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Performance Evaluation of Enterprise Financial Work Based on BP Neural Network

Zhaoyang Wu*

Qinghai Normal University, Qinghai, China
75666145@qq.com

**corresponding author*

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Abstract: Comprehensively and scientifically evaluating the work results and financial performance of enterprise development is an important project in enterprise development. In order to solve the shortcomings of the existing research on the performance evaluation of enterprise financial work, this paper discusses the function equation of BP neural network and the constituent elements of the performance evaluation of enterprise financial work, and aims at the performance evaluation of enterprise financial work based on BP neural network. The evaluation indicators and parameter settings of the model application are briefly introduced. And the structure of the financial work performance evaluation model proposed in this paper is designed and discussed. Finally, the financial work performance evaluation model designed in this paper is compared with the training data, target data and real data of the financial work performance evaluation of six different types of enterprises. The experimental data show that the training data of the financial work performance evaluation model designed in this paper is not much different from the target data and the real data. About 1.5%, and the error between training data and target data is only about 1.2%, so it verifies the reliability of the application of the enterprise financial work performance evaluation model based on BP neural network.

1. Introduction

The managers of the enterprise promote the improvement of the enterprise management system and the steady development of the enterprise through the financial performance evaluation. A good level of financial performance represents that the enterprise has a reliable development model and management method, and promotes the scientific and sustainable development of various enterprises.

Nowadays, more and more scholars pay attention to the research of various technologies and system tools in the performance evaluation of corporate financial work, and through practical research, they have also achieved certain research results. Karpushenko M U believes that financial performance evaluation is a key part of ensuring survival, coping with various competitions and promoting the improvement of operation management. Financial performance evaluation has scientific and objective evaluation indicators. Karpushenko M U mainly uses logistic regression analysis method to determine the influencing factors of financial performance indicators. And the correlation between them is analyzed, and it is believed that the financial performance indicators are closely related in terms of asset growth ratio, profitability, debt repayment ability, and development ability. The number of clusters, the experimental results shows that the financial performance evaluation will affect the enterprise's asset structure ratio, asset growth ratio [1]. Altunta ST's assessment of corporate performance and efficiency, as well as the evaluation and adjustment of corporate financial health, remains a prerequisite for improving the decision-making process of corporate strategic management. The purpose of Altunta ST is to evaluate the performance and efficiency of the Slovak medical spa industry in recent years, to study the link between these two types of corporate financial performance evaluations, and to adjust the corporate operation management system through the assessment of corporate financial status. Results of spa industry performance as measured by economic value added can show a clear picture of the financial health of the business. Therefore, the management of enterprise financial efficiency is very critical to realize the sustainable success strategy and competitive development of the enterprise [2]. Pivavar IV analyzes the impact of an energy capital on the financial performance of small and medium-sized energy companies. Pivavar IV takes a sample of 587 small and medium-sized Portuguese energy companies and uses the GFM system to estimate and analyze dynamic corporate financial data. The findings suggest that the human and structural capital of energy capital can have a positive impact on the financial performance of energy companies. Human capital and relational capital are the main part of the success of energy enterprises and the premise and foundation of energy development. Furthermore, the results show that co-ordination among energy capital components improves the financial performance of energy firms [3]. Although there are many researches on performance evaluation, the research on performance evaluation based on BP neural network still has some limitations.

Therefore, in order to solve the problems existing in the existing research on the performance evaluation of corporate financial work, this paper firstly introduces the mathematical formula model of BP neural network and the concept of the basic composition of performance evaluation, and then discusses the design and implementation of the performance evaluation model for corporate financial work designed by the Institute. The parameter settings and evaluation indicators in the application, and finally design the company's financial work performance evaluation model framework, and carry out the experimental test through the specific application effect of the designed model. The final experiment shows the effectiveness of the application of the company's financial work performance evaluation model designed in this paper. .

2. Performance Evaluation of Enterprise Financial Work Based on BP Neural Network

2.1. Performance Evaluation of Corporate Financial Work

The enterprise financial work performance evaluation system is composed of the following elements:

(1) Evaluation objectives

The evaluation goal refers to the purpose that performance evaluation should achieve, and is the premise of the entire performance evaluation system to operate [4].Therefore, performance

evaluation goals should also serve the business development and competition goals of enterprises [5].

(2) Evaluation subject

The evaluation subject generally refers to the stakeholders who have a certain interest relationship with the evaluation object and are concerned about the development status of the enterprise and the performance evaluation results [6]. Usually includes managers, creditors and shareholders, and employees, etc. [7].

