Research Article

Analysis of Financial Management and Decision-Making in Institution of Higher Learning Based on Deep Learning Algorithm

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Received 22 May 2022; Revised 23 June 2022; Accepted 27 June 2022; Published 16 August 2022

Academic Editor: Liping Zhang

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This study creates a model of financial management and decision-making in higher education institutions and implements financial early warning and decision-making in higher education institutions based on the DL algorithm and data-driven thinking. In addition to analyzing the causes of financial risks and creating an early warning system for financial risks, this study provides prevention strategies for financial risks in institutions of higher education. Concurrently, a high-precision early-warning model of shared financial risks is established using the early-warning index data that were obtained by screening and imported into the MATLAB training DL network. The main system modules are designed simultaneously using the timing diagram and flowchart of the model, which is based on model analysis and the modeling process. This model’s main objective is to boost the effectiveness of financial management and scientific judgment in higher education institutions. Finally, it is used for experimental analysis and result research, providing an early warning of financial project budget execution progress. Compared to the traditional model’s accuracy of 12.03 percent, the experimental results demonstrate that this model’s prediction accuracy can reach 95.78%. The financial management and decision-making analysis of a higher education institution are the subjects of this study’s application of the DL algorithm. Positive results were obtained, which can serve as a starting point for future research in the field.

1. Introduction

Higher education institutions serve as a hub for the creation of new cultures, a force for the advancement of social, economic, and cultural development, as well as a place to develop talents for societal advancement. In the modern world, a nation’s overall strength and ability to compete internationally are determined by the advancement of education, the state of science and technology, and the level of knowledge innovation [1]. The information management of finances, the center of affairs management, and a crucial component of the institution of higher learning’s daily operations are its fundamental organizational units which connect all of the school’s divisions, teams, and staff members closely. Higher education institutions have transitioned from being closed to being open, and their extensive development model is being replaced by an intensive development model [2]. This is reflected in the financial management of institutions of higher learning, which calls for switching the financial management mode from “financial reimbursement” to “management decision-making” and changing the growth accounting of financial management into benefit accounting. The financial operations of institutions of higher learning have gradually created a capital circulation chain akin to that of businesses under the current system of school management as a result of the diversification of university investors and the multiplicity of university identities. The way higher education institutions operate their funds has undergone significant changes. New tasks and goals are part of the financial management of a higher education institution. Financial activities now have a wider range of topics covered in addition to paying more attention to the restrictive relationship between input and output and closely connecting the cost and benefit. Financial information management has reached a new level of scientiﬁc rationality as a result of the accelerated production of a large amount of data and the swift advancement of information technology [3]. The financial management of
higher education institutions is currently going through a unique phase where there are many new tasks and challenges. The impact of this challenge has been very clear, even though the core of financial management in institutions of higher learning is still an economic management task to coordinate and deal with various financial revenue and expenditure activities in institutions of higher learning and their overall economic relations. The main development objective at the moment is to implement DL (deep learning) algorithm [4–6] research, new technical means, and business intelligence to the development and management of financial management in institutions of higher learning in order to realize scientific decision-making. In addition, how to further standardizing the financial management system of a higher education institution in the context of a complex development situation will undoubtedly have an impact on and constrain the institution’s ability to develop entirely. Therefore, there are some theoretical and practical implications to the research on decision analysis based on the DL algorithm and university financial management.

