Hindawi
Mathematical Problems in Engineering
Volume 2022, Article ID 2780122, 9 pages
https://doi.org/10.1155/2022/2780122

Research Article

BP Neural Network Algorithm Based on Big Data for Monitoring and Early Warning of China's Public Finance

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Received 18 April 2022; Revised 26 May 2022; Accepted 30 May 2022; Published 25 June 2022

Academic Editor: Wen-Tsao Pan

Public finance plays an important role in the development and construction of the country. Public finance is derived from and used by the people. On the one hand, public finance mainly comes from national taxes and the income of some state-owned enterprises or state-owned assets. On the other hand, public finance is used for national infrastructure, military investment, scientific and technological research and development, national daily operation, and other expenses. Therefore, the state of public finance is closely related to people's lives, and it is also one of the basic symbols of a country's prosperity and strength. How to ensure that the country's public finance is in a good state, grasp the leverage balance of public finance revenue and expenditure, and avoid the situation of national "bankruptcy" is additional attention that the public finance department should pay in the process of operation. Therefore, we urgently need a set of public finance monitoring and early warning system that matches China's public finance operation mechanism and conforms to China's basic national conditions. At present, previous studies rely on the existing detailed data on public finance to measure the situation of China's public finance, but this method refers to fewer data and is not forward-looking enough. Therefore, this paper adopts a BP neural network algorithm to monitor and warn the situation of China's public finance based on computer big data.

1. Introduction

The essence of public finance is a kind of government distribution behavior. It is a model parallel to a market economy. When there are problems in the country's market economy, the government public finance plays the role of macro-control (Zhi et al. 2021) [1]. It concentrates the labor value created by the people and then transports it to all aspects of the country. Such as social welfare, military construction, scientific and technological research and development, and other state-owned enterprises or institutions (Yin et al. 2021) [2]. For example, China stipulates that companies must pay five insurance and one fund to employees. When people meet the retirement age and pay pension insurance in full, they will enjoy a pension every year; Or scientific research funds or project funds needed by research projects of some scientific academies to ensure the international front-end status of China's science and technology; In addition, some large-scale infrastructure projects that benefit the people, such as subways, railway stations, and airports, are also initiated and funded by the state; In addition, the remuneration received by staff employed during the normal operation of the country, such as civil servants, is also uniformly issued by public finance (Pan et al. 2021) [3]. Therefore, we can see that the national public finance is to concentrate the human and financial resources of the country and do some work beneficial to the people in the name or on behalf of the country. Therefore, the state of public finance is closely related to people's happy life. When the state's public finance is in good condition, the people live and work in peace and contentment and the people are rich. The country's comprehensive strength has gradually increased, and its international status and influence have also gradually increased; When the state of national public

finance is in a bad situation, it is bound to affect the normal operation of the country. For example, the annual pension of retirees cannot be issued, and some urgent or necessary large facilities cannot be built (Jin et al. 2021) [4]. In the current context of economic globalization, some means of production in China still rely on imports. If the national financial capacity is insufficient, it will lead to the insufficient purchase of means of production and other effects. Finally, it leads to the deterioration of social stability and even the bankruptcy of the government. The essence of government bankruptcy is that the government has a deficit in public finance and is unable to pay or repay its debts (Rui et al. 2020) [5]. To avoid the bankruptcy of local governments, the debt crisis caused by the central government forced the central government, so it allowed the bankruptcy and reorganization of local governments. Our latest is the bankruptcy and reorganization of Hegang City, Heilongjiang Province on January 20, 2022. Hegang City, Heilongjiang Province has been relying on coal resources as the main source of public finance for many years. With the depletion of coal resources in recent years, the economic benefits declined year by year. Finally, the government failed in economic transformation and announced bankruptcy and reorganization (Luca et al. 2021) [6]. In addition, many Western European countries, such as Greece and Iceland, have also declared bankruptcy in recent years. It was analyzed that the main reason for the bankruptcy of these countries was that the government issued excessive social welfare, resulting in a deficit in public finance, the state could not make ends meet, could not repay its debts, and finally declared bankruptcy (GOR et al. 2021) [7]. From the above cases, we can see that public finance is not only closely related to people's lives but also closely related to the fate of the government and the country. The main reason for the deterioration of the state of the government's public finance is that the government revenue and expenditure cannot offset, resulting in losses or fiscal deficits, and finally, the government is unable to repay and declares bankruptcy.

