4. Conclusions

The measurement of contagious effect of financial risk is a very complex theoretical problem that academic circles pay close attention to. Copula method is widely used because of its various functional types, which can describe the overall dependence and tail dependence among different markets. In recent years, the model also has gradually developed from dual static Copula model ignoring the information set influence to time-varying vine Copula model taking information set constraints into account.

From the theoretical perspective, simple and static models are gradually replaced by complex, dynamic models. On the one hand, dual Copula model can only measure the financial risk contagion between two countries or markets due to simple structure, thus its applications are confined. However, vine Copula model has wide application fields because it may research multiple markets, independently set each market and accurately fit the reality. On the other hand, the static model is difficult to meet the complex changes in actual conditions because the preparatory conditions are too simple, thus there ane some gaps between empirical results and theoretical expectations. The dynamic model can reduce or eliminate the effect of abnormal changes on the results by setting the time-varying or variable structure, and overcome the deficiencies of static model to some extent.

From the respect of application innovation, dual model is relatively strong in expansion due to simple structure and conditions so that it is often combined with other analysis methods in empirical studies, thus improves its abilities for comprehensive analysis

ability. Nevertheless, vine Copula model is hard to be combined with other methods, leading to limit in applications to some degree.

In summary, in the future, the innovations of Copula methods for financial risk contagious effect measurement can be studied from two aspects. On the one hand, the copula model can be diversified and conducted dynamic theoretical innovation to make it helpful for theoretical research. On the other hand, we can improve the expansibility of copula model, strengthen the ability of joint application with other analytic methods, so as to improve they usage of practical application.

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Research on the Mechanism of Green Building Propulsion Based on Bilateral Evolutionary Game Model

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Abstract: By analyzing the three constraints of "economic interests", "emotional cognition" and "policy guidance" in the process of green building development, the author constructs an evolutionary game model of "bilateral" stakeholders in the supply side of green construction industry, analyzes and discusses the dynamic game process of green building supply side stakeholders, and puts forward countermeasures and suggestions. Research shows that the incremental cost of green building supply side of any interests of the main market transaction is higher than the incremental income, promotion will fail because of externalities; incremental profits of real estate developers to promote green building direction at random for early convergence; supply side incentive measures with the guidance of promoting green building.

Keywords: Supply side, evolutionary game, Green building, promotion mechanism

1. Introduction

In January 2015, the Central Economic Work Conference fully explained the characteristics of the "new normal economy". In December the same year, the Central Economic Work Conference proposed to focus on strengthening the structural reform, in the moderate expansion of aggregate demand at the same time, to capacity, to inventory, to leverage, reduce costs, and make short board. Economic development mode from extensive to intensive growth, low efficiency, high pollution shift to high efficiency, low emission development, driven by factor-driven shift to innovation-driven development model (Duan, 2013). The face of supply-side reform of the new normal, China's green building development must take the road of innovation, overall innovation needs of the whole industrial chain innovation (Ma, 2007; Kai, 2011). However, the development process of green building involves many participants, including government, owners, developers, contractors, suppliers, consumers, the public and other stakeholders, for different subjects to pursue their own interests (Jin, 2010; Gao, 2016). Different subjects for the pursuit of their own interests, their behavior choices vary, their behavior will greatly affect the development of green building process. Zheng introduced the value

chain theory, and they pointed out that the green building supply chain management is characterized by large scale and long duration. The lack of common benefit basis among the multi - stakeholder involved in the green building, and the lack of effective cooperation innovation incentive mechanism seriously hampered the development of green building in China.

In the process of promoting green building, incentive is an effective means to improve the performance of the project. Motivation mechanism can be divided into three types: incentive based on cost, monetary and non-monetary incentive, contract and external contract incentive. Revenue incentive is one of the key issues in the project incentive. As a long-term dynamic incentive model, emotional incentive has a lasting incentive and constraint effect on project-oriented organizations. Many scholars use the external theory of economics to analyze the external economy of green building. In order to solve the problem of "market failure" in green building, the author puts forward the design of incentive mechanism of green building by setting up the market allocation model of green building (Sun, 2006; Tu, 2009). In the incentive mechanism design research, the green building related cooperation between enterprises is to implement the basis of innovation. Cuifang Zhang has studied the quality decision under asymmetric information, quality evaluation decision-making, payment transfer decision-making and coordination mechanism of rewards and punishments. Hong-bo WANG according to the theory of incentive mechanism, qualitative analysis is carried out on incentive objectives, incentive objects and incentives of green building, and established the government and the developer community evolutionary game model, proposed that the government should lock the far-sighted incentive policy. Jian-gang SHI based on the fairness preference, this paper constructs a cross-organizational two-way incentive model, and analyzes the impact of project effort, fairness preference, payment cost and distribution system on project value increment. Based on the above research results, domestic and foreign scholars do not consider the influence of interaction decision among the stakeholders in the coordination of interests of green building propulsion mechanism. In the selection of incentive subjects, the driving factors of green building promotion mechanism are not clear.

From the supply side perspective, real estate developers in the green building development path by the "economic interests", "emotional awareness", "policy-oriented" three conditions of the constraints. Specifically, the internal factors of green building developers mainly include their own economic interests, external factors mainly lies in the constraints of policies and regulations, as well as consumer market awareness of the competitive pressure,as shown in figure 1.The promotion mechanism of green building is to take the real estate developer as the center, explore its game with the government and buyers of both the innovative mechanism, to form an innovative, harmonious, green, open, sharing social benefits, economic benefits, environmental benefits of the common development of the path mechanism.

2. Model establishment

This paper takes the green building supply side as the breakthrough point, through the construction of the developers and buyers, government "bilateral" game to examine

the green building industry chain innovation relationship.It is assumed that the green building's strategy choice for home buyers has two: development and non development. Home buyers to deal with green building developers also have two behavioral strategies to choose: participate or not participate in the purchase of green building products. Governments have two strategies for green building developers: the implementation of incentive policies and the implementation of policy in the form of mere formality. Therefore, the probability of green building developers to develop green buildings is x and the probability of not building green buildings is $1\text{-}x$ .The probability of buyers to participate in green building is y , buyers do not participate in the probability of green building is $1\text{-}y$. The probability for the government to implement the incentive policy is z , and the implementation of the policy is $1-z$. Then this paper carries out the model hypothesis with three dimensions: "economic interest", "emotional cognition" and "policy orientation".