DL originated from the research of artificial neural networks. Compared with a traditional neural network, the DL network can process low-level features to identify high-level results. DL has strong fault tolerance [6, 7]. The focus of DL is to adopt some available parts of neural cell networks in organisms to make up for the shortcomings of computers, rather than completely copy them with physical devices alone. Neural network is the main learning algorithm at present, which has good nonlinear classification and prediction ability [8]. When performing the algorithm operation, researchers need to start the forward transfer program, transmit the data to be processed to the neuron nodes of the input layer, then process the network data through the hidden layer of the neural network, and finally analyze the results of the output layer. The generalization of the neural network is manifested in its self-learning ability and the ability to process data at high speed to find the optimal solution [9]. The neural network can continuously train and adjust the error according to the weight environment between the neural layers, and the data distribution is not strict. DL is a self-learning method, which performs better than traditional methods in identifying attributes and features. Based on DL theory, this study makes a relatively detailed study of the financial management and decision-making model of the institution of higher learning. The contributions of this study are as follows: (1) This study expounds on the innovative financial management mode of the institution of higher learning from the following aspects: basic principles, basic ideas, contents, and established modes. At the same time, it discusses the realization of decision algorithm based on DL algorithm in the financial management of the institution of higher learning, constructing data analysis flow chart, applying data integration, data storage management and data analysis technology, and decision tree classification algorithm to show a closed-loop data analysis flow. (2) In view of the lack of awareness of financial risk management in institutions of higher learning, this study puts forward the countermeasures of establishing a financial risk early warning index system. At the same time, the early-warning index data obtained by screening are imported into the MATLAB training DL network, and a high-precision early-warning model of shared financial risks is established. The method of this study is the application of innovation and method innovation in the field of financial risk early warning and DL theory.

2. Related Work

By establishing an input-output benefit analysis model and according to the input-output principle, Khan and others selected input and output indicators that can reflect the level of teaching and scientific research achievements in institutions of higher learning. Calculate the benefit index of internal units, and put forward the ways to reduce occupation and improve the output of internal units in institutions of higher learning [10]. Aggei constructs a university financial management system, which realizes the centralized management of university finance and the integration of campus information system through financial management software, so as to realize the dynamic management of the school and provide accurate and reliable information for leaders’ decision-making [11]. Tom et al. constructed the overall design framework of financial management process reengineering in institutions of higher learning. Taking a university’s financial management as a research case, it analyzes the entry point of university financial management process reengineering, and selects specific financial management businesses to optimize the process [12]. Wang conducted in-depth and systematic research and discussion on several theoretical issues of financial risk management in institutions of higher learning. At the same time, he proposed the generalized financial risk concept of the institution of higher learning and discussed the financial risk management system of institution of higher learning [13]. Jiang pointed out that the financial management decision support system is a scientific decision-making system that assists decision-makers at all levels to realize financial management [14]. It mainly uses a large amount of financial data and many models to achieve scientific management through human-computer interaction. Aina et al. analyzed the principle of financial management early warning and found the key technology of financial management early warning; then collected data related to financial management early warning, and used the neural network to model and describe the change law of financial management early warning; and introduced chaotic particle swarm. The algorithm optimizes the parameters of the financial management early warning classifier; and finally enters the financial management early warning simulation experiment [15]. Serido et al. selected nine important indicators that can affect financial risk from three aspects: solvency, operational ability, and development potential to establish a financial risk early warning indicator system in institutions of higher learning [16]. Hristov et al. introduced a deep neural network in DL for early warning of shared financial risks [17]. According to the characteristics and decision-making process of college financial data, Wang studied and analyzed the advantages and disadvantages of the clustering algorithm.
and classification algorithm, proposed an improved decision tree algorithm based on metrics; and established a college financial management model [18].

This study develops the financial risk early warning index system based on the in-depth discussion of prior related literature. The listed companies are combined with the DL network and used as samples to train the deep network, yielding the DL network model that can be used for financial risk warnings in higher education institutions. The expected system functions are known to be realized one by one after a thorough and scientific test. The effectiveness of early warning systems for financial management based on DL has also significantly improved. It has a high practical application value and can provide early warning to financial management in a timely manner as well as address some issues with the current early warning process for financial management.