To avoid the imbalance between revenue and expenditure in the final financial liquidation, we need to predict the two in advance, so as to measure the situation of public finance. If there is a bad trend, we need to take corresponding measures to remedy it in advance. This is the significance of public financial risk monitoring and early warning. The traditional risk early warning method is only to analyze and check the income and expenditure in public finance and conclude the state of public finance. However, this method only counts what has happened, and cannot effectively predict some income or expenditure that has not occurred (Smith et al. 2021) [8]. Therefore, the effectiveness and foresight of risk early warning of this method are insufficient, which may lead to the risk of late prediction results and insufficient remedial measures. Therefore, we hope to introduce BP neural network into risk monitoring and early warning. Through the optimization of China's public finance risk monitoring and early warning indicators. Because BP neural network has a good simulation effect, small data demand, and nonlinearity. With the advantages of feedback regulation ability, the neural network is most suitable for the monitoring and early warning of public financial risk in China. BP neural network can fully combine the detected revenue sources in public finance, including tax, through neural network deep learning and other algorithms; Income from state-owned assets, such as profits obtained from the import and export of national resources or national land leasing; And other fee income, such as large-scale social infrastructure built by the state (subway, train, aircraft Park, etc.), and comprehensively monitor the sources of expenditure in public finance (the specific sources are described in detail above and will not be repeated here), so as to realize full monitoring of data. Next, the BP neural network algorithm is trained and learned to achieve the best predictive value of public financial revenue and expenditure, and finally, realize the function of public financial risk monitoring and early warning and maximize its significance.

2. Related Work

The research on public finance risk monitoring and early warning system originated in the 1980s. In the 1970s, the world had an economic crisis caused by oil, which led to the world economic recession (Agnieszka et al. 2020) [9]. During this period, to alleviate the impact of the economic crisis, the Federal Reserve and banks in other developed countries took the lead in agreeing to adopt a loose monetary policy. With the implementation of this policy, the interest rate generated by the lending of the Federal Reserve and other capitalist banks was very low, which attracted many people to borrow money from banks for investment, so that businessmen can effectively alleviate the cash flow in the capital chain at a low interest rate, And banks can maintain a certain profit under the economic crisis (Cristina et al. 2020) [10]. Many developing countries in Latin America borrow money. They began to borrow money from capitalist banks to develop oil. This initiative has also enabled a large number of Latin American countries to quickly enter the door of middle-income countries from low-income countries (Xiang et al. 2020) [11]. However, in the early 1980s, the banks of capitalist countries suddenly decided to stop loose monetary policy and raise lending rates. At the same time, the Federal Reserve suddenly announced the rise of the US dollar exchange rate (Jie et al. 2020) [12]. This move has a direct impact on the price of oil. Because the exchange rate of the US dollar is inversely proportional to the price used, when the exchange rate of the US dollar rises, the price of oil begins to fall sharply. Businessmen who borrow money from capitalist banks to exploit oil cannot make ends meet, and the input is higher than the output (Xiang et al. 2020) [13]. This also directly led to Latin American countries falling into a serious debt crisis and finally forced to go bankrupt and restructure, while capitalist countries also took the opportunity to carry out a large number of privatization. As a result, the economic development of Latin American countries began to be seriously hit, and the debt trap has not recovered so far (Sujie et al. 2020) [14]. This event is also known as the "middle and middle income trap," but the essence behind it is caused by a serious fault in the national public finance. If Latin American countries could predict the

public finance risk of large-scale borrowing to exploit oil and prevent it in advance, they would not invest so much in the initial stage or make some remedies in the later stage, so as to avoid the fate of bankruptcy and reorganization (Qun et al. 2020) [15]. For this reason, academia began to pay attention to the problem of public financial risk monitoring and early warning in the 1980s, and the analysis of bankruptcy and reorganization in Latin American countries is the starting point of the whole logical discussion (Guiping et al. 2020) [16]. The earliest early warning theory was put forward by Babson, an American economist. He believes that the state of the country's public finance and the state of the country's economy are the same as the trend of the stock market. This theory was not recognized at the beginning until it successfully predicted the stock disaster in 1929. So far, the argument that the stock market is an economic barometer is still supported by most people. In addition, Professor Babson proposed the "Babson index", which is also the first indicator to measure the state of public finance in history. Subsequently, the United States successively established institutions specialized in monitoring economic fluctuations and the state of public finance. Harvard University established the Economic Research Committee in 1917, which proposed the "American general business intelligence index" to measure the monitoring and analysis of American economic fluctuations. This practice has gradually spread all over the world. In recent years, the world bank, the International Monetary Fund, and the European community have begun to strengthen the research on national public finance. They require the government to ignore the risk situation of public finance while making financial reports, which is the premise of trade exchanges. In addition, Brazil has set up "local government borrowing restrictions" and Colombia has set up a "traffic signal system". These norms have played a substantive role in the monitoring and early warning of government public financial risks (Jian et al. 2020) [17].

