ISSN 2616-5902 Vol. 3, Issue 4: 31-36, DOI: 10.25236/AJBM.2021.030408

Determine the impact on the U.S. and China's economy based on Correlation analysis

Tianxing Ma[1], Tianqi Wu[2], Haoyu Yu[3]

[1]School of Resources and Safety Engineering, Central South University, Changsha, Hunan, 410083
[2]School of Public Administration, Central South University, Changsha, Hunan, 410083
[3]School of Economics and Finance, Shanxi University of Finance and Economics, Shanxi, 030000

Abstract: *The US presidential election is held every four years. 2020 is the year of US presidential election, with Republican candidate Donald Trump and Democratic counterpart Joe Biden running for president. The results of this election are not only of great significance to the economic development of the U.S., but will also have an important impact on the development of Sino-US trade and the world economy. We need to consider the policy measures taken after the election of Republican candidate Donald Trump and Democratic candidate Joe Biden to determine the corresponding economic change indicators, and collect data related to the domestic economy during the president's administration in the past few years. Correlation analysis is used to obtain the Pearson coefficient, which eliminates the more relevant indicators, and uses the remaining indicators to establish the back-propagation (BP) neural network economic impact prediction model after Trump and Biden are elected respectively. We obtain the economic development trend of the U. S. in the next few years through model solving.*

Keywords: *Correlation analysis, BPNN, Genetic Algorithm, Economy Prediction Model*

1. Background

The US presidential election is held every four years. This year, Donald Trump and Joe Biden will compete for the presidency. The two candidates have different political views and different strategies on China-us relations. Biden, as the Candidate of the Democratic Party, has a political view similar to that of former President Obama, with a conservative policy towards China. Trump, as the candidate of the Republican Party, has a slogan of "Make America great again". He has radical political views and sharp measures against China.

With the development of globalization, the results of the US presidential election will be reflected in such fields as economy, technology and culture. Whoever is elected will have a significant impact on the global situation.

With the development of globalization, the results of the US presidential election will be reflected in such fields as economy, technology and culture. Whoever is elected will have a significant impact on the global situation. Now, in the context of the global COVID-19 epidemic, the outcome of the US presidential campaign will be further amplified, and the policies of the two presidential candidates will determine whether COVID-19 in the US can be effectively controlled

Therefore, it is particularly important to build an appropriate mathematical model based on the analysis of previous data and to analyze the impact of trump or Biden on the US, China and even the world. In particular, through mathematical model analysis of the economic impact, the comparison of national strength will eventually return to the competition of economic strength. China and the United States are the two largest economies in the world, and the newly elected US President's policy towards China determines the development of the global economy.

2. Analysis

If we need to establish the impact of the two candidates' different policies on the United States, we first need to get data on the U.S. economy, social welfare, climate, immigration and so on in recent years. The correlation analysis of these data is then carried out, and the intensity of policy needs to be quantified to facilitate subsequent modeling and data analysis. Finally, BP neural network is used to predict the dependent variables after different leaders come into power.

ISSN 2616-5902 Vol. 3, Issue 4: 31-36, DOI: 10.25236/AJBM.2021.030408

3. Models for problem 1

3.1 Analysis and Solving of Question One

We first need to get data on the U.S. economy, social welfare, climate, immigration and so on in recent years. The correlation analysis of these data is then carried out, and the intensity of policy needs to be quantified to facilitate subsequent modeling and data analysis. Finally, BP neural network is used to predict the dependent variables after different leaders come into power. The following figure 1 shows the mind map for Problem Solving 1:

