Hindawi
Discrete Dynamics in Nature and Society
Volume 2022, Article ID 2370582, 9 pages
https://doi.org/10.1155/2022/2370582

Research Article

Performance Evaluation of Laboratory Management System Based on BP Neural Network

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Received 7 May 2022; Revised 12 July 2022; Accepted 31 July 2022; Published 21 August 2022

Academic Editor: Wen-Tsao Pan

Due to the lack of scientific performance evaluation methods and effective performance management, many tax authorities' performance evaluation and performance management are not perfect. The BP neural network has strong nonlinear mapping, self-learning, and self-adaptive abilities. It has been widely used in the field of numerical prediction and pattern recognition. Based on the exploration of neural network, this paper combines BP neural network with performance evaluation and applies BP neural network to the performance evaluation of university laboratories. Data envelopment analysis (DEA) is mainly used to evaluate the performance of other fields. This paper selects key laboratories as the research object. The performance evaluation of university laboratories based on BP neural network is studied. The existing laboratory evaluation system is scientifically and reasonably revised, reasonable scientific methods are introduced, and a complete and scientific evaluation scheme suitable for the current evaluation requirements is explored. This paper perfects the evaluation method system, so as to scientifically and reasonably allocate research resources, which can maximize the enthusiasm of research departments.

1. Introduction

In recent years, with the further standardization and improvement of university laboratory management system, higher evaluation requirements have been put forward for the performance of experimental equipment [1]. At present, in order to cultivate applied innovative talents and excellent engineers, many universities have increased the proportion of practical and experimental teaching in their teaching plans and encouraged students to actively participate in various innovative activities, discipline competitions, and teachers' scientific research [2]. This requires that experimental teaching and laboratory management should be more of a top priority for educational equipment, but in practice, it appears to be significantly lagging behind, and many schools still use manual bookkeeping for management [3]. The shift in the focus of public personnel management from the defense of abstract meritocratic principles to a focus on maximizing productivity and measurable output outcomes, the result-oriented approach to administrative control, the simplification of burdensome regulations, and the expansion of autonomy for public organizations and personnel have all contributed to a preference for greater use of performance evaluation techniques [4].

Institutional laboratory performance assessment can make a more comprehensive evaluation of laboratories, can objectively give the advantages and shortcomings of each laboratory in the teaching of the college, and can provide an adequate theoretical basis for the construction of laboratories in the college [5]. Laboratories are not only an important support for the development of weapons and equipment but also an important carrier of the core capabilities of the military industry, providing an important technical basis for building an innovative national defense science and technology industry and enhancing the independent research and development capability of weapons and equipment [6]. Laboratory management system is a complex system operation process, which is

affected not only by internal aspects such as quality, cost, schedule, and safety but also by external environmental factors such as social, economic, legal, technological, political, and natural factors. An intelligent laboratory management system consists of three components: a hardware platform, a management software system, and a laboratory management control system based on information control technology [7]. The impact of internal and external factors on performance is very complex due to different management objectives and variable project environments [8]. The experimental users can directly access the laboratory to use the instruments and equipment within the authority to realize the full opening of the laboratory to students and further improve the laboratory management and experimental teaching quality [9].

BP artificial neural network is an important branch in the field of artificial intelligence, and this technique can compensate for the errors judged by the subjective aspect and make the assessment performance to a more accurate degree [10]. Performance evaluation is a very important and necessary part of the laboratory management system, which enables the laboratory to have a proper grasp of all aspects of future project execution, schedule control, budget adjustment, cost assessment, etc., and to improve the effectiveness and efficiency of the evaluation. Through performance evaluation, the organization's strategy and performance expectations are implemented to individuals, while employees improve their value through continuous communication with supervisors and the process of performance improvement. Laboratory management mainly includes planning and design of laboratories, institutional adjustment, implementation and reform of experimental teaching, laboratory team building, use and management of instruments and equipment, construction and implementation of rules and regulations, information collection and management, technical safety management, and environmental construction and maintenance. It is an important part of the scientific research management reform to establish a scientific research evaluation system and to develop practical evaluation methods, to change the old method of management by administrative means alone, to strengthen science, to reduce blindness, to strengthen the sense of competition, and to stimulate the vitality of scientific research work.

This paper revises the existing laboratory evaluation system scientifically and reasonably, introduces reasonable scientific methods, and explores the establishment of a complete and scientific evaluation scheme to meet the current evaluation requirements. The existing research performance evaluation literature mainly uses data envelopment analysis technology to evaluate the performance of other fields. This paper selects key laboratories as the research object. Relying on the strong learning ability of BP neural network, it can realize multifactor data fusion, output more accurate performance evaluation values after nonlinear transformation, reduce and overcome the limitations of traditional performance evaluation, and provide effective decision support for managers.