China's risk monitoring and early warning of public finance started late, mainly from the reform and opening up in 1978. In the early stage of reform and opening up, China's economic system was mainly a planned economic system. Although some research was also carried out on the risk monitoring and early warning of public finance during this period, most of them were qualitative research (yuan y et al. 2020) [18]. At the same time, in the early days of the founding of the people's Republic of China, we experienced three years of natural disasters from 1960 to 1965 and the impact of historical events such as the Cultural Revolution from 1966 to 1976. For a long time, the research on public financial risk monitoring and early warning was in a stage of slow development or even stagnation (Zhong et al. 2020) [19]. Until the reform and opening up in 1978, the objective economic fluctuation law under the market economy system requires us to strengthen the risk monitoring and early warning of Public Finance (shliu sh et al. 2020) [20]. The Institute of systems engineering of Jilin University published the measurement and prediction of China's economic cycle in 1987. The research results have become one of the representative studies in the risk monitoring and early warning research of public finance in China, which has laid a foundation and provided a theoretical basis for the follow-up risk monitoring and early warning research of public finance. At the same time, scholars in the fields of mathematics, metrology, and statistics have studied China's public finance through interdisciplinary research. For example, Dong Wenquan used the composite index to study public finance; Professor Chen Lei and others used the S–W prosperity index for research; Xu Dilong, he Dazhi and others established an index early warning system in the field of public finance risk monitoring and early warning by using the overall financial risk analysis method commonly used in the financial field to monitor the risk in public finance (Shaohua et al. 2020) [21].

3. Method

Before establishing the research method of public financial risk monitoring and early warning system, we first need to make a theoretical analysis from three aspects: the formation source, communication mode, and the structure of monitoring and early warning system. The formation source of public finance risk has been described in detail above. The function of public finance is to provide public goods or public services in the role of the state, maintain the stability of the national economy and further promote the development of the national economy. When there is a risk in the public finance, that is, the income and expenditure of the national public finance cannot be offset, and there is an imbalance, the country will not be able to operate well or even normally. We call the national public finance risk. The emergence of public finance risk is the result of the comprehensive action of various factors, which is mainly divided into internal factors and external factors. The internal factors mainly come from the capacity of the national public finance department. For example, European countries ignore their capacity and over-distribute social welfare, resulting in the country's inability to repay the debt deficit; Or other imbalances that lead to excessive expenditure and insufficient income. The main external factors come from the country's macroeconomic regulation and control and the objective fluctuations of the financial industry. Macroeconomy determines the scale and efficiency of social production, and the law of financial development plays a leading role in social capital flow and social resource allocation. Therefore, if we want to carry out risk monitoring and early warning on public finance, we should first focus on the internal and external factors affecting the risk of public finance. In addition, the complexity of public finance risk monitoring and early warning is also reflected in the complexity of the public finance transmission process, which is mainly reflected in two aspects: one is the transfer and spread of public finance risk in the transmission process. If there is an imbalance in the revenue and expenditure of local public finance, it usually chooses the decision of borrowing, which leads to the scenario of risk transfer or joint undertaking. When the local public finance cannot adjust and repay the debt in time, the debt will also affect the public finance of the borrowed local government, and then bring potential public finance risks to

the local government. Although China's budget law stipulates that local governments are prohibited from borrowing, it is still impossible to avoid special behaviors under special circumstances. Therefore, because of the public financial crisis caused by local governments borrowing but unable to repay, China's central government allows local governments to carry out bankruptcy and reorganization, which is also a measure to avoid the transfer of local government public financial crisis to the central government and further spread of public financial crisis; On the other hand, once the public financial risk occurs, it will not only have an impact within China's financial sector. When the government is unable to repay its debt, it usually chooses to increase the issuance of money. The issue of money will further trigger inflation, and finally, the inflation crisis will affect people's lives. At this time, the government's financial crisis will gradually transition into an economic crisis. Therefore, in the process of public financial risk monitoring and early warning, we should not only pay attention to the source of risk but also pay attention to the influence of various factors in the process of risk transmission. Therefore, the monitoring and early warning process of public financial risk based on the BP neural network algorithm is mainly shown in Figure 1.

At present, the commonly used models for public finance monitoring and early warning include the risk matrix model, binary classification tree model, analytic hierarchy process model, and neural network model. Based on previous studies, neural network model, as a new analysis method, performs better in the complexity and comprehensiveness of data analysis than other methods. Therefore, this paper mainly studies the monitoring and early warning of public financial risk through a neural network algorithm. The specific comparison results are shown in Figure 2.

Figure 2 analyzes and compares the KLR model, linear weighting factor, Fisher discriminant model, FR probability model, BP neural network model, risk matrix, analytic hierarchy process, binary classification tree model, and analytic hierarchy process. It can be clearly seen from Figure 2 that from the overall score of the overall monitoring and early warning system method of public finance, BP neural network mainly depends on computer technology. Therefore, the complexity of the method is far lower than that of other methods, and the performance is extremely superior. On the whole, the method based on BP neural network has the highest comprehensive score, which shows that the research on public financial risk prediction through BP neural network has certain methodological convenience. However, it should be noted that the limitation of BP neural network method in the research of risk monitoring and early warning is much higher than other algorithms, which may cause some errors in the process of data processing. Therefore, to make the monitoring more accurate, we need to improve the BP neural network algorithm in the process of public financial risk monitoring and early warning.

