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Analysis of the economic impact of US presidential election on the US and China

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ABSTRACT. *With the U.S. election drawing to finality, the country will usher in a new leader. In this paper, support vector machine, numerous additive regression and cellular automata models have been established. Spearman correlation coefficient analysis and Dijkstra algorithm have been utilized to conduct multi-field analysis on the influence of different leaders on the economic trends of the two countries. Additionally, numerous additive regression model has been entrenched. In contemplation of determination on the influencing factors related to the ECONOMIC growth of the United States, the support vector machine model has been formulated to procure the effective correlation (0.95<x). Secondly, regarding the endogenous impact of the epidemic, regions have been partitioned in accordance with the severity of the epidemic, and Spearman's algorithm has been availed to scrutinize the correlation amongst different parameters and the economy. Plus, a cellular automata model has been elevated to simulate the epidemic situation. In intellection of this confrontation, we ought to determine whether there lies any influencing factors of the United States on the advancement of Chinese's economy, owing to which first and foremost we have investigated the influencing factors of online access to the U.S. economy which are demonstrative of certain changes as well as the changes of Chinese economic data, and then we are supposed to regress the relationship between both of them, in which we have built the RBF support vector machine (gaussian radial basis) model, carried on the correlation analysis of the relationship. What's more, we have predicted the circumstances where Biden has been rendered superordinate on the office compared with the Chinese economy.*

KEYWORDS: *Support vector machine; multiple linear regression; graph theory; cellular automata model;*

1. Introduction

We have processed through the text analysis to obtain the influencing factors in the duration of some trump politics, to modify the data of some political factors that influence the matters to correct the model, and eventually to predict the evolutionary inclination of the development of China's economy. Last but not least, it is such a requisite to compare them. What is more imperative is that diktat algorithm is

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functioned to path all policies and optimize the shortest path of the best policy. Also, this paper evaluates the models in which we have functioned, analyzed and pointed out the advantages and disadvantages of each model to facilitate persisting improvement.

2. Restatement of the Problem

2.1 Background of the Problem

American presidential elections are held every four years. 2020 is the year of the US presidential race between Republican Donald Trump and Democrat Joe Biden. Candidates from the two parties have distinct political positions and policy platforms on finance and trade, managing of goods and financial governance, and other key development areas such as the strength of COVID-19 prevention and control measures, infrastructure investment, taxation, environmental protection, health insurance, employment, trade, immigration, economic growth rate, education, etc. The election of distinct candidates will form different strategic patterns of worldwide and financial development, which will have a greater impact on the US economy and the universal economy (including China's economy).

2.2 Questions

It is generally believed that the main factors affecting the US economy include education, immigration, epidemic disease, trade, etc. In this paper, we have deliberated these influencing factors due to the succeeding questions listed below. The following problems are solved by taking China and the US as the research objects:

1) Establish a mathematical model to measure the trend of economic growth by referring to existing economic indexes.

2) Search data and list the factors that affect the Sino-us economic indexes, and analyze the future trend.

3) Analyze and propose Suggestions according to the results of model 1 and 2.

3. Problem Analysis

3.1 Analysis of Question one

Question one requires the establishment of a mathematical model and a multiple linear regression model. In order to determine the influencing factors related to the economic growth of the United States, a support vector machine model is constructed to obtain the effective correlation ($0.95<x$).Secondly, considering the endogenous impact of the epidemic, the regions were divided according to the

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severity of the epidemic, and the Spearman algorithm was used to analyze the correlation between different parameters and the economy. Finally, the cellular automata model is constructed to simulate the epidemic situation under different policy parameters so as to judge the economic trend more accurately.

3.2 Analysis of Question two

Question two requires the analysis of the effect of different leaders in China, we need to determine the influence factors of the United States where they have any influence on the development of Chinese economy, so first we investigated the influence factors of online access to the U.S. economy which positioned some kind of changes and the change of Chinese economic data, then we need to get the relationship between them, so we build RBF support vector machine (gaussian radial basis) model, and have carried on the correlation analysis, get the relationship between them, and then we control variable method that is functioned to strike the influencing degree of each factor on the Chinese economy, Then we utilize a cross validation to judge whether the control variable method is reasonable, and then find out the impact of each factor on China's economy step by step, and then convert it into impact factors to quantitatively judge the impact of the United States on China's development.

3.3 Analysis of Question three

Question three requires Suggestions and policies to the government based on the results of the 1,2 two-question model, measures to visualize the policy dynamics to analyze the dynamic balance, and graph theory algorithm to show the optimal policy path.

4. Model Assumptions

1) Assume that no major accidents will occur in a period of time in the future.

2) Assume that there is no interference from the spherical disturbance term.

3) Assume that there are no other endogenous variables other than the epidemic.

5. Establishment and Solution of the Model

5.1 Background

The us presidential election, which takes place every four years, is in full swing, with Republican Donald Trump and Democratic rival Joe Biden running for President in 2020. The candidates differ in their political positions on finance and trade, economic and financial governance, and a number of other major

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development areas (such as COVID-19 combat measures, infrastructure, taxation, environmental protection, health insurance, employment, trade, immigration, education, etc.). The election of different candidates will shape different strategic models of global economic and financial development and will have a greater impact on the US economy and the global economy (including China's economy).