3. Methodology

3.1. Discussion on the Current Situation and Model Implementation Technology of Financial Management in Institution of Higher Learning. Artificial neural network research led to the development of DL. DL networks can handle low-level features to identify high-level results in comparison to traditional neural networks [19]. The fault tolerance of the DL network is high. The fault-tolerant feature of DL allows it to restore missing data information using the information from the remaining data, effectively resolving the impact of missing data on the accuracy of financial model prediction when using the internet plus. A nonlinear complex network system known as a neural network is made up primarily of numerous processing units that resemble neurons [20]. An input layer, several hidden layers, and an output layer make up the multi-layer back propagation neural network (Bpnn). It can link neurons at various levels and can link weights in a weight-based manner. The DL network’s training methodology is distinct from the conventional BPNN approach. Forward information flow and backward error correction propagation make up the BPNN algorithm. The weights of each neuron node must be modified using error reverse modification if there is a significant discrepancy between the actual output value of the output layer and the expected value of the sample. The final weights can be obtained after a number of modifications and adjustments. There are two stages to the training of the DL network. The specific process is as follows: (1) the unsupervised layer-by-layer training method is used to train each network level layer by layer. Then the initial values of each layer and overall network parameters are obtained. (2) The supervised training method is used to adjust the parameters of the network. Through continuous learning, the characteristics of the network can be described more accurately, to achieve a high level of recognition and prediction. The DL model is shown in Figure 1.

The institution of higher learning’s financial management mode serves as the foundation of its financial management system and serves as an organizational structure for managing relationships, allocating financial rights, and organizing financial activities. The development of school undertakings and the strengthening of financial management in institutions of higher learning are both greatly aided by the application of proper financial management practices [21]. On the one hand, institutions of higher learning face financial risks in the diversified education of today. Higher education institutions are incorporated bodies that interact with society, manage democratically, and independently-run schools in accordance with the law. There are certain financial risks associated with raising money for schools, managing and using education funds, etc. It is capable of carrying out economic activities independently and accepting full financial responsibility. On the other hand, as the size of higher education institutions continues to grow, more money is being invested in building campuses and creating new academic fields. Diversified financing has become an unavoidable option because the typical state financial allocation can no longer support the needs of school development. The position and significance of financial management in institutions of higher learning are elevated as a result of this diversified trend. Diversified financing strategies not only bring substantial amounts of money to the school but also present challenges and risks to its financial management. The internal management system of universities has a number of issues that have hampered its growth. From the actual management of institutions of higher learning, at present, institutions of higher learning mainly reflect several types of financial risks in terms of financial indicators: the risk of financial imbalance, investment risk, the debt risk formed by the debt development of institutions of higher learning and the financial risk of school run industries. As institutions of higher learning gradually move toward the market and the scale and intensive development of schools, institutions of higher learning must correctly, reasonably, and effectively use the raised funds and strive to achieve more and better social and economic benefits with the least capital consumption and labor occupation. However, at present, the financial management in institutions of higher learning still has obvious inadaptability in concept, management and personnel quality, and the present situation of financial management is not optimistic. At the same time, because the institution of higher learning can’t solve the combination of power and responsibility, there is no effective incentive policy, and the corresponding management means are relatively simple. They mainly rely on school administrative orders to implement financial management. For a long time, the income of institutions of higher learning has been dominated by financial allocation, with insufficient attention paid to the use of funds and a lack of awareness of cost saving. When the state’s financial allocation is limited, making ends meet, the operation of funds will become more and more difficult, and institution of higher learning will fall into financial difficulties.