Economic interest–Assuming that the game model, λ_1 are direct revenue of green building developers, and λ_2 are direct revenue of green building buyers. ϕ_1 is the cost of developers to develop ordinary construction, and ϕ_2 is the purchase of ordinary buildings need to pay the cost of construction.

Emotion cognition–For more intuitive expression of the impact of consumer sentiment on the supply side, the game model is introduced to the concept of green building developers and home buyers to participate in the incremental revenue and incremental cost of green building. ρ_1 and ρ_2 are green building developers and home buyers to participate in green building incremental benefits. $\phi_1^{'}$ is the additional cost to the development of green buildings and $\phi_2^{'}$ is the additional cost of purchasing green buildings.

Policy Guidance– λ_3 is the government social benefits from green building popularity. $\text{-}\lambda_3$ is the government loss because of the developer did not develop green building. When the government adopts the incentive policy, if the green building developers actively respond to the development of green building will get the government's incentive π_1 .If green building developers still do not invest in the development of green building when the government to take incentive policies, then the government will take punitive measures $\text{-}\pi_2$ against green building developers.

		Home buyers		**Government**	
		participate(y)	**Not participate ($1-y$)**	**Incentive policy(z)**	**A mere formality policy($1-z$)**
Developers	*Development (x)*	$\lambda_1-\phi_1+\rho_1-\phi_1^{'}$, $\lambda_2\text{-}\phi_2+\rho_2\text{-}\phi'_2$	$\lambda_1\text{-}\phi_1\text{-}\phi'_1$, $\lambda_2\text{-}\phi_2$	$\rho_1-\phi'_1+\pi_1$, $\rho_3-\pi_1$	$\rho_1-\phi'_1$, ρ_3
	Not develop (1–x)	$\text{-}\phi_2$,0	$\lambda_1\text{-}\phi_1$, $\lambda_2\text{-}\phi_2$	$-\pi_2$, $-\rho+\pi$	0,0

Table 1– the game model of the supply side of green building

The core participants in the supply side of green building: green building developers, home buyers and government. Without considering the impact of policy factors on the construction market, the game group is bounded rational, limited information role of economic man. According to the model hypothesis, the game model of developers - home buyers, developers - government is constructed. The game matrix is shown in Table 1.

Based on this, this paper takes the green building supply side of the main interests as the starting point, construct the dynamic game model of the supply side of green building, judge the relationship between the factors and factors influencing the game selection strategy, simulate dynamic evolution process of the parties, analyzes the evolution law, and puts forward the long-term coordination mechanism and decision-making suggestions for green building advancement.

3. Green building developer - home buyers evolutionary game analysis

In the static game of the two game groups of the green building, green building developers and home buyers average expected return are u_S and u_g, respectively.

$$\begin{aligned}\overline{us} = &[(\lambda_1 - \phi_1 + \rho_1 - \phi_1^{'})y + (\lambda_1 - \phi_1 - \phi_1^{'})(1-y)]x \\ &+[-\phi_1 y + (\lambda_1 - \phi_1)(1\text{-}y)](1-x)\end{aligned}$$

$$\overline{u}_g = (\lambda_2 - \phi_2 + \rho_2 - \phi_2^{'})xy + [(\lambda_2 - \phi_2)x + (\lambda_2 - \phi_2)(1-x)](1-y)$$

According to the expected return of the two game groups, green building developers can get green building strategy. The copy dynamic equation for home buyers is:

$$H(x) = \frac{dx}{dt} = (\rho_1 y + \lambda_1 y - \phi_1^{'})x(1-x)$$

$$H(y) = \frac{dy}{dt} = [\lambda_2 x - \phi_2 x + \rho_2 x - \phi_2^{'} x - \lambda_2 + \phi_2)y(1-y)$$

Make:

$$H(x) = \frac{dx}{dt} = 0, \quad H(y) = \frac{dy}{dt} = 0$$

Solving differential equations, get:

$$x = 0, \ x = 1, \ y^* = \frac{\phi_1^{'}}{\rho_1 + \lambda_1}$$

$$y = 0, \ y = 1, \qquad \frac{\lambda_2 \quad \phi_2}{\lambda_2 - \phi_2 + \rho_2 - \phi_2}$$

Based on the above calculation, the 5 partial equilibrium points of the dynamic evolutionary game matrix composed of two groups of game groups, green building developers and home buyers, are obtained:

$$O(0,0)\,,A(0,1)\,,B(1,0)\,,C(1,1)\,,D(x^*,y^*)$$

A series of equilibrium points are obtained by the equation group, which is the choice of the strategy of the collective set in the equilibrium state. However, not all of the equilibrium state is stable, so the stability of the equilibrium point is analyzed. Therefore, in this paper, by using the local stability analysis method of Friedman, by (3), (4) the dynamic equation can be used to get the real estate developer -- the determinant and trace of Jacobi matrix determinant and its trace. As shown below:

$$Det(J)=\begin{vmatrix}\dfrac{\partial H(x)}{\partial x} & \dfrac{\partial H(x)}{\partial y}\\ \dfrac{\partial H(x)}{\partial x} & \dfrac{\partial H(x)}{\partial y}\end{vmatrix}=(1-2x)\left[(\rho_1+\lambda)y-\phi'_1\right](1-2y)$$

$$\left[(\lambda_2-\phi_2+\rho_2-\phi'_2)x\text{-}(\lambda_2\text{-}\phi_2)\right]-x(1-x)(\rho_1+\lambda_1)y(1-y)(\lambda_2-\phi_2+\rho_2-\phi'_2)$$

$$Tr(J)=\frac{\partial H(x)}{\partial x}+\frac{\partial H(y)}{\partial y}=(1-2x)\left[(\rho_1+\lambda_1)y-\phi'_1\right]+(1-2y)\left[(\rho_1+\lambda_1)y-\phi'_1\right]+$$

$$(1-2y)\left[(\lambda_2-\phi_2+\rho_2-\phi'_2)x-(\lambda_2-\phi_2)\right]$$

The five equilibrium points obtained from the above deductions correspond to $Det(J)$ and $Tr(J)$, and the stability conditions are determined according to the results. The stability of the local equilibrium points is discussed respectively. Green building developers - buyers system Jacobian matrix results in Table 2.