The traditional BP neural network is suitable for solving local search problems, and the optimal value can be obtained quickly from online problems. However, because the optimal value of BP neural network is searched and transmitted along linear neurons, the algorithm is easy to fall into a local minimum in solving nonlinear problems. Therefore, when using BP neural network to solve nonlinear problems, there will be the result of taking the local optimal value as the optimal value in the definition domain. The law of general BP neural network signal changing with time is shown in formula (1) and formula (2).

$$\tau \frac{\mathrm{d}u_i}{\mathrm{d}t} = -u_i(t) + \sum w_{ij}(t) - \theta_t, \tag{1}$$

$$y_i(t) = f[u_i(t)]. \tag{2}$$

For solving problems in different linear states, BP neural network has different activation functions to extract its linear features. For linear problems, linear activation functions are usually used for extraction. See formula (3) for the specific extraction formula.

$$f(u_i) = \begin{cases} 1, & u_i \geq u_2, \\ au_i + b, & u_i \leq 0 \leq u_2, \\ 0, & u_i \leq u_1. \end{cases} \tag{3}$$

When the solution object presents a nonlinear state, it is divided into jump type and S-type according to the degree of domain dispersion. Different activation functions are usually used for different degrees of domain dispersion. When domain jump type is defined, BP neural network uses step function to activate the function. See formula (4) for the specific process.

$$f(u_i) = \begin{cases} 1, & u_i \geq 0, \\ 0, & u_i \leq 0. \end{cases} \tag{4}$$

Another common S-type nonlinear problem is usually trained with a sigmoid activation function. The sigmoid function is one of the most widely used activation functions in BP neural network. Its function itself presents a nonlinear non derivative distribution, but the derivative of the sigmoid function presents a linear continuous derivative distribution. Therefore, in the process of sigmoid function activation training, we can adjust the curve parameters of the function by adjusting the constant C value in the function, which can achieve the characteristics similar to the over-order function. This is also one of the reasons why it is widely used in the neural output activation training of BP neural network. See formula (5) for specific activation function formula.

$$f(u_i) = \frac{1}{1 + \exp\ (-u_i lc)^2}. \tag{5}$$

To solve the optimization problem, we use the input value and output value of BP. The input value of x-layer BP is quantified as the optimal value of BP network. The optimal value of the x-layer BP network is introduced into the output value of BP network. Thus, we can obtain the solution matrix w between the hidden layer y and the output layer o. The specific formulas of each process are shown in formulas (6) to (10).

$$X = (x_1, x_2, \ldots, x_i, \ldots, x_n)^T, \tag{6}$$

$$Y = (y_1, y_2, \ldots, y_j, \ldots, y_m)^T, \tag{7}$$

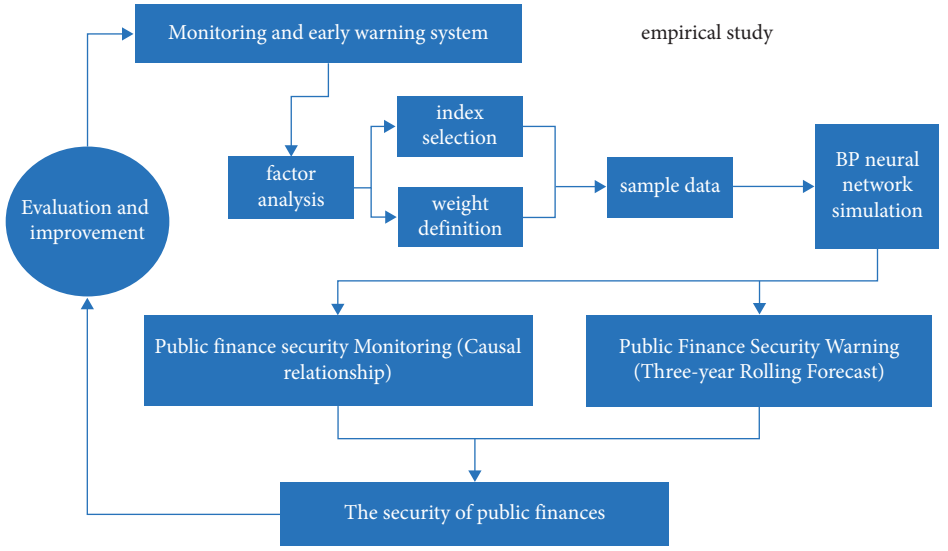

Figure 1: Flow chart of empirical research.

$$O = (o_1, o_2, \ldots, o_k, \ldots, o_t)^T, \tag{8}$$

$$V = (v_1, v_2, \ldots, v_j, \ldots, v_m)^T, \tag{9}$$

$$W = (w_1, w_2, \ldots, w_k, \ldots, w_t)^T. \tag{10}$$

The accuracy of the improved BP neural network model algorithm is compared with that of the traditional BP neural network algorithm and other algorithms, as shown in Figure 3. It can be seen that with the increase in training algebra, the loss value of the algorithm shows a downward trend. But on the whole, the accuracy and stability of the improved BP neural network are greatly improved.