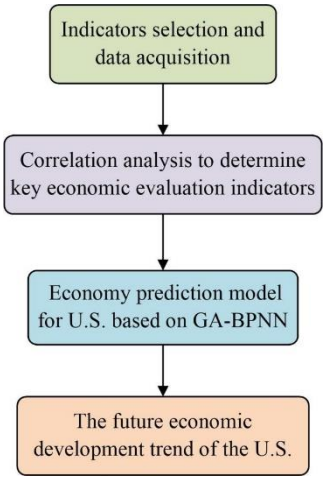

Figure 1: The mind map for Problem Solving 1

3.2 Model Preparation

(1) Data Processing

To study the impact of the Trump and Biden administrations on the United States, we have broken down the data for total imports, total sales, taxes, employment GDP, social welfare, consumption level, and environmental protection spending from 2012 to 2020 as follows. The data from 2012 to 2015 can be used to predict Biden's influence [1-2], while the data from 2016 to 2020 can be used to predict Trump's.

(2) The Foundation of Model

The calculation formula of Pearson correlation coefficient is shown in the following [3-4]:

$$\rho_{X,Y} = \frac{\operatorname{cov}(X,Y)}{\sigma_X \sigma_Y} = \frac{E[(X-\mu_X)(Y-\mu_Y)]}{\sigma_X \sigma_Y},$$

$$r = \frac{\sum_{i=1}^{n}(X_i-\overline{X})(Y_i-\overline{Y})}{\sqrt{\sum_{i=1}^{n}(X_i-\overline{X})^2}\sqrt{\sum_{i=1}^{n}(Y_i-\overline{Y})^2}}.$$

$$r = \frac{1}{n-1}\sum_{i=1}^{n}\left(\frac{X_i-\overline{X}}{\sigma_X}\right)\left(\frac{Y_i-\overline{Y}}{\sigma_Y}\right).$$

The most representative multi-layer feed forward neural network is BP neural network. This algorithm is suitable for the prediction model. The basic structure of BP neural network is shown in Figure 2 below [5-6]:

ISSN 2616-5902 Vol. 3, Issue 4: 31-36, DOI: 10.25236/AJBM.2021.030408

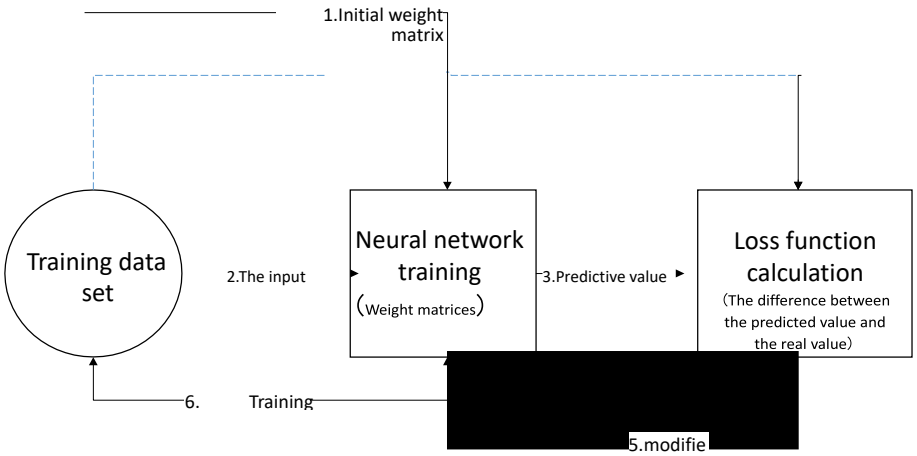

Figure 2: Neural network flow chart

3.3 Model Establishment

Firstly, we use Q-Q chart to test the data, and then we use MATLAB software to analyze the Pearson correlation of these data. After Pearson correlation analysis, the results of Pearson correlation analysis are shown in the figure 3-4 below we found that the volume of import and export trade is strongly correlated with sales volume, so it can be removed from the forecast model. In the same way, tax, health care expenditure and financial expenditure should also be omitted in the establishment of prediction model.