(3) Evaluation object

There are two objects of performance evaluation, one is the company, the other is the management, the two are interrelated but different from each other. The results of the evaluation will definitely affect the subject of the evaluation, and have an inevitable connection with the development of the subject and the object of the evaluation [9].

(4) Evaluation indicators

The performance evaluation index generally refers to which parts of the evaluation object can be evaluated. It is designed according to the evaluation purpose and the requirements of the evaluation subject, and is an important material basis and objective basis for the performance evaluation work [10].

2.2. BP Neural Network

The steps to determine the expected value of the output layer of the BP neural network are as follows:

(1) Determine the target results and actual results

The target result is the ideal value that can be achieved by each evaluation index, and the comparison between the target result and the actual result is the actual value or theoretical calculation value of each enterprise [11]. According to the actual results, the initial sample data is constructed [12]. There are $v=16$ evaluation indicators and u evaluated objects $v=16$, $u=6$ in this article. Construct the initial matrix:

$$G=\begin{bmatrix} g_{11}...g_{1v} \\ g_{v1}...g_{uv} \end{bmatrix},(k=1,2,..,v;l=1,2,..,u) \tag{1}$$

Considering enterprise financial work performance decision-making plan $G_0=\max(G_{01},G_{02},...G_{0v})$, different types of indicators have different formulas for determining target results. Among them, if it is a benefit-type indicator, the maximum number of indicators is the actual result of the indicator [13]. That is $G_{0l}=\max(G_{1l},G_{2l},...G_{nl})$, so the target result is determined as: $G_0=(1,1,...1)_v(v=16)$

Calculate the correlation coefficient t_{kl} between the l-th evaluation index of the k-th evaluation object and the corresponding index of the target result.

$$t_{kl}=\frac{\min_u \min_v \left|G_{ol}^{'}-G_{uv}^{'}\right|+y\max_u \max_v \left|G_{ol}^{'}-G_{uv}^{'}\right|}{\left|G_{ol}^{'}-G_{uv}^{'}\right|+y\max_u \max_v \left|G_{ol}^{'}-G_{uv}^{'}\right|} \tag{2}$$

Among them, y is the error coefficient between the target result and the actual result, and $0<y<1$ is generally taken as $y=0.8$ [14]. $\min_u \min_v \left|G_{0l}^{'}-G_{kl}^{'}\right|$ and $\max_u \max_v \left|G_{0l}^{'}G_{kl}^{'}\right|$ are the

relative error and absolute error of the error difference sequence between the target result and the actual result [15]. And formula (3) can calculate the error coefficient matrix H :

$$H\begin{bmatrix} t_{11}...t_{1v} \\ t_{u1}...t_{uv} \end{bmatrix} \tag{3}$$

3. Investigation and Research on Performance Evaluation of Enterprise Financial Work Based on BP Neural Network

3.1. Selection of Performance Evaluation Indicators

The performance evaluation of enterprise financial work is usually carried out from four aspects, including profitability, development ability, debt repayment ability, and operation ability [16]. The main portal websites for investors to obtain information will also clearly give the financial indicators of these four aspects. The author combines the principles of enterprise performance evaluation and comprehensively selects the following 16 financial indicators that investors can easily obtain [17]. The specific evaluation indicators are shown in Table 1:

Table 1. Evaluation metrics

Profitability	Earnings on net assets, Earnings per share, Net assets per share/Total earnings Per share
Development ability	EPS growth rate, Earnings revenue growth rate, Net asset growth rate, Total asset growth rate
Debt repayment ability	Current ratio, Equity ratio, Equity ratio/Total liabilities, Gearing ratio
Operational capability	Profitability ratio of total assets, Shareholders' equity ratio, Inventory turnover ratio

3.2. Model Training Parameter Settings

In the training of enterprise financial performance evaluation model, in addition to knowing the number of units at each layer, it is also necessary to determine the parameters of each layer, network parameters and test functions [18]. The specific parameter design is shown in Table 2:

Table 2. Parameter settings

Parameter item	Parameter settings
The number of output layer nodes	M=10
Number of input layer nodes	N=2
Target Error Accuracy	0.001
Learning rate	0.01
Step count	2000
Transfer function	Tansing
Output layer function	Purelin
Error function	Mse
Learning function	Learndm