On the other hand, the traditional BP neural network is very sensitive to the initial weight. When the network is initialized and trained with different weight assignments, the optimal training solution is often different. Therefore, in the initial training of the model, the training results of different people are different, which is the reason behind it. The influence of different initial values of traditional BP neural networks on the results is shown in Figure 4. It can be seen from Figure 4 that the training results of traditional BP neural networks are greatly affected by the initial value, the stability of the training results is poor, and the error value is also high. This disadvantage of the traditional BP neural network has a great impact on the training results, so this paper further improves the problem of over-dependence on the initial value of the model.

The main goal of improving the BP neural network is to speed up the training speed, avoid falling into local minimum and improve other abilities. Even so, the effective learning rate at the beginning of training may not be suitable for subsequent training. To solve this problem, people recall making the network automatically adjust the learning rate in the training process. This method can ensure the stable learning of the network, make its error continue to decline, improve the learning rate and make it learn at a greater learning rate. Once the learning rate is too large, the learning rate should not be reduced, that is, once the learning rate is too large.

According to the definition of the BP neural network, we can obtain the output value net of each output node. See formula (11) for details.

$$net_k = \sum_{j=0}^{m} w_{jk} y_i, \quad k = 1, 2, \ldots, l. \tag{11}$$

By continuously adjusting the parameters, the error e between the output values is minimized. The solution process of error E is shown in the formula.

$$E = \frac{1}{2}(d - O)^2 = \frac{1}{2}\sum_{k=1}^{l}(d_k - l_k)^2. \tag{12}$$

The error signal can be further obtained by expanding from formula (12). See formula (13) and (14) for the specific process:

$$\begin{aligned} \delta_k^o &= -\frac{\partial E}{\partial n\ et_k} \\ &= -\frac{\partial E}{\partial o_k}\frac{\partial o_k}{\partial n\ et_k} \\ &= -\frac{\partial E}{\partial o_k} f'(net_k), \end{aligned} \tag{13}$$

$$\begin{aligned} \delta_j^y &= -\frac{\partial E}{\partial n\ et_j} \\ &= -\frac{\partial E}{\partial y_j}\frac{\partial y_j}{\partial n\ et_j} \\ &= -\frac{\partial E}{\partial y_j} f'(net_j). \end{aligned} \tag{14}$$

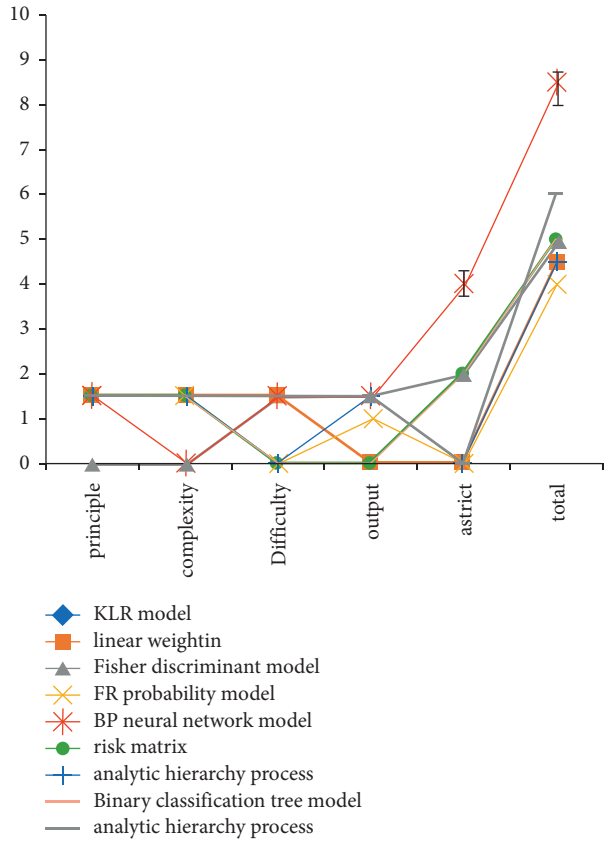

Figure 2: Monitoring and early warning method score.

Next, the model error signal is brought into the decision matrix M to obtain the BP neural network model that does not rely too much on the initial value and has the smallest error difference. The introduction process is shown in formula (15), and the accuracy of the training result of the improved BP neural network model is shown in Figure 5.

$$M = \begin{matrix} A_1 \\ A_2 \\ \\ \\ \\ A_m \end{matrix} \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \cdots & \cdots & & \\ & \cdots & \cdots & \\ & & \cdots & \cdots \\ x_{m1} & x_{m2} & \cdots & x_{mn} \end{bmatrix}. \quad (15)$$

After optimizing the initial value of the traditional neural network and the local optimal value of the traditional neural network. We take the 2011 public finance risk monitoring and early warning of A/B Township in Qingdao as an example, and the specific fitting results are shown in Figure 6.