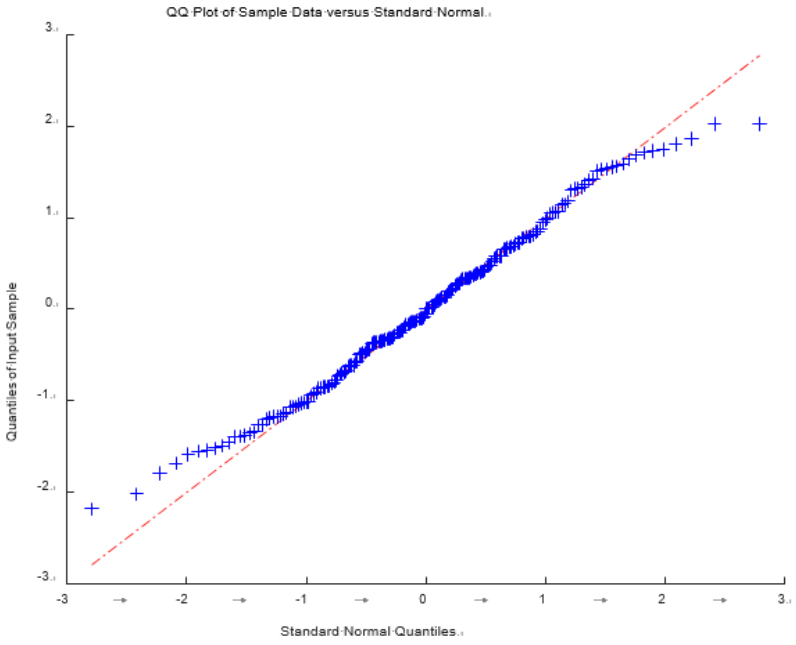

Figure 3: Normal distribution test Q-Q chart

As shown in the figure 4-5 below is the prediction process of BP neural network:

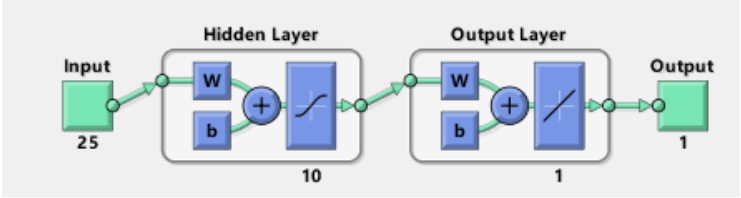

Figure 4: Model structure of BP neural network

ISSN 2616-5902 Vol. 3, Issue 4: 31-36, DOI: 10.25236/AJBM.2021.030408

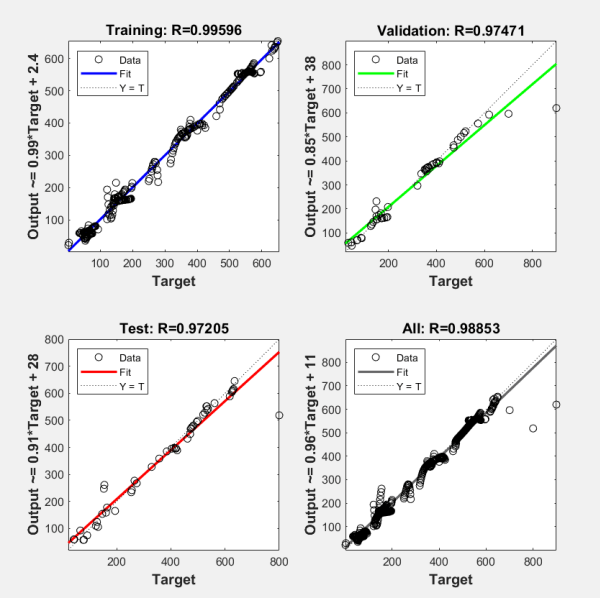

Figure 5: BP neural network testing process

3.4 Results

As shown in the figure 6-8 below, the predicted values of the parameters after Biden's administration are predicted with the data from 2012 to 2015:

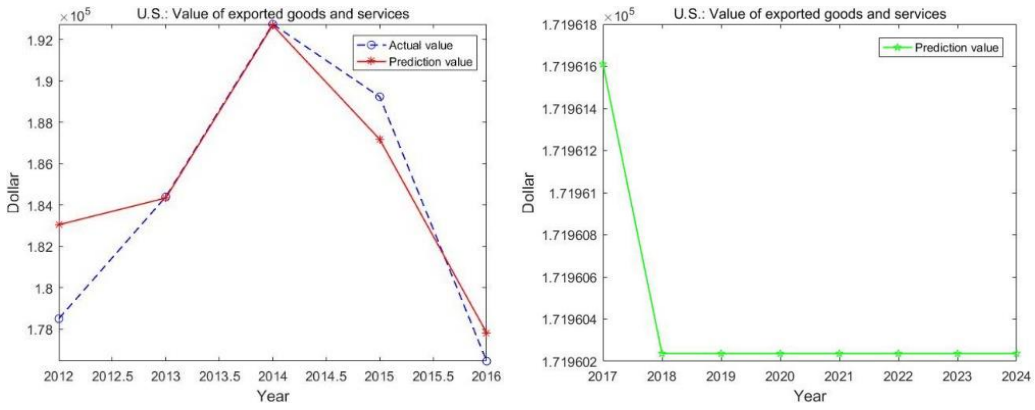

Figure 6: Forecast result of US exports values with Biden in power

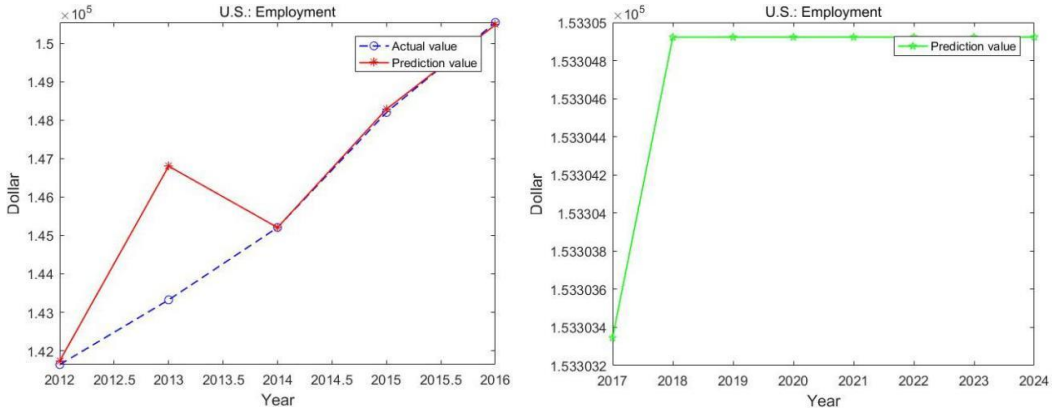

Figure 7: Forecast result of US employment values with Biden in power

ISSN 2616-5902 Vol. 3, Issue 4: 31-36, DOI: 10.25236/AJBM.2021.030408

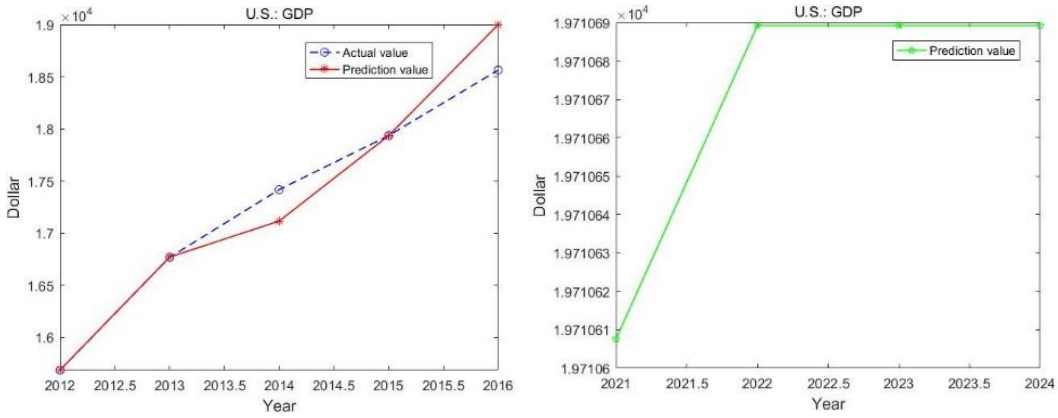

Figure 8: Forecast result of US GDP with Biden in power

3.5 Analysis of the Result

Through BP neural network prediction, it can be found that if Biden is in power, the export volume of the United States will decrease, while that of the United States under trump will rise. The employment rate will rise when both are in power. The employment rate will rise more when trump is in power, and GDP will rise more when Biden is in power. Moreover, GDP growth in trump will decline year- on-year, while Biden will rise. The consumption level of residents will rise during Biden's administration and decrease during trump's administration.

We should put forward two kinds of preparatory measures for Biden and trump respectively after they are elected. If Biden is elected, according to the model analysis results, we can find that, the export volume of the United States will decrease with the employment rate will rise. If Biden is the president, the GDP growth of the United States will be stronger, the United States will become stronger than that under trump, and the total consumption of residents will rise accordingly. Therefore, the threat of the United States to China will become greater after Biden takes office.

China's unemployment rate will increase, which proves this from the side, but the trade volume between China and the United States will increase if Biden is in power. In the face of Biden's administration, I think China should give full play to its advantages in infrastructure, increase the employment rate and export more goods to the United States in line with Biden's policy.