In view of the problems existing in the financial management of institutions of higher learning, this study believes that there are mainly the following reasons: (1) the strength of budget management constraints is weakened and there is no sound control system. (2) Lack of business awareness and
do not pay attention to complete cost accounting. (3) The current financial analysis has limitations. (4) Financial decisions need to be improved. The distinction between college capital movement and business capital movement is made by the non-profit higher education institution. A higher education institution’s fund movement is characterized by raising, using, and saving money; it is a one-way flow that can only keep things running normally and cannot cover expenses. Enterprises will experience a survival crisis in the market competition once their financial situation worsens. Higher education institutions aren’t an exception. Although it is unlikely to fail like businesses, its capital chain could fail, leading to unpaid wages and benefits, incredibly challenging daily operations, and other events that would compromise the standard of instruction and teaching and jeopardize the growth of higher education institutions. The financial management of institutions of higher learning is showing a leaping development trend with the establishment of a market economy and the deepening of the higher education reform system. Objectively, these trends mandate that universities implement significant changes to their financial management system, mode of financial management, and financial operation mechanism. Higher education institutions can’t currently be judged by the market because they are in a seller’s market, which prevents them from investing in scientific research or improving their facilities. In general, higher education institutions’ own development plans and financial stability play a major role in determining how much money is invested in scientific research and how well courses are taught. As a result, the investment in scientific research and educational level made by various institutions of higher learning is actually uneven. Correctly comprehending the law of fund movement and bolstering financial management is crucial for enhancing the management of institutions of higher learning, maximizing the distribution of educational resources, and enhancing school administration effectiveness. Financial management should not only be seen as a crucial component of university administration but also as the backbone of academic success. As a result, in order to control the financial management of institutions of higher learning, a more scientific and effective management approach must be used in order to adapt to the new environmental changes.

3.2. Construction of University Financial Management and Decision-Making Model Based on DL. The objectives of financial management in institution of higher learning can be summarized as follows: to establish a financial management mode that is compatible with the development of the market economy, coordinated with the reform of the management system in institution of higher learning, takes the financial department of an institution of higher learning as the core, is based on comprehensive financial revenue and expenditure plan management, and combines centralization and decentralization in a coordinated and orderly manner. At the same time, the management mode aims at optimizing the allocation of resources, adjusting the expenditure structure, and improving the efficiency of running a school. After using the financial management system, institutions of higher learning realize the timely exchange of financial data, deepen the cooperation between departments, strengthen the
financial management of institutions of higher learning, and make the operation of institutions of higher learning more smooth and more efficient. This is the main function of the financial management system. According to the importance and reality of business, college business processes can be divided into two categories: main business processes and supporting business processes. The former mainly includes business activities such as talent training, scientific research, and science and technology industry. It is the factor that determines the uniqueness and core competitiveness of institutions of higher learning. The latter includes human resource management, financial management, logistics support, etc. It is a business activity required to provide basic support for the main business processes. Too high or too low financial risk is not conducive to the development of institutions of higher learning. Too low financial risk will reduce the investment income of institutions of higher learning, reduce the teaching quality of institutions of higher learning, and then affect the development of institutions of higher learning; Too high financial risk will lead to financial crisis and make institutions of higher learning fall into financial difficulties; Moderate financial risk is conducive to the development of institutions of higher learning. When designing the system, we should first clarify the purpose of system development in combination with the actual needs of institutions of higher learning; Then the main functions of the system are determined around the purpose of system development; Then, and the main function modules are divided based on the function realization; Then design each functional module. The principles of financial risk management are as follows: (1) The principle of coordination. (2) Principle of the overall structure. (3) Cost-benefit principle. (4) Principle of applicability. The management activities of the financial risk management system must be combined with stability and flexibility, which is convenient for daily management and operation as well as emergency management in the face of emergencies. The framework and algorithm flow of the financial management intelligent decision support system are shown in Figure 2.

Asset management in institutions of higher learning must be combined with budget management and financial management, which are inseparable whole. The combination of the three is not only conducive to effectively carrying out asset management, but also conducive to deepening the reform of the budget management system, scientifically compiling budget, and strengthening financial management. The financial risk of institutions of higher learning is not caused by a single risk, but by the interweaving of various risk factors such as debt risk and investment risk. Therefore, the financial risk management of institutions of higher learning should form a risk management system. The purpose of establishing early warning indicators is to quantify information and provide an objective basis for decision-making. In the process of establishing early warning indicators, in order to truly and comprehensively reflect the financial risks faced by institutions of higher learning, we should select relevant indicators with significant impact and high sensitivity. Use performance indicators to evaluate institutions of higher learning, encourage them to develop and improve themselves, and enhance their competitiveness. This study mainly establishes a financial risk early warning index system from three aspects: solvency, operational capacity, and development potential, as shown in Table 1.