Through Figure 6, we can see that the real data of A and B are roughly consistent with the monitoring and early warning of public finance predicted by the BP neural network. For places A and B with high debt ratios, the corresponding public finance risk monitoring, and early warning index is also high. When the debt service ratio of A and B is low, the corresponding public finance risk monitoring and early warning index are also low. Therefore, the

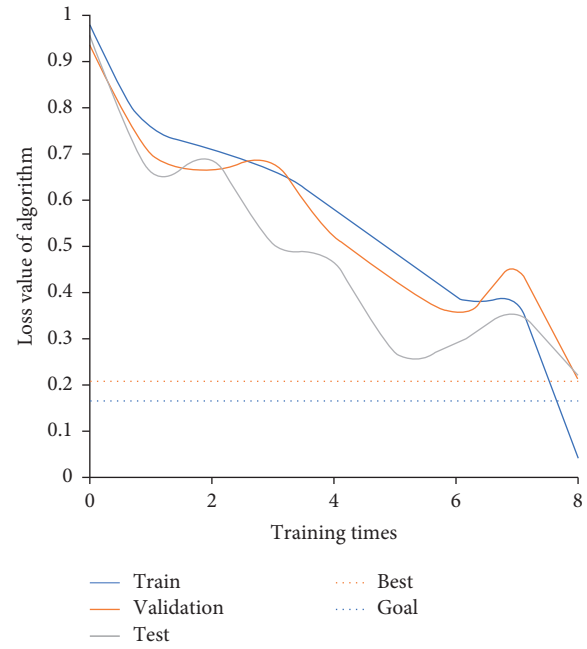

Figure 3: Improved BP neural network algorithm accuracy performance degree.

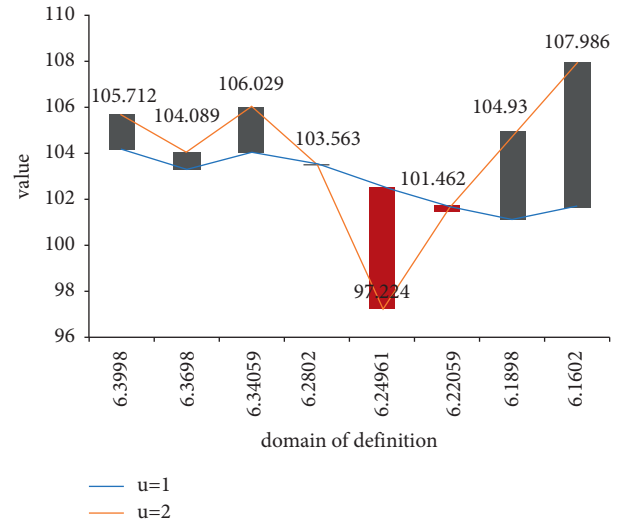

Figure 4: Training effect of traditional BP neural network under different initial values.

data from the actual case fitting proves that the improved BP neural network public finance risk monitoring and early warning system proposed in this paper has a high fitting rate and good accuracy.

4. Result Analysis and Discussion

Finally, we carry out real public financial risk monitoring and early warning based on the improved BP neural network algorithm. We preliminarily design the BP neural network early warning model through MATLAB software. The model includes the front-end GUI window interface and the BP neural network algorithm on the back-end server to monitor

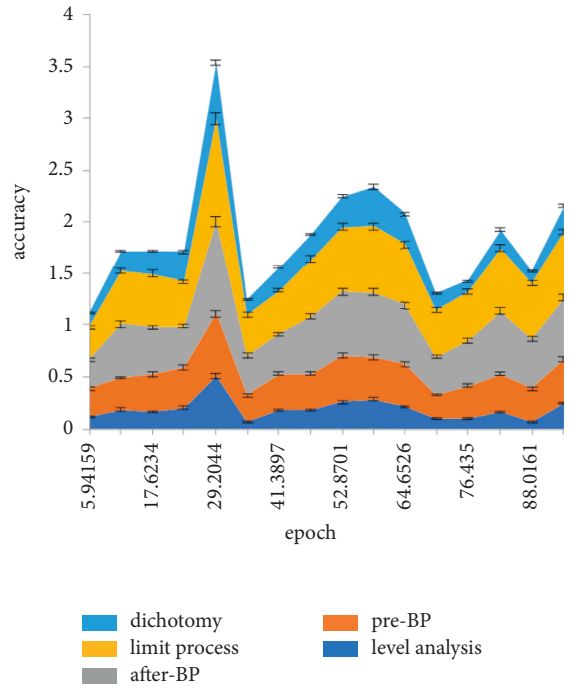

Figure 5: The accuracy of improved BP neural network.