Equilibrium	*Det*(*J*)	*Tr*(*J*)
O(0, 0)	$\phi_1'(\lambda_2-\phi_2)$	$-\phi_1'-\lambda_2-\phi_2$
A(0, 1)	$(\rho_1+\lambda_1+\phi_1')(\lambda_2-\phi_2)$	$\rho_1+\lambda_1-\phi_1'+\lambda_2-\phi_2$
B(1, 0)	$-\phi_1'(\rho_2-\phi_2')$	$\phi_1'-\rho_2+\phi_2'$
C(1, 1)	$(\rho_1+\lambda_1-\phi_1')(\rho_2-\phi_2')$	$-\rho_1-\rho_1+\phi_1'-\rho_2+\phi_2'$
D(x^*, y^*)	A'	0

Table 2 – Green Building Developers - Homebuyer Systems Jacobian Matrix

Real estate developers to develop green buildings on the premise that the development of ordinary buildings to ensure a certain economic benefits, so λ_1-$\phi_1 > 0$ .Similarly, home buyers to participate in green building is to meet the ordinary building guarantee income, and then in the green building and general construction of low-carbon environmental aspects of the balance, so λ_2-$\phi_2 > 0$ .Therefore, in this condition, the green building developers - buyers of local stability of the system need to discuss a total of four kinds of situations, the results of the analysis in Table 3.

Condition	**Equilibrium point**	*Det* (*J*) **symbol**	*Tr* (*J*) **symbol**	**Result**
$\rho_1 - \phi_1^{'} > 0$ $\rho_2 - \phi_2^{'} > 0$	*O*(0, 0)	+	-	stable
	A(0, 1)	+	+	Unstable
	B(1, 0)	-	+/-	Unstable
	C(1, 1)	+	-	stable
	D(x^*, y^*)	+/-	0	Saddle point
ρ_1-$\phi'_1 < 0$ ρ_2-$\phi'_2 > 0$	*O*(0, 0)	+	-	stable
	A(0, 1)	-	+/-	Unstable
	B(1, 0)	-	+/-	Unstable
	C(1, 1)	-	+/-	Unstable
	D(x^*, y^*)	+/-	0	Saddle point
ρ_1-$\phi'_1 > 0$ ρ_2-$\phi'_2 < 0$	*O*(0, 0)	+	-	stable
	A(0, 1)	+	+	Unstable
	B(1, 0)	+	+	Unstable
	O(1, 1)	-	+/-	Unstable
	D(x^*, y^*)	+/-	0	Saddle point
ρ_1-$\phi'_1 < 0$ ρ_2-$\phi'_2 < 0$	*O*(0, 0)	+	-	stable
	A(0, 1)	-	+/-	Unstable
	B(1, 0)	+	+	Unstable
	C(1, 1)	+	+	Unstable
	D(x^*, y^*)	+/-	0	Saddle point

Table 3 – Green building developer - home buyers local stability analysis results of the system

Conclusion 1: green building developers to develop green building incremental gains and buyers to participate in green building can get incremental benefits are positive. The probability combination ABOD of two game groups converges to (not develop, do not

participate in) the strategy choice, ADBC probability combination group converges to (development, participation) strategy combination.

When $\rho_1\text{-}\phi'_1 > 0$, $\rho_2 - \phi'_2 > 0$, green building developers to develop green building and buyers to participate in green building can get positive incremental gains. Saddle point $D(x^*, y^*)$ and two unstable points $A(0,1)$, $B(1,0)$ joined the broken line to the system is divided into two states converge in different parts. The evolutionary game system of the two groups has two convergent directions, namely, the strategies of convergence (not development, non-participation) or the strategy of convergence (development, participation).

Conclusion 2: Green building developers, home buyers any party into the green building transaction market incremental cost higher than its incremental revenue, through the continuous evolution of the market, the final strategic choice will be stable to the green building developers do not develop green building, home buyers do not And then the purchase of green property strategy.

When $\rho_1\text{-}\phi'_1 < 0$, $\rho_2\text{-}\phi'_2 > 0$, green building developers to develop green building incremental gain is negative, that the development of green building incremental cost is higher than the incremental revenue decline. When $\rho_1\text{-}\phi'_1 > 0$, $\rho_2\text{-}\phi'_2 < 0$, Home buyers to participate in green building incremental revenue is negative, that buyers purchase green property incremental benefit is lower than incremental costs. When $\rho_1\text{-}\phi'_1 < 0$, $\rho_2\text{-}\phi'_2 < 0$, both green building developers and buyers enter the green building market, both incremental costs are higher than the incremental gains of the game groups, the evolutionary game of the two game groups has only one evolutionary stabilization strategy (not development, not participation).

4. Green Building Developer - Government Evolutionary Game Analysis

Green building developers and the government's average expected returns were $\overline{\rho s}$, $\overline{\rho_z}$.

$$\overline{\rho}_s = [(\rho_1 - \phi_1^{'} + \pi_1)z + (\rho_1 - \phi_1^{'})(1-z)]x + (-\pi_2 z)(1-x)$$

$$\overline{\rho}_z = [(\rho_3 - \pi_1)x + (-\rho_3 + \pi_2)(1-x)]z + \rho_3 x(1-z)$$

$$G(x) = \frac{dx}{dt} = (\pi_1 z + \rho_1 - \phi'_1 + \pi_2 z)x(1-x)$$

$$G(z) = \frac{dz}{dt} = \left[(\rho_3 x - \pi_1 x + \pi_2 - \rho_3 - \pi_2 x)z(1-z)\right]$$

$G(x) = \frac{dx}{dt} = 0$, $G(z) = \frac{dz}{dt} = 0$ can be obtained at the same time:

$$x = 0 , x = 1 , z^* = \frac{\phi_1^{'} - \rho_1}{\pi_1 + \pi_2}$$

$$z = 0 , z = 1 , x^* = \frac{\rho_3 - \pi_2}{\rho_3 - \pi_1 - \pi_2}$$

The local equilibrium point of dynamic evolutionary game matrix composed of green building developers and government:

$$E_1(0,0) , E_2(0,1) , E_3(1,0) , E_4(1,1) , E_5 \ (\frac{\rho_3 - \pi_2}{\rho_3 - \pi_1 - \pi_2}, \frac{\phi_1^{'} - \rho_1}{\pi_1 + \pi_2})$$

According to Eqs. (9) and (10), we obtain the Jacobian matrix determinant and the trace of the game system composed by the green building developer-government, and obtain the Jacobian matrix determinant and traces described in the following table.