4. Application Research of Enterprise Financial Performance Evaluation Based on BP Neural Network

4.1. Design of Enterprise Financial Performance Evaluation Model Based on BP Neural Network

Based on the sample data collected by the indicators for evaluating the financial performance of enterprises provided above, this paper collects 20 companies as test sample data, among which 6 representative companies are selected as samples for model training. The steps of the enterprise financial work performance evaluation model are shown in Figure 1:

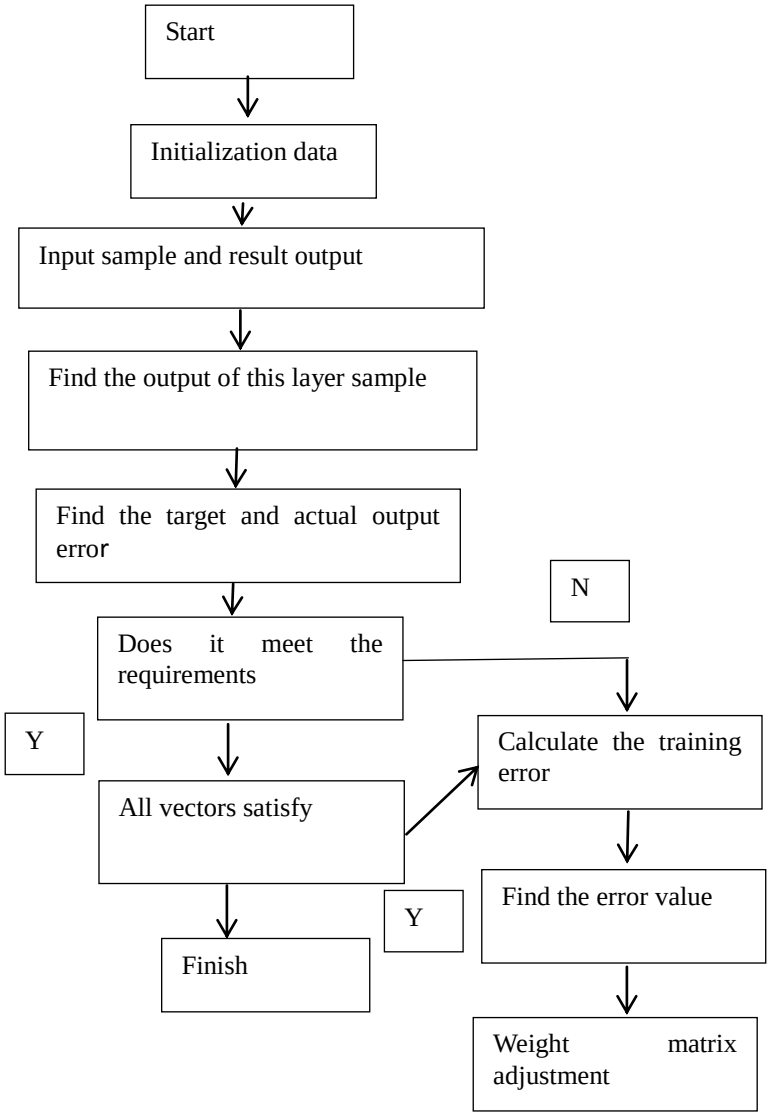

Figure 1. Enterprise financial performance evaluation model based on BP neural network

The specific steps of the BP neural network enterprise financial work performance evaluation model are as follows:

(1) Standardize the performance evaluation index of enterprise financial work as the input layer neuron. The neurons in the output layer are the comprehensive performance evaluation results of the enterprise.

(2) Assign initial values to the connection weights and other parameters of the BP model neurons of the enterprise financial work performance evaluation.

(3) Input the sample set of enterprise financial work performance evaluation, each sample point includes the determined indicators and expected output of the standardized enterprise financial work performance evaluation, the former is the input sample, and the latter is the target output. The relevant indicators of the target output can select the target value of the enterprise's strategy.

(4) Calculate the target and actual output error of enterprise sample data according to the given formula.

(5) Starting from the output layer of the BP model of enterprise financial work performance evaluation, judge whether it meets the target output, and adjust it according to the situation.

(6) The training of BP neural network for enterprise financial work performance is completed.