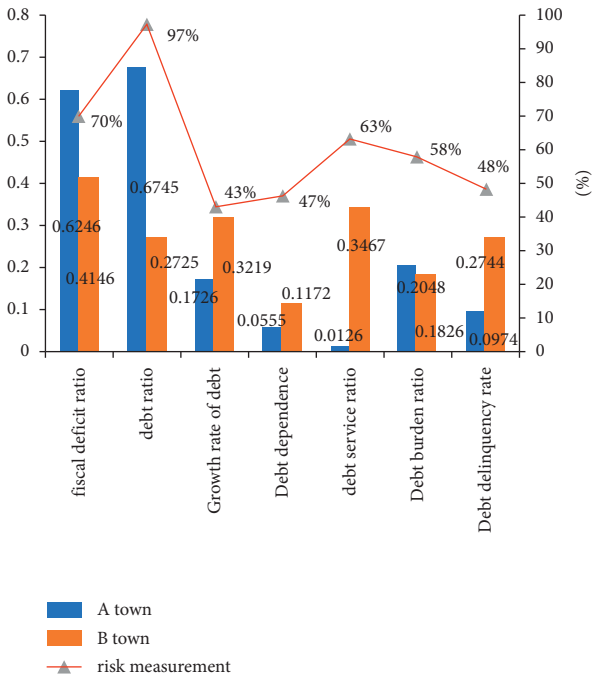

Figure 6: Prediction results of improved BP neural network model.

and warn the public about financial risk. The specific GUI window interface is shown in Figure 7.

The page prompts that when using the program for public financial risk monitoring and early warning system, you need to first confirm the number of layers of the BP neural network, the number of input neural layer nodes, the value, and range of input parameters, the number of neurons in the hidden layer and the activation function used. After

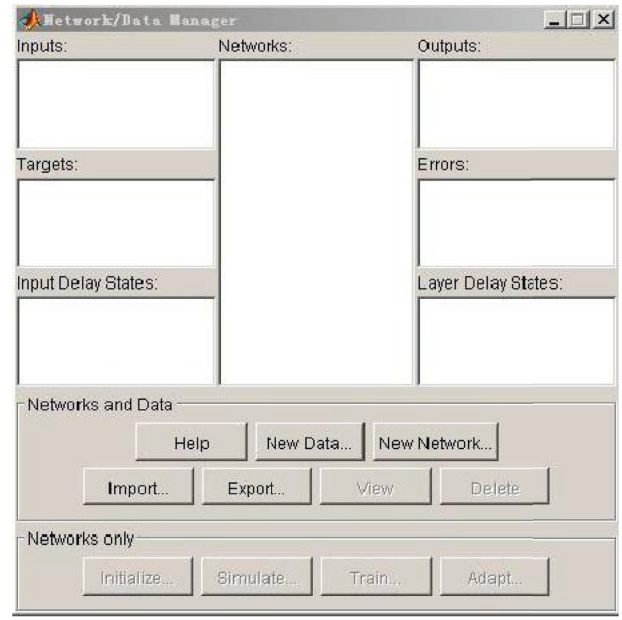

Figure 7: Basic GUI window interface for artificial neural networks.

the user inputs the training premise as required, the model will train according to the set parameter rules and output the results. Considering the applicability of the program, only the nonadjustable parameters in the algorithm are forcibly fixed in the program, and there are no mandatory requirements for some parameters that can be adjusted according to the monitoring and early warning object.

Next, we use the system to monitor and warn the public finance of a local township. Public finance risk is mainly divided into central public finance risk and local government public finance risk. Generally speaking, due to the high flexibility and small impact of local public finance, the risk of local public finance is much greater than that of central public finance. Even one of the sources of central public finance risk is that the transfer of local public finance risk grafts the central government, resulting in central public finance risk. Therefore, in the process of public finance monitoring and early warning, it is necessary to pay attention to the risk monitoring and early warning of local public finance. The specific prediction results are shown in Figure 8.

It can be seen from Figure 8 that there is a small gap between the predicted value of public finance-related indicators for a local government and the actual statistical value, and the basic predicted value can well fit the actual statistical data. The specific prediction data is the most accurate in the debt growth rate index, and the difference between the two is only 0.06%. In terms of debt ratio, the prediction result is poor, with a difference of 0.33%. We speculate that this is due to the inconsistency between the two calculation processes. When calculating the debt growth rate, the government's annual debt lending is determined according to the economic situation of the current year. In the absence of special circumstances, such as drought and flood and other irresistible factors, the government's annual