5.2 Question one

5.2.1 Models Establishment

In the title we are requires to quantitative analysis the influence of different candidates elected to the American economy, here we use AHP method to draw each factor score of the candidates, comparison, we select infection rate, growth rate, with the number of masks, GDP, per capita, infrastructure, vegetation coverage rate, per person taxes, imports and exports, employment rate, per person salary to support the ten indexes trump and support Joe biden's states were analyzed, and the factors involved in too many, we in order to overcome the least squares estimates in the matrix with multiple linear relationship and not stable, we dimension of principal component analysis (PCA).For this, we did the following flowchart, carries on the analysis to the topic.

5.2.2 Models Solution

First, we standardized the data. For the accuracy of the data, we searched the two states that supported Trump, namely the states that supported Biden, which were numbered 1-6 and 7-12 respectively. Our evaluation factors, the number of votes obtained in the final ballot, are listed in the figure below.

Number	δ_i	α_i	α_p	Number	δ_i	α_i	α_p
1	5.1406	51.406	51.4	6	0.2129	1.935	98.121
2	3.0666	27.878	79.284	7	0.1678	1.525	99.647
3	0.9485	8.622	87.906	8	0.0263	0.238	99.885
4	0.5727	5.206	93.112	9	0.0086	0.0783	99.963
5	0.3381	3.073	96.186	10	0.0036	0.033	99.997

Figure 1 Evaluation factors

Calculate the eigenvalue A, which is the contribution rate of each factor to

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$\frac{\alpha_i}{\sum_{i=1}^{m}\alpha_i}=\alpha_i$ $\frac{\sum_{k=1}^{p}\lambda_k}{\sum_{k=1}^{m}\lambda_k}=\alpha_p$ the, i=1,2...m,at the same time, The cumulative contribution value of the principal component, when the cumulative principal component is close to 95% of the time, we can think of the following value as an independent variable, so we can judge the number of principal components.

5.2.3 A cellular automata model is established to visualize the population time flow and to predict the economy

Firstly, the CA model of single-factor population flow was established to solve the distribution of air pollution concentration in New York at 8 am, 12 noon and 9 PM respectively.

(1)Set the CSCA model running rules:

$H=50\,m$;

(2)Population diffusion formula:

$$M_{i,j}^{t+1}=M_{i,j}^{t}+\{m[(M_{i-1,j}^{t}-M_{i,j}^{t})+(M_{i+1,j}^{t}-M_{i,j}^{t})+(M_{i,j-1}^{t}-M_{i,j}^{t})+(M_{i,j+1}^{t}-M_{i,j}^{t})]\}+\{md[(M_{i-1,j-1}^{t}-M_{i,j}^{t})+(M_{i-1,j+1}^{t}-M_{i,j}^{t})+(M_{i+1,j-1}^{t}-M_{i,j}^{t})+(M_{i+1,j+1}^{t}-M_{i,j}^{t})]\} \quad (1)$$

Within t is time; i,j is the cell location; $M_{i,j}^{t}$ is the concentration of cellular pollutants; m is the pollutant transfer coefficient in four positive directions; d is the bevel coefficient. Set up $m=0.094, d=0.34$

(3)Epidemic and pollutant drift formulas:

$$\overline{M}_{i,j}^{t+1}=M_{i,j}^{t+1}+W_{K,L}^{t}\cdot m\cdot[M_{K,L}^{t}-M_{i,j}^{t}] \quad (2)$$

Within, $K\in[i-1,i+1];L\in[j-1,j+1];K,L\neq i,j,K,L$ is the location of the pollutant; $W_{K,L}^{t}$ is the velocity influence coefficient.

(4)MATLAB software for simulation:

As can be seen from the figure, the crowd in New York is relatively dense at 8 am and 9 PM, and relatively sparse at 12 PM. If Trump is elected, the outbreak may be uncontrollable and affect economic development more. If Biden takes office, he may seize the noon time to strictly manage the crowd.

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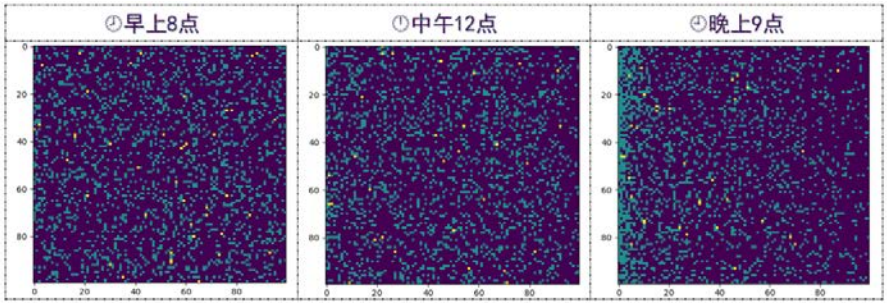