4.2. Application of Enterprise Financial Performance Evaluation Based on BP Neural Network

In order to verify the performance of the BP model constructed above, it is also necessary to test the BP model. The 2021 data of 52 sample companies are used as test data, and the test results are compared with the expected and actual results. The results are shown in Figure 2 and Table 3. In this paper, the data samples of six typical companies in the sample companies are selected as simulation samples to test the test effect of the evaluation model. The specific experimental data are shown in Table 3:

Table 3. Financial work performance evaluation results data

Company	Test Results	Target result	Actual results
Company A	0.354	0.352	0.356
Company B	0.349	0.342	0.346
Company C	0.336	0.331	0.335
Company D	0.324	0.312	0.320
Company E	0.310	0.315	0.311
Company F	0.298	0.310	0.296

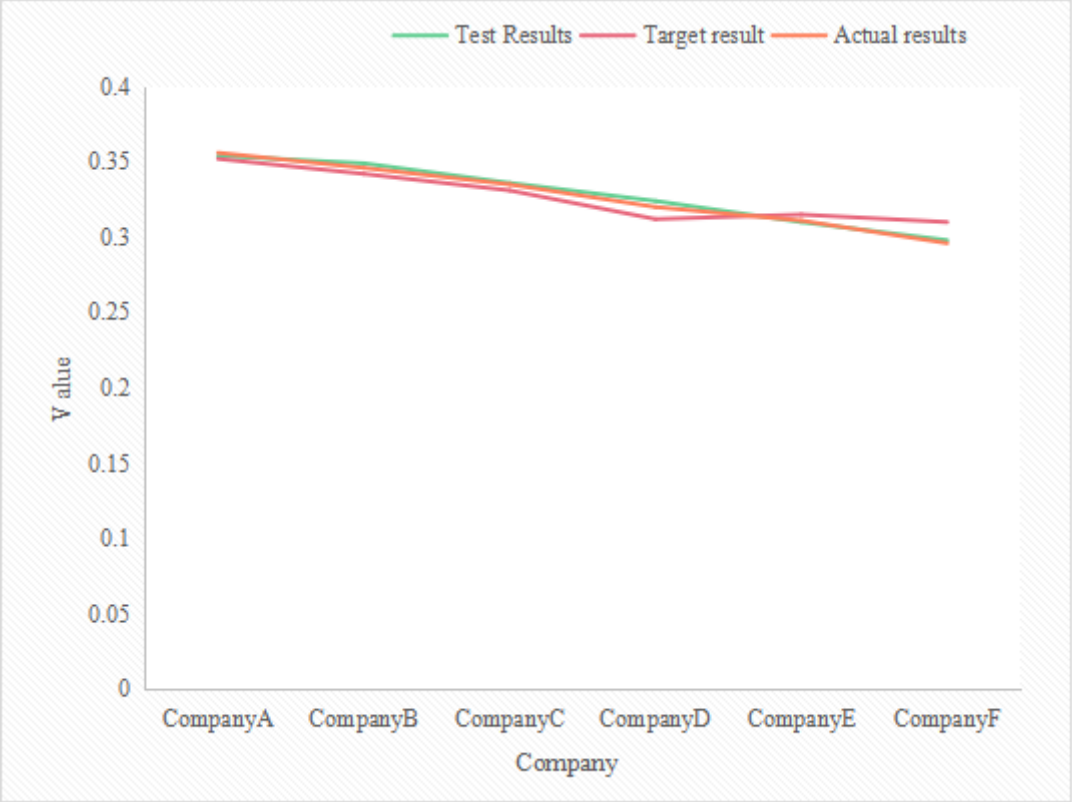

Figure 2. Comparison of financial performance evaluation results

From the above data, it can be seen that although Company C and Company D have fast revenue growth and strong profitability, they have lower operational stability and greater investment risk than the main board. Therefore, the relative error between the target results and the test results of the neural network training is relatively large, but the data analysis of the training results and target results of the six enterprises and the actual results, when the neural network conducts financial work performance evaluation training for the six enterprises, the actual The error between the test data and the test data is small, the average relative error is within 1.5%, and the test results are basically consistent with the target output results, within a reasonable range of errors. Therefore, the test effect of the evaluation model is better.

5. Conclusion

This paper specifically expounds the technical basis based on the evaluation model, including the structural elements of the performance appraisal of the company's financial status and the description of the parameters of the BP neural network, as well as the parameter setting of the BP-based performance appraisal of the company's financial status and the deployment of the appraisal objectives At the same time, it focuses on the design of the evaluation process framework based on BP. Using the BP-based company's financial status work performance assessment to compare the experimental results of the six companies with the experimental results and their target data, it proves the superiority of the BP-based evaluation model.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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