Equilibrium point	*Det* (*J*)	*Tr* (*J*)
E_1(0, 0)	$(\rho_1 - \phi'_1)(\pi_2 - \pi_3)$	$\rho_1 - \phi'_1 + \pi_2 - \rho_3$
E_2(0, 1)	$-(\rho_1 + \phi'_1 + \pi_1 + \pi_2)(\pi_2 - \rho_3)$	$\phi'_1 - \rho_1 - \pi_1 - \rho_3$
E_3(1, 0)	$(\rho_1 - \phi'_1)\pi_1$	$\phi'_1 - \rho_1 - \pi_1$
E_4(1, 1)	$(\pi_1 + \rho_1 \ \phi_1 + \pi_2)\pi_1$	$\phi'_1 - \rho_1 - \pi_2$
$E_5(x^*, y^*)$	A	0

Table 4 – Results of green building developers and government systems Jacobi matrix

Stability of equilibrium point is discussed according to the condition of stability determination. The results of local stability analysis are shown in Table 5.

In the game behavior of green building developers and government, when the government take incentive policy, the government will adopt the strategy of substituting for the award and use a fine instead of punishment.

5. Countermeasures and Suggestions

Based on the green building developers and the supply side "bilateral evolutionary game" analysis, combined with the "economic interests" and "emotion" and "policy oriented" three major constraints on green building dynamic game model based on promoting mechanism put forward countermeasures three aspects of suggestions:

Condition	Equilibrium point	*Det* (*J*)	*Tr* (*J*)	Result
ρ_1-$\phi'_1 > 0$ $-\rho_3 + \pi_2 > 0$	$E_1(0, 0)$	+	+	Unstable
	$E_2(0, 1)$	-	-	Unstable
	$E_3(1, 0)$	+	-	stable
	$E_4(1, 1)$	-	-	Unstable
	$E_5(x^*, y^*)$	+/-	0	Saddle point
ρ_1-$\phi'_1 > 0$ $-\rho_3 + \pi_2 < 0$	$E_1(0, 0)$	-	+/-	Unstable
	$E_2(0, 1)$	+	-	stable
	$E_3(1, 0)$	+	-	stable
	$E_4(1, 1)$	-	-	Unstable
	$E_5(x^*, y^*)$	+/-	0	Saddle point
ρ_1-$\phi'_1 < 0$ $-\rho_3 + \pi_2 < 0$	$E_1(0, 0)$	+	-	Stable
	$E_2(0, 1)$	+	+/-	Unstable
	$E_3(1, 0)$	-	+/-	Unstable
	$E_4(1, 1)$	-	+/-（+）	Unstable（stable）
（若 ρ_1-$\phi'_1 < -\pi_2$ ）	$E_5(x^*, y^*)$	+/-	0	Saddle point
ρ_1-$\phi'_1 < 0$ $-\rho_3 + \pi_2 > 0$ （if ρ_1-$\phi'_1 < \pi_2$ ）	$E_1(0, 0)$	-	-	Unstable
	$E_2(0, 1)$	+	+/-	Unstable
	$E_3(1, 0)$	-	+/-	Unstable
	$E_4(1, 1)$	-	+/-（+）	Unstable（stable）
	$E_5(x^*, y^*)$	+/-	0	Saddle point

Table 5 – Local stability analysis of green building developers and government systems

- ***Economic interests:*** Green building supply side should integrate green building upstream and downstream industry chain. Mature industrial chain contributes to the formation of scale benefits green building industry. Through the scale effect, improve incremental income, reduce incremental costs. After the accumulation of advanced technology digestion understanding, can increase the incremental economic benefits of green building. At the same time, the domestic and international green building new technology actively introduce, promote, adopt subsidies, incentives and other incentive policy, for green building developers to reduce investment development design green building incremental cost.

- ***Emotional cognition:*** Green building supply side should strengthen the green building products marketing planning. When the incremental benefits of both sides of the game groups are greater than incremental costs, it is very important for green building investment to develop green buildings and buyers involved in the purchase of the probability combination. Home buyers to participate in the higher the degree of green building, green construction enterprises to invest in the development of green building accounts will increase, promote the promotion of green building market development.
- ***Policy orientation:*** Green building supply side should establish feasible and effective green building supervision system. Perfecting the legal system and strengthen supervision, especially the increase of the development of green building, green building, fake fake shoddy behavior severely ruling. At the same time, should also encourage green building technology independent research and innovation. In the green building technology development stage, economic benefits are not significant, developers will face greater financial pressure is difficult to maintain, through policy, subsidies and other ways to help developers solve the technical problems of green building,

6. Conclusion

Green building is an important carrier to achieve sustainable development of the construction industry, and exploring the relationship between stakeholders is a problem worthy of attention and research in the sustainable development of the construction industry. This paper from the perspective of supply side reform of green building developers -- buyers from three dimensions of economic interests, emotion cognition and policy orientation is established, two groups of developers -- model of government supply side dynamic evolution game, the stability of evolutionary equilibrium evolution strategies are analyzed and discussed.

In the dynamic game developers - buyers, the incremental cost of the supply side of any party to the transaction market is higher than the incremental revenue, promoting mechanism will fail; convergence direction of incremental profit of green building developers on the supply side of the development of random. If the green building developers and property buyers the incremental cost of any party involved in green building trades than the incremental income, after the evolution of the market, the final choice of strategy will stabilize to green building developers does not invest in the development of green building, buyers choose not to purchase green building strategies. If the two party participation in green building transactions are profitable, the incremental income is greater than the incremental cost, then the model will provide two different strategies (development, participation), (no, not to participate in the development of evolution). Under this condition, the initial game green building investment development green building and property buyers involved in the purchase of the probability combination is particularly important.