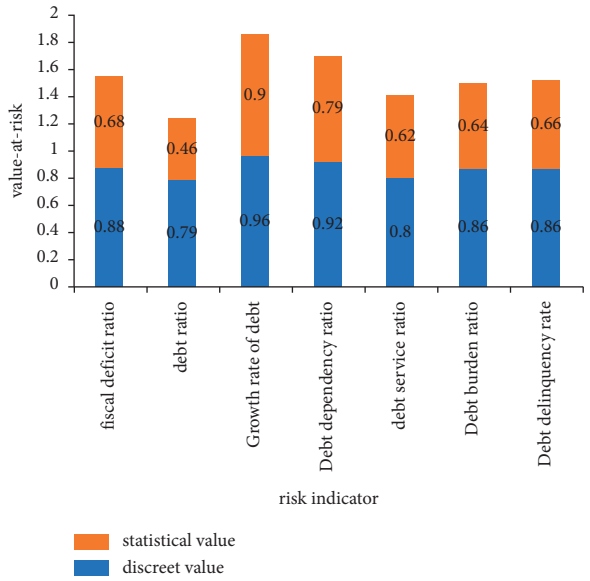

Figure 8: The optimized BP neural network algorithm predicts the results of local government public finance.

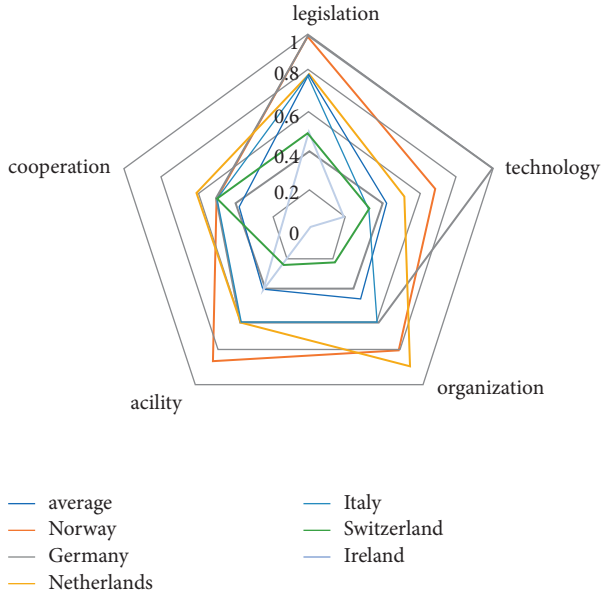

Figure 9: Key points of daily monitoring of public finance risks in Western European countries.

economic situation is stable. Therefore, many data can be referred to when calculating the debt growth rate, and there are few accidents, Therefore, the fitting degree of debt growth rate is good; Debt ratio refers to the ratio of the government's external debt balance to the government's export revenue. Therefore, two data indicators are involved in the calculation of debt ratio - debt balance and government export revenue. On the one hand, they are related to the debt budget and on the other hand, they are related to import and export trade. Both indicators are greatly affected by market factors. For example, the epidemic has led to the failure to implement a large number of budgets and the stagnation of import and export trade in the past two years, These factors are often unpredictable in risk monitoring and early warning through BP neural network. Therefore, there is a slight deviation in the predicted value due to too many external irresistible factors. In the follow-up research, we can try to set some parameters to simply simulate or simply simulate this kind of abnormal problem, so as to further improve the early warning accuracy of the model. The difference between the statistical value and the predicted value of other public finance risk monitoring and early warning indicators is about 0.2%. Overall, the predicted value is more accurate.

In addition to the public finance early warning function of the improved BP neural network at a specific time, it also plays a monitoring function in daily life. This process is a part of early warning. Only data statistics and prediction can be carried out without outputting conclusions. Therefore, using the improved BP neural network to conduct daily monitoring of public finance risks in Western European countries, it can be found that the key contents are shown in Figure 9. We can also focus on the following aspects of public financial risk monitoring in our country.

5. Conclusion

Previous studies rely on the existing detailed data on public finance to measure China's public finance, but this method involves fewer data and is not forward-looking enough. Therefore, based on computer big data, this paper uses BP neural network algorithm to monitor and warn the situation of China's public finance. BP neural network algorithm is mainly used to monitor and warn the public about financial risk. The problems of local optimal solution and over-dependence on initial parameters in traditional BP neural networks are improved, and the prediction results are more accurate. In addition, this paper also simply designed the GUI page of public financial risk monitoring and early warning and used the program to test the daily monitoring and early warning of public financial risk of a township government in China. The overall prediction performance is good, but the prediction results of some risk indicators involving force majeure factors are poor. We believe that these factors can be added to the algorithm to make the prediction more accurate. However, there are some limitations in this paper. For example, only the nonadjustable parameters in the algorithm are forcibly fixed in the program, and there are no mandatory requirements for some parameters that can be adjusted according to the monitoring and early warning objects. This needs further elaboration and analysis in future research and analysis.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

This work was supported by 2021 Shaanxi Provincial Education Reform Project, Construction and Practice of Talent Training Mode for Innovative Experimental Class of Information Specialty under the Background of New Engineering (No. 21BY183), 2021 Shaanxi Provincial 14th Five-Year Education Science Planning Project, and Exploration on the Training Mode of Entrepreneurship and Innovation Talents Based on OBE Concept (No. SGH21Y0318).

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