If Trump wins the election, the GDP growth of the United States will not be as strong as Biden's administration, the year-on-year growth will decline year by year, and the total consumption of residents will also decline. However, due to Trump's trade war policy, China's exports to the United States will encounter resistance. And the Trump administration takes negative measures to treat COVID-19 pneumonia, and the epidemic may become more serious. In the face of Trump's administration, I think China should persist in the trade war with the United States to gain more exports, stabilize its own development, realize the 2025 Made in China plan as soon as possible, and improve the innovation of Chinese products.

4. Evaluation and Promotion of Model

Before the BP neural network prediction, the model in this paper also carries out correlation analysis to improve the accuracy of prediction. The method used to predict the influence of Biden's administration on the basis of the changes of economic and other factors in Obama's administration is bound to have some errors. The novel coronavirus pneumonia is not considered in 2020.

References

[1] He Wanxin, Yang Hua, Zhao Gang, Zeng Yan, Li Gang. A Quantile-Based SORA Method Using Maximum Entropy Method with Fractional Moments [J]. Journal of Mechanical Design, 2021, 143 (4).
[2] Engineering - Concurrent Engineering; Recent Studies from Central University of Finance and Economics Add New Data to Concurrent Engineering (Service Evaluation Throughfh-entropy Method: a Framework for the Elderly Care Station) [J]. Journal of Technology & Science, 2020.

ISSN 2616-5902 Vol. 3, Issue 4: 31-36, DOI: 10.25236/AJBM.2021.030408

[3] Science - Scientific and Industrial Research; New Scientific and Industrial Research Study Findings Have Been Reported by Researchers at National Institute of Technology (Assessment and Implementation of Lean and Green Supply Chain In Medium Scale Automobile Industries Using Ahp and Fuzzy ...) [J]. Journal of Transportation, 2020.

[4] Engineering - Management and Engineering; Study Findings on Management and Engineering Discussed by Researchers at University of Defence (Application of hybrid model fuzzy AHP - VIKOR in selection of the most efficient procedure for rectification of the optical sight of the long-range ...) [J]. Journal of Engineering, 2020.