2. Performance Evaluation of Laboratory Management System Based on BP Neural Network

2.1. Calculation Index of Performance Analysis. The laboratory is an important base for teaching and scientific research. The safety management of the laboratory is the basic guarantee for the normal operation of the experiment. All personnel working and studying in the laboratory must abide by the relevant rules and regulations of the laboratory. Laboratory staff and personnel participating in the experiment must carefully study relevant safety regulations and safety technical operation procedures. Facing the historical opportunities and new challenges at the same time, in the new period, in order to further strengthen the laboratory construction in colleges and universities, to grasp the laboratory work comprehensively, and especially to strengthen the overall common management of school laboratories, it is necessary to establish a set of scientific and reasonable performance appraisal system for laboratory construction. At the same time, this is also an important and urgent task for workers engaged in laboratory construction and management at present. The traditional model can only evaluate the relative effectiveness of decision units and classify them into two categories—effective and noneffective—but cannot rank the decision units. With the gradual stabilization of the large-scale search and the slowing down of the update, the coefficients of the velocity v_i^t at the time of t are adjusted by using the property that the inverse cosine function has monotonically decreasing on $[0, 1]$ as follows:

$$w(t) = sqrt\left[\frac{4}{7} * \arccos\left(\frac{t}{t} - \max\right)\right] * \left[\frac{(t - \max - t)}{(t - \max - 1)}\right]. \quad (1)$$

Call $w(t)$ the inverse cosine function speed adjustment factor, where the velocity update equation is transformed as follows:

$$v_i^{t+1} = w(t) * v_i^t + \left(x_i^t - x^*\right)F_i. \quad (2)$$

At present, it is common for universities to purchase or develop their own laboratory management system to improve the informationization level of laboratory management. However, most of the laboratory management systems are aimed at the laboratories with mainly networked PCs. Therefore, a better solution is found by using the calculation index of performance analysis, and then the network parameters are used as the initial parameters of the algorithm at this time and then trained, and finally the optimal network parameters are searched. The current laboratory assessment uses a combination of quantitative assessment by experts (qualitative assessment) and quantitative calculation by assessment organizations (quantitative assessment). The basic relationship between the indicators in the indicator system can form a recursive hierarchical structure, which is shown in Figure 1.

First, the capacity of the laboratory to accommodate students and the rated number of laboratory hours are calculated based on the available laboratory area, and the

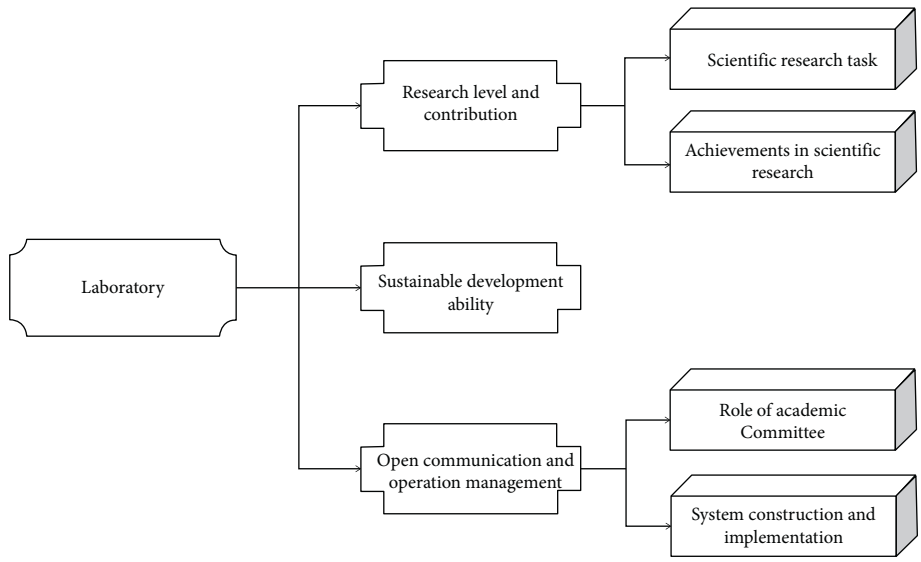

Figure 1: Hierarchical structure of indicator system.

college laboratory utilization rate is calculated based on the actual number of man-hours of students doing the laboratory. Performance can generally be defined at three levels: organizational, group, and individual. The dimensions of performance differ in terms of what they include, what they influence, and how they are measured. By calculating the correlation between different granularity N-gram features, the different granularity features are correlated with each other, and the corresponding weights are assigned to the different granularity features, and the performance is obtained by weighting and summing:

$$\alpha_i^t = \frac{\exp\left(U_i^{tT} u_w\right)}{\sum_t \exp\left(U_i^{tT} u_w\right)}. \tag{3}$$

c_i^t is the i word characterization of the t-th feature.