In this system, accounting plays a significant role and consists primarily of deposit-back accounting, general ledger management, cash management, accounts receivable management, accounts payable management, and fixed asset management. By examining the fundamental management procedures for current financial accounting, users can more effectively improve the management’s impact during the operational process. Each university has a unique environment, and both the financial relationships between the same university and others over time as well as between different universities vary. The established financial risk early warning system in institutions of higher learning will unavoidably be impacted by these factors in terms of its accuracy and scientific validity. Therefore, in addition to quantitative analysis, essential qualitative analysis of financial risks in higher education institutions is a useful supplement to quantitative analysis, and it occasionally can reveal the actual situation and essence of financial risks in higher education institutions better than quantitative analysis. We should not only manage the financial risk itself during the financial risk management process but also give other risks the necessary and sufficient consideration they require, as well as assess and manage risks based on the overall risk level of a higher education institution. Both missing values and noise values are significant contributors to inaccurate data in the system. As a result, the system’s data cleaning process consists primarily of two steps: adding missing values and smearing noise values. Finding deviations and missing data should come first. The missing and biased data must then be filled in and corrected.

The DL algorithm corrects the weight and deviation of each neuron layer by judging whether the error function of the whole neural network drops the fastest. The iteration is shown in the formula:

$$X_{k+1} = X_k - a_k b_k.$$  (1)

Among them, $X_k$ represents the weight and bias value of the network; $X_{k+1}$ represents the weight and bias value after iterative calculation; $a_k$ represents the learning speed of the neural network; and $b_k$ represents the gradient of the error function. Selecting the Sigmoid function as the transfer function between neurons in the neural network, the training sample set is expressed as:

$$X_k = [X_1, X_2, X_3, \ldots, X_n].$$  (2)

Among them, $X_k$ represents a $H$-dimensional vector. Denote the expected output value as:

$$d_k = [d_{k1}, d_{k2}, d_{k3}, \ldots, d_{kp}]^T.$$  (3)

Express the actual output value as:

$$Y_k = [Y_{k1}, Y_{k2}, Y_{k3}, \ldots, Y_{kp}]^T.$$  (4)
Both the weights and the actual output are a function of the number of iterations. The hidden layer can determine the number of nodes in the neural network according to the following formula:

\[ n = \sqrt{n_1 + n_2} + \alpha. \]  

(5)

Calculate the actual output of the hidden and output layers as:

\[ y_i = f\left(\sum_{j=0}^{n} w_{ij} x_j\right). \]  

(6)

In order to calculate the pertinent indicators and analyze the financial risks through an early warning system for higher education institutions, this study employs quantitative analysis and qualitative analysis techniques. This allows the institution’s financial activities to be adjusted in a timely manner, deviations can be controlled, and appropriate actions can be taken to effectively prevent and suppress the emergence of unfavorable conditions, allowing the institution to achieve its objectives. With the exception of a portion of the funds, the remaining balance between income and expenditure in an institution of higher learning’s financial management activities will be used as business funds to make up for the balance of unit income and expenditure in the following year. This system should be used to manage all financial information for institutions of higher learning and should have complete control over all financial actions.

The main features frequently used by university administrators when using this system include report generation and viewing, financial data collection and analysis, etc. College administrators find it convenient to more easily and thoroughly understand the pertinent financial data of institutions of higher learning thanks to these useful functions.