Figure 2 Population concentration distribution at different times

5.3 Question two

5.3.1 Models Establishment

In the title it requires us to render quantitative analysis of the influence of different candidate on China's economy, here we have still carried out investigation in accordance with the thinking of an answer, used AHP algorithm factor score, analyzed the influence of the two candidates for Chinese trade. And it is worth noting that China's epidemic management has done better than the United States, so in the confrontation of the outbreak, more consideration does not lie in the infection rate, but the impact of the epidemic, furthermore, in the immigration, multinationals such as trade, China is also affected by the outbreak, in the same way, *in order to overcome the least squares estimates in the matrix with multiple linear relationship and not stable, We have done principal component analysis for the dimensionality reduction.*

5.4 Question three

By a model, calculating the reaction rate with principal component analysis (pca) and the percentage increase of infection, infrastructure, and per capita taxes to affect the principal component of the U.S. economy, which had a greater influence on the outbreak of the U.S. economy, I suggest that China can increase the vaccine research and development, the first developed before the vaccine in many countries, now because the epidemic is still very serious, the demand for the vaccine is very big, therefore, our country can take an outbreak of money to develop the vaccine.

China needs to increase investment in the electronic information industry and support more small and micro enterprises with independent research and development. China will invest more in medical treatment in the next few years, in medicine and so on. At the same time, stealthily, China may spend more on its military, more on infrastructure (hospitals) and less on other things. In our view,

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China's response ought to mainly support its own enterprises instead, strengthen foreign trade with other countries to compensate for the loss of the United States, and increase its comprehensive strength in case of emergency.

Question 3: Combining the model of Question 2 and establishing the policy analysis

Step1 make policy analysis Suggestions based on the results of problem 1 and 2 models

To trump stage we should strengthen the regulation of foreign trade to trade cooperation around to avoid direct collision with the United States, for Biden who came to power, by random forest feature weights known in problems 2, he will increase the cooperation around to boycott China, we should promote social service ability strong itself and international image, no matter what stage we should be situated in according to the various factors affecting the effective policy under the flexible regulation.

Step2 Dijkstra algorithm presents the weighted graph path of the policy

Let the vertex set of graph G be V, and let another set S represent the set of the end points of the shortest path. If the shortest path ends at x, then it can only reach x by arcs (v, x) or by vertices in S, that is:

$$(v, vi, \ldots, x).$$

Proof: Suppose(v,...,x)If there is a vertex in the path that is not in S, then there is a path whose end point is not in S and whose length is shorter than the path. But this is not possible, because the model produces the shortest paths in the order of increasing length, so all paths shorter than this path have been generated, and their end point must be in S.

The shortest path matrix between any two points is calculated as follows:

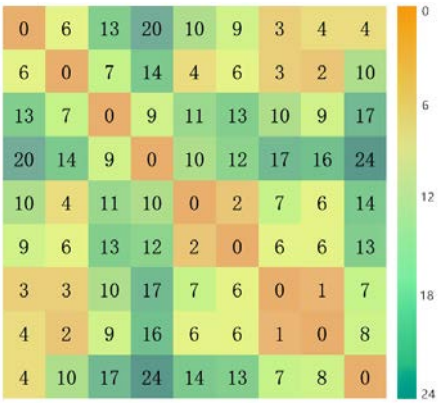

Figure 3 Shortest path matrix

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According to the figure, no matter who takes office, China should, on the basis of vigorously controlling the epidemic, promote the combination of medical care and the care to enhance social service capacity, improve infrastructure and start multilateral trade, so as to make great progress in the post-epidemic era.

6. Model evaluation

6.1 Strength

①Utilize MATLAB to write code to solve and curve fitting the relationship amongst variables, model ideas are clear.

②The neural network algorithm is functioned to simplify the evaluation index and the calculation results are accurate.

③Availing of multiple linear regression model to process the data and reduce the dimension, so that the problem is simplified.

④The results show that the method improves the solution accuracy and the calculation error is small.

⑤The third problem combines the model, conclusion and data of the first and second problem. Conduct the case study through specific analysis, and specific solutions are given for different situations.

6.2 Weakness

①The simplification of the model may lead to additional error effect, which might render some error on the final data.

②After processing dimension reduction, only part of the factors on the impact of the Chinese and American economies are considered, not a comprehensive consideration, and there is no closed-loop feedback.

7. Conclusion

Utilizing support vector machine, numerous additive regression and cellular automata models, we draw the conclusion that founded on all the above analysis, it is suggested that our country should adopt a large amount of funds to maturate vaccines, scrutinize on the protection of people's livelihood, and narrow the gap between the rich and the poor. It should also vigorously cradle domestic enterprises and strengthen foreign trade with other countries to increase comprehensive strength within emergencies. Substantiation from an endogenous shock of the epidemic suggests that regions should be partitioned in accordance with the severity of the epidemic, and Spearman's algorithm has been availed to scrutinize the correlation

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amongst different parameters and the economy. Furthermore, we adopt the cellular automata model to simulate the epidemic situation. To analyze the problem more effectively, we also build the RBF support vector machine (gaussian radial basis) model to analyze if there lie any influencing factors of the United States on the advancement of Chinese's economy. Consistent with this, we discover that governance via threat of exit is weaker in the presence of ownership cliques.

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