BP networks can both learn and stock numerous input-output pattern of mapping relations, while eliminating the need to express mathematical equations that describe such mapping relations. The parameters of the laboratory's operational status are then measured both from the student perspective and from the internal business perspective, fully linking the school's long-term strategy with the school's short-term actions and transforming the visionary goals into a systematic set of performance measurement indicators. The advantage of BP neural network is that it can find the rules of data in the knowledge pattern and deal with various types of data. Therefore, the performance evaluation of university laboratories uses the theory of artificial neural network, which overcomes the problem of traditional evaluation procedures to create complex mathematical models and mathematical analytical formulas. It also makes the assessment more accurate. Therefore, making full use of neural network theory to establish laboratory performance evaluation model is an effective method of performance evaluation. The evaluation objectives are decomposed into elements, and a hierarchical structure of evaluation elements is established. Based on the basic data collected by the intelligent laboratory management system, the performance analysis mathematical model is applied to analyze the performance of laboratories in each college. Since the three-layer structure of the BP neural network can fit to approximate any desired nonlinear (or linear) continuous function with any desired accuracy, here, a three-layer BP neural network is used to do quantitative analysis, and the three-layer BP neural network model is shown in Figure 2.

Second, the average utilization rate of the machine-hours used is calculated for the number of machine-hours used for large instruments and equipment in the college laboratory over 50,000 yuan. Experimental teaching performance is the output performance of the organization or individual after the input of human, material, time and other resources in the input-output period. In the late search phase of the algorithm, the discovery probability is reduced in order to increase the speed of convergence of the algorithm. Thus, the discovery probability is improved as follows:

$$pa_t = \exp\left(\frac{t}{t_{\max}}\right) * \cos\left(\frac{t}{t_{\max}}\right) * pa_{\text{begin}}. \tag{4}$$

pa_t is the discovery probability of the t-th iteration and $\exp(t/t_{\max}) * \cos(t/t_{\max})$ is the function dynamic decreasing factor.

The online data is captured by the IOT, and the consistent requirements are obtained after communication and exchange with the school management users. In the forward propagation stage, the propagation of neurons is not reversible, but if the error between the output variables and the predicted values is beyond the allowed range, then the error signal will be backward propagated to find out the error of the numerical variables in the implied layer and adjust the weights or thresholds of each layer. Finally, the teacher provides a statistical data model that can form a data information report, which can be used to visualize the performance values of i colleges, so as to assess the efficiency of

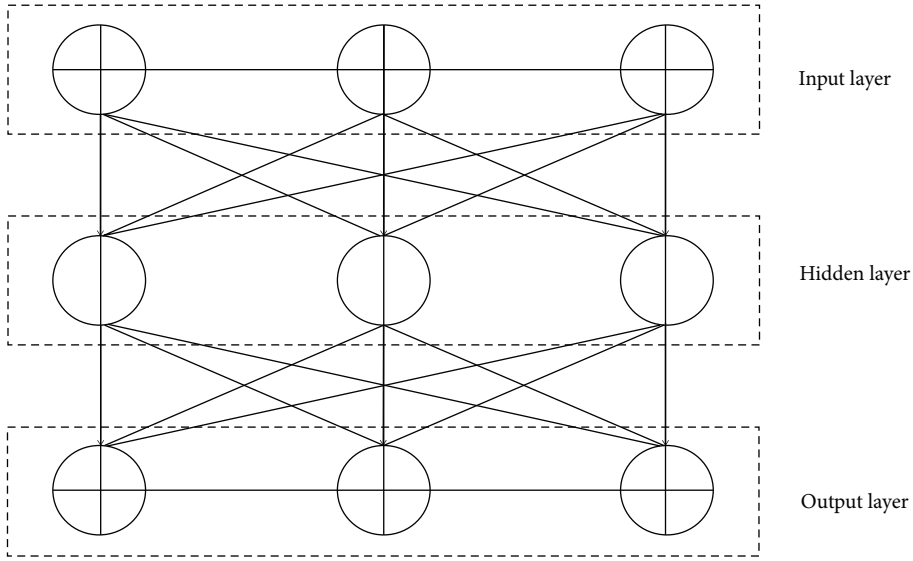

Figure 2: Three-layer BP neural network model.

laboratory management and laboratory teaching. Then, the number of nodes is increased sequentially until the minimum error value is recorded. The formula for determining the number of nodes in the hidden layer using the trial-and-error method:

$$m = \sqrt{k + l} + a. \tag{5}$$

m is the number of hidden layer nodes, k is the input node, and l is the output node.