Suppose the input sample data is \(X'\), \(R_{i}(X')\) is the radial basis function, and the neural network output is:

\[ f(X') = \sum_{i=1}^{l} W_{ii} R_{i}(X'). \]  

(7)

In the formula, \(i\) represents the \(i\) th neuron node; \(l\) represents the number of neuron nodes; and \(W_{ii}\) represents the connection weight of the hidden layer. The specific definition of radial basis function is:

\[ R_{i}(X') = \exp\left(-\frac{1}{\sigma_i} \left\| X' - c_i \right\|^2 \right). \]  

(8)

In the formula, \(c_i\) represents the center of the radial basis function; \(\sigma_i\) represents the width of the center point; \(\left\| X' - c_i \right\|\) is the distance between the sample and the center. In the learning process of the neural network, the specific basis between different samples and centers is obtained as follows:

| Primary index | Secondary index | Indicator representation |
|--------------|----------------|-------------------------|
| Debt paying ability | Debt as a proportion of total income | X1 |
| Debt paying ability | Asset-liability ratio | X2 |
| Debt paying ability | Liquidity ratio | X3 |
| Debt paying ability | Rate of return | X4 |
| Early warning index system | Net asset income ratio | X5 |
| Operating capacity | Balance ratio of income and expenditure | X6 |
| Operating capacity | Technical input ratio | X7 |
| Development potential | Income-generating capacity ratio | X8 |
| Development potential | Growth rate of scientific research expenditure | X9 |
\[ \sigma_j(y) = \exp[\|X'(j) - c_j(j - 1)\|]. \] (9)

The sample is continuously adjusted to the \( c_{\text{min}} \) center of the minimum distance, as shown in the following formula:

\[ c_{\text{min}}(j) = c_{\text{min}}(j - 1) + \alpha(X'(j) - c_{\text{min}}(j - 1)), \] (10)

where \( \alpha \) is the learning rate. Adjust the distance paradigm accordingly, as shown in the following formula:

\[ \sigma_{\text{min}}(j) = \|X'(j) - c_{\text{min}}(j)\|. \] (11)

Repeat the above process continuously to determine the optimal \( c(j) \).

The organization is the hardware element of the internal control mechanism. In order to establish an organization and operation structure suitable for its own characteristics, institution of higher learning should set up internal institutions according to their own conditions, and divide and balance each management layer and its authority and responsibilities. In order to facilitate coordination and management, institution of higher learning should clarify the relevant responsible persons. At the same time, we should give full play to the important role of supervision institutions. The financial management system can combine the actual financial management needs of institution of higher learning to achieve efficient financial management. The financial management system has the characteristics of planning, control, and information consistency, and it plays an irreplaceable role in university finance, operation, and financial supervision.

4. Result Analysis and Discussion

In this chapter, 150 institutions of higher learning under the total sample are divided into two groups, namely, the test sample for judging the accuracy of the model and the training sample for establishing the college financial risk early warning model based on DL. Whether it is treated specially is the criterion to judge whether the financial crisis occurs in institutions of higher learning. It is marked as "ST" by special treatment, but not as "non-ST" by special treatment. There are 130 training samples and 20 testing samples respectively, among which ST universities and non-ST universities are equally distributed. Thereby constituting all samples of the DL network. MATLAB software is used as a tool to program, and then nine financial risk early warning index data of 130 training samples are input into the program. Defining the warning time and warning conditions is a prerequisite for the early warning of the progress of financial budget implementation in institutions of higher learning. Early warning in institutions of higher learning lacks systematic, complete, continuous, and in-depth theoretical research and practical application. In this study, the financial budget data of a university is selected as a sample, and the progress of budget implementation is forewarned. The test computer configuration is shown in Table 2.

| Serial number | Deploy      | Parameter            |
|---------------|-------------|----------------------|
| 1             | Processor   | Intel eight nuclear  |
| 2             | Memory capacity | 16G                   |
| 3             | Hard disk capacity | 500 GB               |
| 4             | Cache capacity        | 512G                 |

can be directly used for the training of deep learning networks. In this study, the minimum-maximum deviation standardization method is selected for data normalization, and its formula is as follows:

\[ y = \frac{x - \text{min}}{\text{max} - \text{min}} \] (12)

The function of this function is to linearly transform the original data and limit the data to [0, 1]. Figure 3 shows the MSE (Mean squared error) of the training model.