In the dynamic game of the developer government, the initial incentive measures for supply side have guiding effect on green building. The incentive reward the government to adopt green building developers did not become the important factors affecting the promotion of green building in the evolutionary game, the incremental cost and

development of green building is a key factor in promoting the green building. Secondly, the incremental profit developers invest in the development of green building green building is positive, the government to take regulatory punitive measures the extent to which directly affect the final results of both sides of the game evolution; third, incremental profit developers invest in the development of green building green building is negative, the government even draconian penalties may not be able to correctly guide the green developers investment and development of green building. Finally, if developers invest in the development of green building green building incremental profit is negative, the government guarantee of green building green building development enterprises not punished the loss is higher than that in the government does not take the incentive policy of green building enterprise development green building loss loss, to a large extent, choose the development of green building green building developers guide strategy.

Based on the green building developers and the supply side "bilateral evolutionary game" analysis, combined with the "economic interests" and "emotion" and "policy oriented" three constraints, put forward the green building green building supply side should integrate upstream and downstream industry chain; strengthen the marketing planning of green building products; the establishment of feasible and effective the supervision system and the development of green building energy consumption tax, environmental tax and other measures.

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Research on the Novel Video Signal Processing System based on Data Mining and Pattern Clustering

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Abstract: With the development and advancement of information technique, the form of data varies and the amount of the multimedia database increases. Video data mining is a very important part of the multimedia data mining, and it is also the new research aspect of data mining. Meanwhile, with easier acquisition and storage of the video data, the problem of how to utilize them effectively becomes increasingly serious. For instance, the security detection applied in video surveillance and emergencies, video content-based extraction of objects in a ball game. Video data mining is different form general database mining. Because of the complexity of video data structure, big size and high redundancy cause slow technology development in video mining. Thus, research and study on improving video retrieval and indexing speed have become the focus of data mining discussion. In this paper, we analyzed the system structure of video data mining, and summarized the concept of video mining. At the same time, we put forward several efficient video data mining algorithms after discussing the recent video mining technology.

Keywords: Video Data Mining, Time Series, Cluster, Video Structurization, Raw Data, Knowledge Discovery

1. Introduction

With the rapid development of modern information technology and data storage technology, such as computer, network and communication, etc. and the ability of people to acquire and collect data is greatly improved, and industry has gradually established its own database system (Akay, 2015; Gonçalves et al., 2015). Thousands of databases used in business management, plant operation and scientific research and other fields. However, people lack strong analytical tools, and we face the "data flooding, poor knowledge" problem (Chen, 2016). For these large amounts of the data, traditional database management systems will take more time to process data, and it fully rely on some advanced assumptions and estimates of data, as a result, these systems cannot meet data needs. How to effectively organize and utilize these massive raw data is a huge challenge for us. Thus, video mining based on data mining methods came into beings,

and this mining technology developed rapidly. Data mining is to extract the knowledge from the data of large databases (Danish, 2016). The extracted knowledge from data mining is expressed as Concepts, Rules, Regularities, Patterns, etc. Fayyad, Piatetsky-Shapiro and Smyth pointed out that: Knowledge discovery is the whole process to discovery knowledge from database, and data mining is a specific key step in the whole process. Yet, knowledge discovery and data mining have been applied so far.

For different databases, different data mining techniques can be used to dig out the different kinds of knowledge. And the application of data mining methods in video mining has become a hot research topic. How to process one or several images, extract information automatically from the video and the images, implement the semantic understanding of video and image data, have aroused great interest of many researchers (Liu, 2015; Nuutinen, 2016). In addition, there is the distribution information among visible objects in video, and video data contain a lot of useful and interesting patterns (Wang, 2016). These patterns not only reflect video content, organization structure, structure characteristics, but also introduce the actual meaning of the specific application in space dimension and time dimension. According to the objects, events and the characteristics of general video expression, we can obtain semantic information and knowledge of video, so we can make use of the semantic information and knowledge to assistant decision making (Rupanagudi, 2015). Automatically extract video content, the characteristics of the organization structure, the motion objects in video and the movement characteristics from a large amount of video data. On the basis of these data, we choose a new video data mining method, in order to discover video content structure mode, etc. Thus, we implement video summary, video classification, video retrieval, and other video intelligent applications.

2. The Present Research Situation of Video Data Mining

Video data mining is one of the aspects of the multimedia data mining, and its formation time is relatively short, all aspects are not mature enough. Although there are a lot of literature and prototype systems that introduce video mining, there are few literatures to explore the research scope of the video mining and its concept is not clear. Video mining understanding and the development of the main research organizations is organized as the follows for references.

1. **MERL: Mitsubishi Electric Research Laboratories**. MERL is the main research and the development organization of Japan's MITSUBISHI electronics company. They proposed the concept of video data mining based on data mining technology. They believed video data mining method is the unsupervised mining method that can mine out interesting objects.
2. **Multimedia Information Group(MIG) in Texas University**. The researchers in MIG proposed that video data mining is to find out previous unknown association patterns from large scale video database and this group mainly focus on video content analysis, mining and abstract.
3. **DIMACS Research Group**. DIMACS is still studying audio mining and cross feature mining as present, they think audio mining can be used for speech recognition, and the cross feature mining can extract information, rules, knowledge according to video and voice features in order to solve the problem of character identification.

3. The Video Data Mining Technology

3.1. The Overview

Video mining involves three parts of the work: Preprocessing of video data, video feature and semantic information extraction, and video discovery and expression of the mode and knowledge. In the aspect of video data preprocessing, focus on video data, usually we need to cut and edit the original video documents. The result of cutting or clipping as a direct object for next step and preprocessing stage contains image processing, data standardization, shot-based preprocessing, object-based preprocessing, etc. In image processing, we use general image smoothing, image enhancement, image filtering method, in order to remove the noise of environment and transmission system. Shot-based preprocessing is to segment original video into several shots, and input these shots. The length of the shot is usually a few seconds, which contains dozens to hundreds of consecutive frames. Object-based preprocessing is to extract object from video data stream, this process helps to get the main information and high-level semantics in the video.