Finally, the number of person-hours per full-time laboratory manager to receive students and faculty is calculated, which mainly assesses the workload of full-time laboratory managers as well as their work efficiency. The BP algorithm is essentially an algorithm that uses the sum of squared errors of a neural network as the objective function and seeks its objective function to achieve the minimum value according to the gradient descent method. The successful management methods and competitive mechanisms of the private sector are advocated to be widely adopted in the public sector such as the government; e.g., the private sector is organized in a form that can flexibly adapt to the environment rather than a rigid section hierarchy. The knowledge base is supported by both tools and content, and a BP neural network model based on the knowledge base and database is developed.

2.2. Build an Evaluation Model Based on BP Neural Network. This evaluation model, as it involves the construction and management status of educational technology equipment of the evaluated school and the quality of school education teaching, is screened by selecting the modules in the educational equipment management system that can respond to the status of school experimental teaching in real time and the input-output index system for the cost-effectiveness of experimental teaching. In order to obtain more reasonable and reliable evaluation results and achieve the expected research objectives, certain working steps must be followed in using BP neural network evaluation, and this step is presented in Figure 3.

First, according to the principle of multiobjective planning, a satisfactory value and an impermissible value are determined for each evaluation index. DEA is a decision-making method to evaluate the relative effectiveness of the same conditions, the same objectives, the same tasks, and the same input and output indicators. Relying on the data collected by the intelligent management platform of experimental training, the data of the input part of laboratory work and the data of the output part of laboratory work are compiled, and the performance of the laboratory is analyzed accordingly. A filter with the initialization window of k is used for the convolution operation, and its width is consistent with the dimension of the word vector. The convolution operation is shown in the following equation:

$$c_i^k = \sigma\left(\sum\left(C[i, i+k] \circ H_k\right) + b\right). \tag{6}$$

σ is the sigmoid activation function, $C[i, i+k]$ is the word vector sequence, and H_k is the convolution kernel.

The learning of BP neural network consists of four processes: pattern propagation, error back propagation, memory training, and learning convergence. It can be used to analyze and evaluate multiobjective, multistage, and multi-indicator algorithms according to the requirements of performance evaluation and provide an effective basis for performance evaluation of laboratory management. The features are expanded sequentially, where the aggregated features at each moment are obtained by splicing the feature words of different granularity at that moment, and the results are shown in the following equation:

$$c_i = \left[c_i^1; c_i^2, \ldots c_i^k\right]. \tag{7}$$

c_i^k is the convolution window of the i word is the characteristic representation of k.

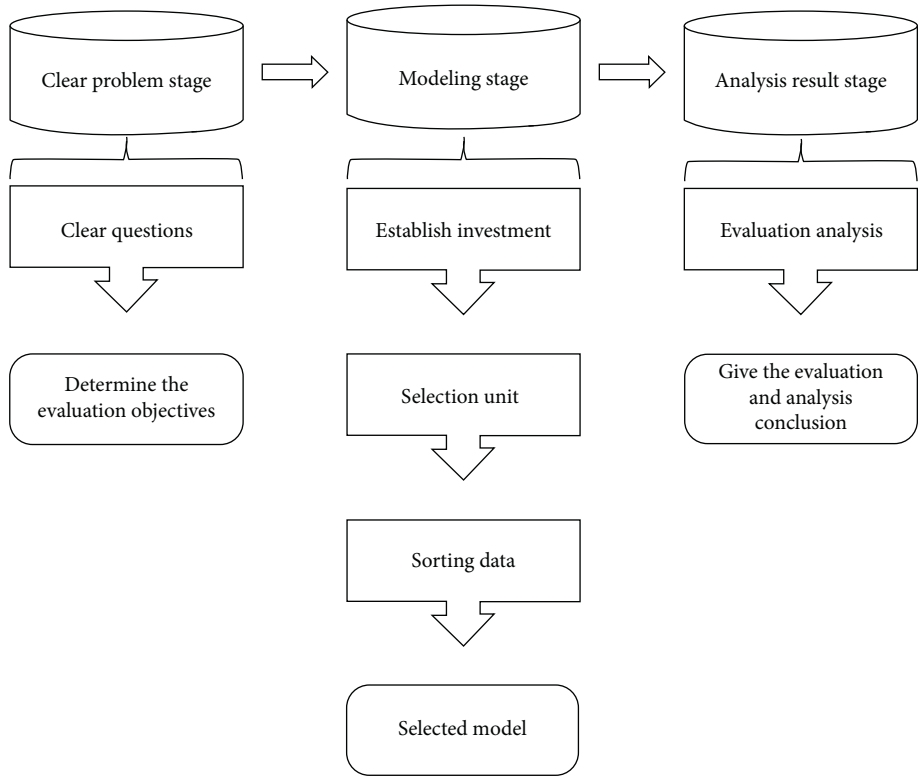

Figure 3: Working steps of BP neural network evaluation method.

Next, the scores of each index are determined by the degree of satisfaction value. The analytical instruments in the laboratory are connected through a computer network, and a distributed management system centered on the laboratory is established. According to the scientific laboratory management theory and computer database technology, a perfect quality assurance system is established and data are shared in a network. Choosing too many decision units will result in too many effective units because they have the same nature. If too few decision units are selected, the assessment objects will all be valid units, so that the real assessment results cannot be obtained. Therefore, most of the daily work of the laboratory (including performance data collection, report generation, etc.) is carried out on the client side, and the server side is only responsible for the processing and exchange of data in the background, while some data that need to be published can be made public through dynamic Web technology using the B/S model. The number of training samples is defined as L, the neural network weights are w_j, the number of neural network connection weights is 1, and the neural network training function is the mean squared difference objective function F:

$$F = \alpha E_w + \beta E_D. \tag{8}$$

α and β are the regularization coefficients.

Decompose a complex problem, after which the constituent elements are classified by attributes, which in turn form different levels. And these factors are further decomposed by dominance relationship and arranged by objective layer, criterion layer, and indicator layer to form a multiobjective, multilevel model, forming an ordered recursive hierarchy. The outputs of each neuron in the implicit layer and output layer of the network are calculated:

$$O_{Pj}^{l} = fi\left(\sum_{j} w_{ji}^{l} O_{i}^{l-1} - \theta_{j}^{1}\right). \tag{9}$$

The BP algorithm is the same, the process is to give several sets of sample data and then continuously use these sample data to train the network; the signal is constantly back and forth inside the network. The network is trained by the database with the sample data according to the index system formed by the knowledge base processing, and the correct output is obtained through the adaptive learning of the BP network, and the trained BP network can make objective and fair evaluation and analysis according to the samples to be identified provided by the database. In most cases, the sum of squared errors (SSE) is used to express the SSE as follows:

$$\mathrm{SSE} = \sum_{i=1}^{k} \sum_{\lambda \in c_i} \mathrm{dis}\left(v_i, x\right), C_i = \frac{1}{m_i} \sum_{\lambda \in c_i} x. \tag{10}$$

k is the cluster number, c_i is the class i, m_i is the the number of samples, v_i is the central point, and x is the cluster sample.

Finally, a weighted average was synthesized to evaluate the overall status of the studied subjects. In terms of hardware, we configured a server in the central lab and installed SQLSERVER2020 as the backend network database, and each hardware lab client computer accessed the

server directly through the campus high-speed LAN. The learning of the BP neural network was successfully completed when all the training patterns met the expectations. For the elements on each layer in the recursive hierarchy, a series of judgment matrices can be constructed based on a two-by-two comparison judgment of the importance to the previous level. The BP algorithm is trained and learned to adjust the weights of the network connections in a systematic way so that the network can obtain the desired output for any input after a systematic adjustment. According to the objectives and requirements of laboratory management, the analysis and evaluation of the processing results of the samples to be identified can serve to continuously enrich the knowledge base and database, and improve the training effect of the neural network.

3. Application Analysis of BP Neural Network in Performance Evaluation of Laboratory Management System

3.1. Derivation and Analysis of BP Algorithm in Performance Evaluation. The BP algorithm is mainly used for the learning of neural network weights and thresholds, and its learning process is composed of two processes: forward propagation of signals and backward propagation of errors. Therefore, the performance evaluation of university laboratories using artificial neural network theory overcomes the problem of traditional evaluation procedures to create complex mathematical models and mathematical analytic formulas and also makes the evaluation more accurate. After setting the parameters of the management system model, the optimization of the BP neural network weights and thresholds is then performed. Through the operation of the management system, we obtain the comparison of the error change and the change of fitness function graphs of the BP neural network training in this paper with the traditional assessment procedure, as shown in Figures 4 and 5.

First, in forward propagation, the input signal is transmitted from the input layer to the output layer through the hidden unit, and the output signal is generated at the output end. The BP neural network-based performance evaluation method requires a certain number of known samples to train the network before the system to be evaluated can be evaluated, and the normalized composite evaluation score is generally selected as the sample expectation. The input normalized samples are initialized with parameters to calculate the input and output values of each layer, and the resulting results have large errors with the predicted values, then the weights and thresholds are modified until the errors end up within the Gertz range. Since there are both qualitative and quantitative indicators in the index system, the qualitative indicators should be quantified in order to make the indicators comparable in the whole system. The actual value of each evaluation index is divided by the evaluation standard value of each index to obtain the evaluation index of each index, and then the evaluation index of each index is weighted arithmetic average to obtain the comprehensive evaluation value.