Although in video preprocessing, video data streams have been divided based on shot or object, we usually have to extract some important video features and then implement data mining. Video feature extraction and video data mining are not separable. There are three video data mining methods: special pattern detection, clustering and classification, and association mining. Figure 1 shows the general framework of video data mining.

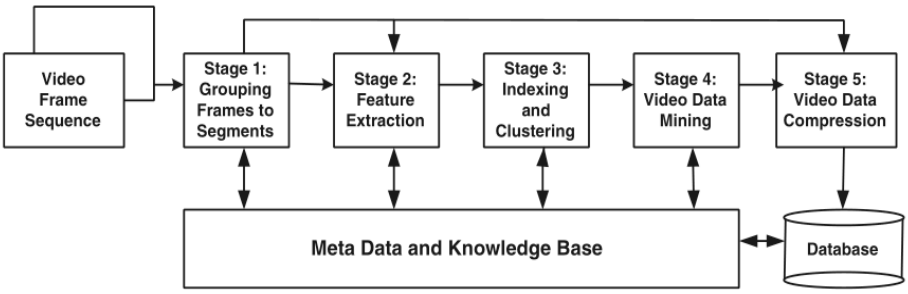


Figure 1 – The General Framework of Video Data Mining

3.2. Special Pattern Detection

Since, video data is a kind of unstructured stream an efficient access to video is not an easy stuff. Thus, the main objective of the video structure mining is the identification of the content structure and patterns to carry out the fast random access of the video database. Video structure mining is executed in the following steps. (1) Video shot detection; (2) Scene detection; (3) Scene clustering; (4) Event mining. The following definitions are used to compare the relationship between adjacent shots which should be focused on.

$$CLi = Max\{StSim(S_i, S_{i-1}), StSim(S_i, S_{i-2})\} \quad (1)$$

$$CRi = Max\{StSim(S_i, S_{i+1}), StSim(S_i, S_{i+2})\} \quad (2)$$

$$CLi + 1 = Max\{StSim(S_{i+1}, S_{i-1}), StSim(S_{i+1}, S_{i-2})\} \quad (3)$$

$$CRi + 1 = Max\{StSim(S_{i+1}, S_{i+2}), StSim(S_{i+1}, S_{i+3})\} \quad (4)$$

$$R(i) = (CR_i + CR_{i+1}) / (CL_i + CL_{i+1}) \quad (5)$$

There is a rule to judge the *i*-th shot need divided or not: If $R(i)$ is large enough, or CRi and CLi are small enough, then divide the shot, that means the *i*-th shot is the start of the new video group. Thus, we can obtain a series of video groups which contain several shots.

3.3. Clustering and Classification

Clustering and classification is to divide video into groups according to its topic. In the literature reviews, the author introduced motion feature extraction and video classification. Video clustering and classification are used to cluster and classify video units into the different categories. Therefore, clustering is the important unsupervised learning technology for the discovery of the actual knowledge from datasets. Clustering video sequences in order to infer and extract activities from a single video stream is an extremely important issue and it has a significant potential in video indexing, activity discovery, pattern recognition and surveillance. In the video surveillance systems, it is used to find the patterns and groups of moving objects that the clustering analysis is used.

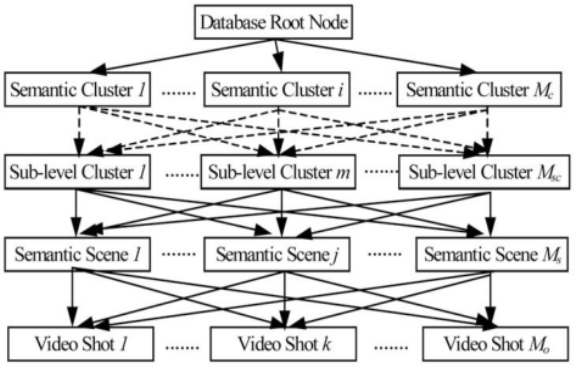


Figure 2 – The Proposed Hierarchical Video Database Model

Clustering similar shots into one unit eliminates redundancy and as the result, produces a more concise video content summary. Clustering algorithms are categorized into general partitioning methods, hierarchical methods, density-based methods, grid based methods and model-based methods. First, build TMM(Total Motion Matrix) to describe the total motion amount of one segment. In this matrix, the number of line is

row resolution of original video, column number is column resolution of original video. Every value in this matrix represents the number of times the pixel changes relative to the background image. At the same time, build AMM (Average Motion Matrix), TM (Total Motion) is the sum of all elements in TMM. AM (Average Motion) is the sum of all elements in AMM. Obviously, TM describes the total amount of motion in a video section, AM is the amount of motion per frame in the paragraph. SC (Summation of Column) is a vector that is obtained by the superposition of the AMM. On the basis of the motion feature extraction, combining with the results of the fragment partition, we use K-means algorithm to cluster the video segments

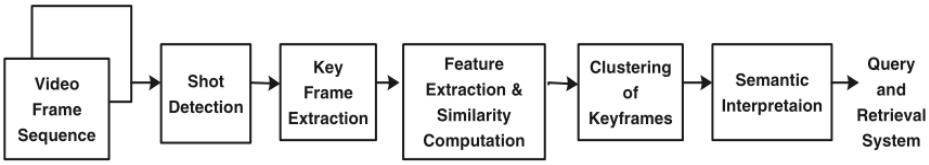


Figure 3 – The Video Clustering Procedures and Steps

3.4. Video Association Mining

Video association mining is the process of discovering associations in given videos. The video knowledge is explored in a two stages, the first being the video content processing in which the video clip is segmented into the certain analysis units extracting their representative characteristics and the second being the video association mining that extracts the knowledge from the feature descriptors. Mongy et al. proposed a framework for video usage mining to generate user profiles on a video search engine in the context of movie production that analyzes the users' behaviors on a set of video data to create suitable tools to help people in browsing and searching a large amount of video data. This method uses association mining technology to figure out the hidden information in video. We regard video objects and characteristic value as data item(DI), and find out the association model from different video objects. However, this part of the work has account for a small proportion in video data mining fields.