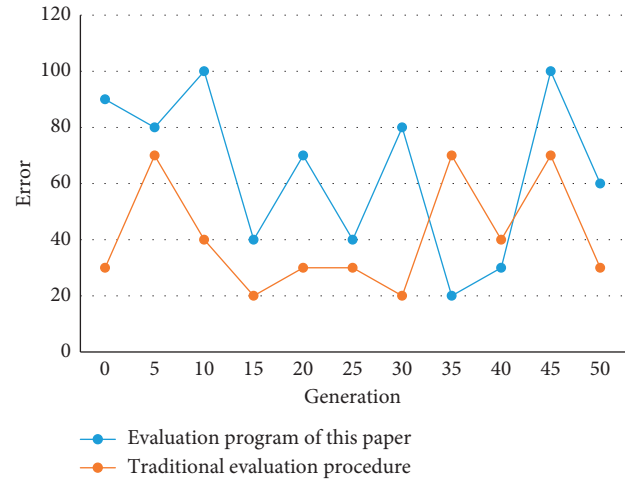

Figure 4: Error changes between BP neural network training and traditional evaluation program.

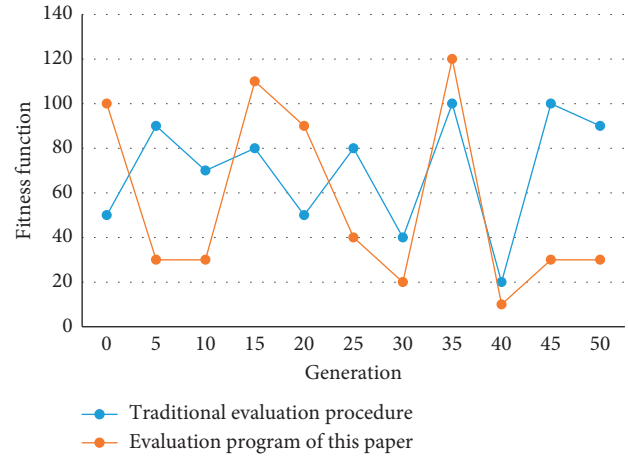

Figure 5: Changes of fitness function between BP neural network training and traditional evaluation program.

Second, in the process of error signal back propagation, the error signal is propagated forward layer by layer starting from the output. In fact, the evaluation indexes are linearly dimensionless, and then the weighted average of the index evaluation value is obtained by using the additive synthesis. For quantitative indicators, due to their different measurement properties, gradations, and tendencies, the effect coefficients can be used to normalize and homogenize them. To automatically generate the above performance evaluation information, it is necessary to accurately collect the usual teacher's tutoring information, each student's information for each experiment, and the experimental staff work information. By collecting the above information in real time, and combining the information of experimental teaching and experimental equipment information, we can generate various performance statistics reports flexibly. The process of minimizing network errors can be regarded as an unconstrained nonlinear optimization process, and the usual training algorithm uses the fastest descent method, and the corresponding adjustment of the weight matrix uses the

delta rule. Using the MATLAB toolbox, the network was programmed to train with the number of hidden layer nodes of 10, and then the performance of the network was tested with test samples, and the results are shown in Table 1.

Finally, by training the input sample data, the error function is made to decrease along the negative gradient direction by continuously correcting the parameters such as the network connection weights, and then the desired output is approximated. The surface is flat and has small slope notches, and it takes several iterations of the weight coefficients in these regions to make the error fall by the required amount. After training in a teacher-learning manner and setting up the learning mode, the input layer receives the data and passes the activation values to the output layer through the intermediate layers. Objective things are relatively complex, and people's understanding of things is not completely clear, so that the judgment matrix will not fully satisfy the requirement of consistency.

Using the knowledge and experience of experts or individuals, it is sometimes called subjective weighting method. However, the judgments of these experts themselves come from long-term reality and are not random assumptions. It should be said that they have an objective basis. Some methods are considered from the statistical nature of indicators. It is determined by the data obtained from the survey without consulting the opinions of experts, so it is sometimes called objective weighting method. Among these methods, the Delphi method is often used. Generally, about 10~30 experts with practical work experience and deep theoretical cultivation in the professional field shall be selected, and the consent of the experts themselves shall be obtained. The P indicators were sent with undetermined weights, relevant information, and unified rules for determining weights to the selected experts, and then they were asked to give the weight values of each indicator independently. The results were recovered, and the mean and standard deviation of each index weight were calculated.

Therefore, the connection weight threshold between the output amplitudes. If there is an error in the expected amplitude and the error is outside the predefined range, the error adjusts the connection weight between layers. The errors of the hidden layer and the output layer of the neural network are acceptable. And at this time, the weights and thresholds do not change. The network weights cannot change with the external environment change this learning method, so the BP network is required to have a good extensibility.

3.2. Solution Analysis of BP Neural Network. The BP algorithm uses the gradient descent method, which has poor global search ability and strong local search ability. When designing a BP neural network, we generally consider the training samples, the number of layers of the network structure, the number of neurons in each layer, the initial weights, and the learning rate.

First, the set of input and output samples is selected. In order to test the actual effect of network training, it is generally necessary to classify the sample data first. The network is first trained with the algorithm to find a better solution, and then the network parameters are used as the initial parameters of the algorithm for training again, and finally the optimal network parameters are searched. However, the evaluation results of the comprehensive evaluation system constructed in this way do not reflect the objective importance of each index through the evaluation data of each evaluation object. Therefore, it is necessary to combine the subjective weighting results of experts and the objective weighting results of assessment data. Although this processing method can improve the differentiation of the composite performance value, it will cause distortion of the data in the mapping process. Therefore, the learning samples are input and the weights and biases of the network are trained using an error back propagation algorithm to iteratively adjust the output vector to be as close as possible to the desired vector. The training is completed when the sum of squared errors of the output layer of the network is less than the specified error, and the weights and deviations of the network are saved. The method is based on the back propagation method, where a value proportional to the previous weight change is added to each weight change, and a new weight change is generated based on the back propagation method. The mean square error of the different network test outputs was calculated based on the error between the simulated output value of the network test and the desired output value, and the convergence and accuracy of the GA-BP neural network were compared with that of the BP neural network, and the comparison results are shown in Figures 6 and 7.

Table 1: Results of 10 hidden nodes.

Algorithm	FAPGABPNN	GABPNN	BP
Structural parameters	1-3-6	9-6-8	12-3-5
Error rate	9.3/57	5.2/18	3.7/56

Next, the number of layers of the network structure is determined. Considering the convergence speed of the network and avoiding the problem of limiting into local minima, the number of implied layers of the network generally does not exceed two layers. According to the objective requirements, index system, and structure of laboratory management performance assessment, cluster analysis was applied to set two input layers and one output layer for planning and progress, forecasting and decision-making, human resources, cost and input, organization and institution, and control and adjustment. The immune particle swarm algorithm is used to determine the initial parameter values of the network to ensure the scientific nature of the initial parameter values. In the process of encoding the particles, if the parameters are encoded in binary, it will cause the encoding string to be too long, and then it has to be reduced to real numbers in decoding, which affects the learning accuracy of the network and the running time of the algorithm. If we consider attaching a large step to enhance its searching ability in the early stage of search, and attaching a small step to improve the accuracy of the optimal solution in the later stage of search, the purpose is to improve the

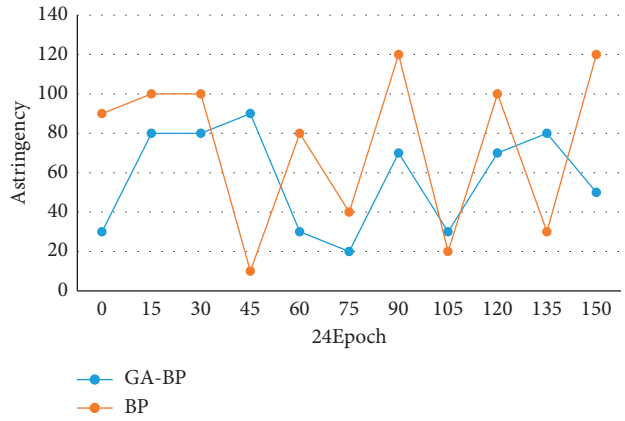

Figure 6: Comparison of convergence between GA-BP neural network and BP neural network.

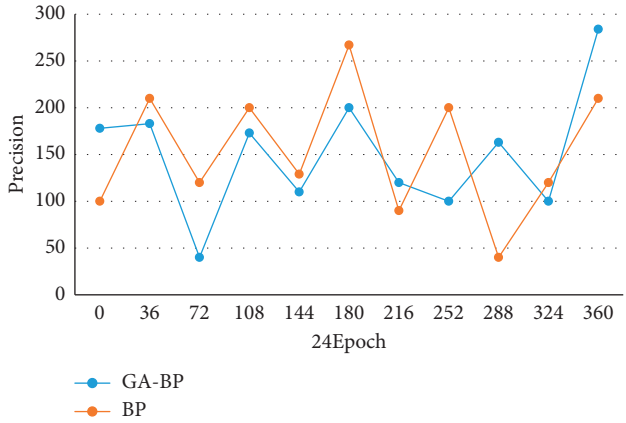

Figure 7: Comparison of accuracy between GA-BP neural network and BP neural network.

accuracy of the optimal solution. Therefore, the cosine function is introduced so that its dynamic curve decreases on the interval with the increase of the number of iterations. By testing the BP network model, GA-BP network model, and SVM model, respectively, the test simulation output values were obtained as shown in Table 2.