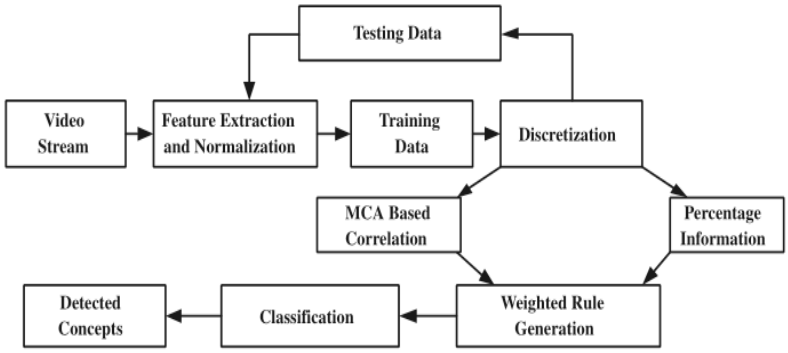


Figure 4 – The Semantic Concept Detection

4. The Ways and Approaches of Video Mining

4.1. The Two feasible ways of video mining

Besides spatial features, there are temporal features: audio features, and the characteristics of motion objects in video. Data of all these features can be used for further data mining. On one hand, video with different contents and structures can be mined and generate different results. On the other hand, different applications need divergent video mining techniques to solve. From the content and structure, we think there still has two main ways to implement video mining: video structure mining and video motion mining.

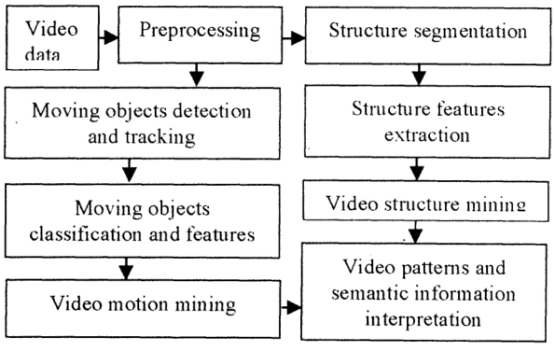


Figure 5 – The Two Main Ways of Video Data Mining

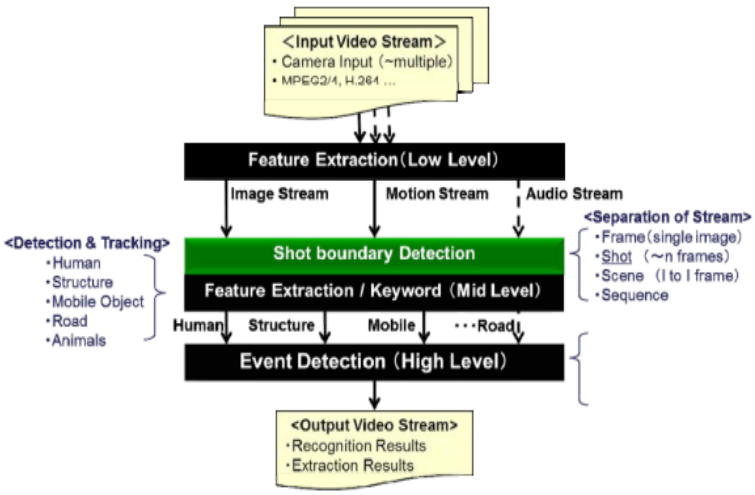


Figure 6 – The Video Data Mining System

4.2. Video Data Mining System

Video data mining system can receive video streams after data compression, such as H.264, etc. or direct images from cameras which are shown in Fig.6. The motion object detection is similar to the image recognition and nevertheless, it is different since image recognition process is based on a frame in general. Video data mining process is based on a shot which consists of the multiple frames and constructs a meaningful action captured by a single camera.

4.3. Parallelism Inherent in Video Mining

There are several data parallelisms and task parallelisms inherent over high level down to low level of video data mining process.

At the higher level, multiple input video streams that are separated into the image steams, motion streams in the frames, audio streams, etc. Next, each stream is separated into shots, and for each shot multiple processes such as object detection and tracking for human beings, motion object, construction, are handle in parallel, by the way, the based on these object detection and tracking input video is edited and can be outputted.

At a lower level, each process of Video analysis, Object detection and tracking, and the video editing, several types of algorithm are applied depending on its type of mining targets, and in each algorithm there are several parallelisms inherent as shown in Fig.7. For example, SIFT (Scale-Invariant Feature Transform), that an algorithm to detect and describe local features in images and robust on rotation and contrast, is inherent both data parallelisms, such as inter frames, inter image blocks, inter pixels, inter feature points that are extracted from images, inter feature values that are groups of feature points, and the task parallelisms, such as Gaussian Filter, localization of feature points, orientation assignment of feature points, matching of feature values, etc.

Application	Objective	Algorithm	Parallelism	
Video Analysis	Predict direction and velocity	Optical Flow	Lines	
	Detect specific features	SIFT*1	Frames, Image Blocks, pixels, features	
	Detect and track human	Cascaded Haar-Like	Pixels	
	Detect line for separation	Hough Transform	Lines	
	Eliminate errors by sequential frames	Ransac*2	Sample Data	
Human Detection	Detect face from various direction	Vector Face Detection	Image Blocks	
	Extract features of face	Model-based Face Detection	Tasks	
Video Editing	Extract segment	Graph-based segment separation	Segments	
	Detect motion vector	Block Matching	Lines	

*1 SIFT: Scale-Invariant Feature Transform
*2 Ransac: Random Sample Consensus

Figure 7 – The Parallelism Inherent in Algorithms for Video Mining

5. The Video Moving Objects Detection and Segmentation

Detection of moving objects in video streams is an important step in extracting time series data from video data. The detection is designed to remove background interference, the system detects the moving objects for interest, generates moving object image, simplifying the segmentation of video moving objects. Video moving object detection methods are mainly has three categories: optical flow method, difference method, background subtraction method. These three methods are discussed as follows: (1) Difference method: Reciprocally subtracts adjacent two or three frames of images and then regards the difference (greater than a certain threshold) as moving objects. (2) Optical flow method: The optical flow field is the image brightness changes information while it does not correspond to the motion field. Ideally, the movement generated from optical flow field can approximately reflect the actual activities. The optical flow method is to analyze optical field, and obtain approximate motion field from image sequences, then generate a video moving object according to the motion characteristics. (3) Background subtraction method: Background subtraction method is one of the most popular methods used in motion detection. The basic idea of the algorithm is the current frame image subtracts with the background image, if the pixel difference is greater than the certain threshold, that the pixel is considered as a moving pixel. For the first stage, the system divides the video into a number of significant shots, and we obtain representation for objects which are present in these shots. Both of these works are simultaneously performed using the local unchangeable features generated at each frame and the basic algorithm previously published is used for our purpose which can be expressed as the follows.

Initialize: The algorithm is initialized with a single cluster with the longest track in the shot.

Iterate:

A: Assignment of Tracks

For each track t in the shot, we calculate the distances to each of the current object cluster O_c as the formula 6.

$$D_{ct} = \sum_f D_{ct}^f = \sum_f (m_c^f - m_t^f)^T (\varphi_c^f)^{-1} (m_c^f - m_t^f) \tag{6}$$

Where the closest object cluster is given as follows:

$$c^* = \arg\min_{c=1}^{K} D_c t \tag{7}$$

B: Estimating the parameters of object clusters

For each cluster object cluster and for each frame associated with that cluster, that calculate the following parameters

$$m_c^f = \frac{1}{N_O} \sum_{t \in O_c} m_t^f \tag{8}$$

$$\varphi_c^f = \frac{1}{N_O} \sum_{t \in O_c} (m_c^f - m_t^f)^T (m_c^f - m_t^f) \tag{9}$$

In figure 8, we put forward the grouping of object clusters. where (a) Each object cluster is considered as a vertex in a graph; (b) Two vertexes are connected if the matching ratio of the corresponding object clusters is above a threshold (see text); (c)Mutually exclusive groups of connected vertices are identified and classified as object groups using general standard graph connected components algorithm; (d) Additional connections, introduced due to a smaller are displayed in red color. This leads to a merging of two, previously separate, object groups into a single object group with a smaller will give fewer and larger object.

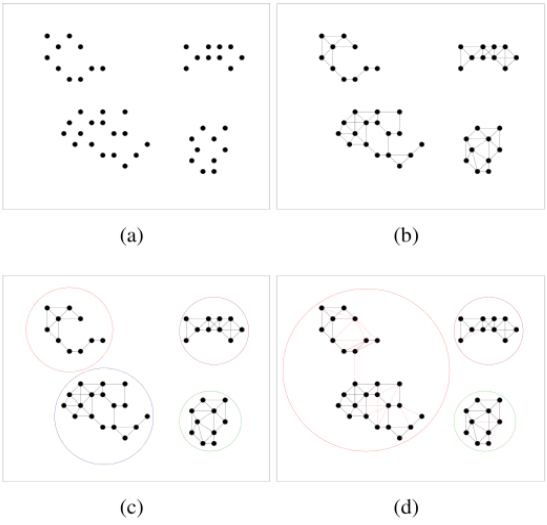


Figure 8 – The Grouping of Object Clusters

Form Invariable Regulation method is based on area of object shapes. Assume that *R* is object represented by binary imagethereforecenter moment of *p*+*q*th order is shown and demonstrated as the follows.

$$\upsilon_{pq} = \sum_{(x,y) \in R} (x - x_c)^p (y - y_c)^q \tag{10}$$

6. The Experiment Results and Data Analyses

Section A: The proposed algorithm in this paper is experimented with a movie named Groundhog Day. This movie is divided into several shots and the image features are extracted from a stable track, and these shot features are grouped into clusters. The mining module in the system mined the different examples of the objects from divergent

clusters into relative groups. Each object is considered as a valid mined object, only if it is mined in 5 different shots at least. Under this condition, 147 objects are mined from this movie. Some of the mined objects and the clusters number are given in Table 1. Table 1 also shows the number of missed and false clusters and precision, recall values for the given mined objects.

Mined Object	Correct	Missed	False	Precision	Recall
	81	292	1	0.988	0.217
	70	131	1	0.986	0.348
	6	4	0	1.000	0.600
	5	2	0	1.000	0.714
	13	1	0	1.000	0.833
	5	0	0	1.000	1.000
	5	0	0	1.000	1.000
	5	18	0	1.000	0.217

	6	6	0	1.000	0.500
	23	3	0	1.000	0.885
	8	4	1	0.889	0.500
	9	4	0	1.000	0.692
	5	1	0	1.000	0.833
	10	3	0	1.000	0.769

Table 1 – Mined Objects and the Number of Clusters

Section B: In this section, we choose an NBA game, this sports video is divided into several shots for clustering. Generally, since one sports video is captured from one place, both shot clustering and classification can acquire relatively good performances. As shown in Figure 9, we can figure out that the shots contain the courts that are successfully clustered into groups.

Where each icon image represents one shot, namely, the first row represents the first shot of each group and others represent each clustered group.

Section C: In the same way, we used this sports video to detect video text and then recognize the words in the shots. There are types of video text: the first one is the text shown in video scenes, referred to as scene text hereafter; the second one is the text post-processed and added into the video, such as team names and their scores, which called caption text. For sports videos, caption text is much more important than scene



Figure 9 – The Video Shots Clustering Results

text because the former directly conveys video semantics and the video text detection is shown in Figure 10.

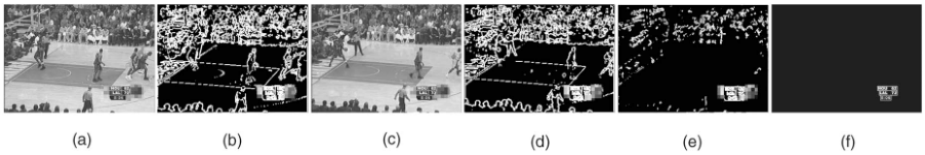


Figure 10 – The Video Caption Text Region Detection

7. Conclusion

In this paper, we introduced and proposed several methods and definition used in video data mining. Video data mining is a very important part of the multimedia data mining, and it is also the new research aspect of data mining. Meanwhile, with easier acquisition and storage of video data, the problem of how to utilize them effectively becomes increasingly serious. While the methods proposed in this paper are specific to basketball videos, namely, video mining based on association for video knowledge exploration is an important idea. By the way, the experiment results show that the algorithms and method proposed or introduced in our paper have high efficiency and are useful for us to figure out issue of video data mining/

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