Finally, the nonlinear fitting implementation function and the appropriate transfer function and training function are selected; the newff statement is called to create the BP neural network; the initial transfer weights and thresholds between the input layer, implicit layer, and output layer are given; and the training parameters are set to train the BP network. That is, the reference selected for each decision unit is different, and thus each decision unit does not have the possibility to see. The trained network is tested with 20 measurement points as a sample, and the network output is compared with the expected output to determine whether the network has been trained stably by the magnitude of the error. The BP network, GA-BP network, and SVM test simulation output values were output as a series of plots in MATLAB, and the comparison graphs were obtained as shown in Figure 8.

If the final output layer of the network is a curvilinear function, the results of the output layer are allowed to be

Table 2: BP network, GA-BP network, and SVM simulation results of test sample data.

	Desired output	Relative error
BP network	8.27	−0.28
GA-BP network	7.27	−1.33
SVM	6.19	−3.29

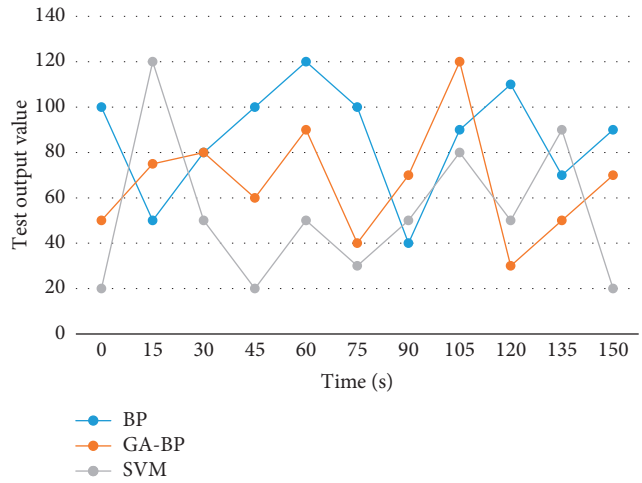

Figure 8: BP network, GA-BP network, and SVM test simulation output value pair.

obtained in small bounds. If purelin is used, the results of the output layer can be any number, and the above mentioned functions are the most common ones that we use in our daily BP network training. Avoid using one or two simple metrics as the whole evaluation of tax work performance, it must cover more than 60%–90% of the work and pay attention to the workload metric that should reflect the laboratory performance in a comprehensive way. The input vector of the neural network is the influencing factors of laboratory performance, and the comprehensive laboratory performance index is the output vector of the neural network with systematic error. The demand generated after designing a reasonable network structure, training samples into the network, and network performance evaluation model until the specified requirements are met. Each expert is given a judgment matrix and is tested for consistency, and then their opinions are arithmetically averaged to derive the weights (reflecting the relative importance of each evaluation index), which can reflect the subjective experience of experts.

4. Conclusions

The importance of performance management, which has a central control role in organizational management and is an effective means for organizations to achieve their strategic goals, has attracted the attention of more and more managers, and the ideas and methods of performance management are being widely used. The purpose of scientific and objective performance evaluation of laboratories is, on the one hand, to motivate college laboratory centers to seriously

improve their management and use efficiency and, on the other hand, to explore a new mechanism for the allocation of laboratory construction inputs, i.e., to apply the comprehensive laboratory efficiency value as a coefficient to a new mechanism for the allocation of laboratory construction inputs. The BP neural network does not require the creation of mathematical models in the process of performance evaluation. It can itself be incorporated into multiple models and obtain output results within the target expectations by virtue of its own network learning. In this paper, we analyze the content and process of performance assessment from the purpose and requirements of laboratory performance assessment. Using the characteristics of BP neural networks, which can describe complex and nonlinear relationships, we combine qualitative and quantitative analysis and establish an assessment model based on BP neural networks to meet the needs of multiobjective, multi-index, and multistage laboratory performance assessment. The final performance of the laboratory can be better and more effective than other laboratories in the use of various resources, so as to attract more resources to enter and produce more results. Laboratory construction is related to the cultivation of students' practical skills, and the laboratory performance evaluation system can improve the efficiency of laboratory performance evaluation and make the laboratory construction more reasonable, so the system is of great significance to the laboratory construction.

However, this paper does not discuss the lag of performance evaluation, and there is a certain delay in the time of postperformance evaluation. As mentioned above, postperformance evaluation is relatively independent and objective. It is not affected by subjective decision-making, but the utility is insufficient.

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.

Acknowledgments

This work was supported in part by the National Natural Science Foundation of Henan Province of China: Research on the Variable Key-Dependent Array Secret Segmentation Method Based on Multi-Dimensional Virtual Permutation (No. 202300410508) and in part by the Henan High-Speed Railway Operation and Maintenance Engineering Research Center: Multidimensional Channel Characteristics Analysis in High-Speed Train Scenarios (No. 2019KFJJ003).

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