It can be seen from Figure 3 that the MSE of the model is getting smaller and smaller, and its convergence trend is obvious, indicating that the training model has entered a stable state. Training samples are used to train the DL network, and test samples are used to test the constructed network to determine the prediction accuracy. Then, according to the feedback of the test results, the network parameter settings are corrected. After continuous trials, the best early warning network model is finally obtained, which can be used for a case early warning and analysis. The MAPE (mean absolute percentage error) of different algorithms is compared. The MAPE comparison of the algorithm is shown in Figure 4.

It can be seen that the MAPE index of this model is low, which indicates that this model has a certain accuracy. A comparison of modeling time of different financial management early warning methods is shown in Figure 5.

Comparing the modeling time of financial management early warning, it can be seen that the modeling time of financial management early warning in this study is shortened, the modeling speed of financial management early warning is accelerated, and more data on financial management early warning in institution of higher learning can be processed.

Training involves the design of network structure. Including several layers of DL network, input layer, output layer, multiple hidden layers, and training parameters. These network structure designs of the DL network determine the training effect. And to determine a good network structure needs to be tested continuously. Generally speaking, the more nodes in the input layer, the larger the range of input data, and the more accurate the prediction of the neural network model. However, a large number of nodes will also increase the pressure of neural network fitting, prolong the training time of the model, and reduce the reliability of the prediction results of the model. Set the number of nodes in the input layer to 18. The training effect is shown in Figure 6.

Because of the different types of output data, the number of output nodes will change with the size of the output database. When a neural network is used to classify the number of output nodes, the most common expression is binary. It has the advantage of clearly and intuitively...
classifying the results of different modes. After training the network, use test samples for testing. Table 3 shows the prediction results of the model.

We can compare the output value of the DL network sharing financial early-warning model and the standard value of the early-warning index data with the pertinent index data of universities, regardless of whether they are ST or non-ST universities, and further determine the financial risk based on judging whether it exists or not. By converting the input data source into a test set, the accuracy of the DL prediction results can be evaluated. Additionally, predictions can be made using the generated DL model to see if the predicted results match the actual values. Figure 7 depicts the model’s prediction precision.

Since the DL network itself has the capacity to learn features on its own, factor analysis and other methods are not used in this study to screen the chosen indicators. Even unlabeled data can be used to learn features if there is enough data available. This is the benefit of the DL network. Since the DL network itself has the capacity to learn features on its own, factor analysis and other methods are not used in this study to screen the chosen indicators. Even unlabeled data can be used to learn features if there is enough data available. This is the benefit of the DL network.

**Table 3: Model prediction results.**

| Serial number | Prediction result | Sample sequence number | Prediction result |
|---------------|-------------------|------------------------|------------------|
| 1             | Right             | 11                     | Right            |
| 2             | Right             | 12                     | Right            |
| 3             | Right             | 13                     | Wrong            |
| 4             | Right             | 14                     | Right            |
| 5             | Right             | 15                     | Right            |
| 6             | Wrong             | 17                     | Right            |
| 7             | Right             | 18                     | Right            |
| 8             | Right             | 19                     | Right            |
| 9             | Right             | 20                     | Right            |

**Figure 3:** MSE of the trained model.

**Figure 4:** MAPE comparison of different algorithms.

**Figure 5:** Comparison of modeling time of financial management early warning by different methods.

**Figure 6:** Training effect diagram.
5. Conclusions

Currently, the financial management of institutions of higher learning serves as both the center of management and economic activity, rather than just being a straightforward accounting function. The financial management of institutions of higher learning is a crucial component of college management, and its scope and content are constantly expanding. In addition to using legal and administrative tools, we should also use information technology to build an integrated financial management model in order to truly improve the level of financial management at higher education institutions. University leaders cannot grasp campus management information with financial information at its core in a timely, accurate, and comprehensive manner without first addressing issues related to financial control, financial early warning, and financial decision-making. Combining financial management with the DL decision support system enables automatic adaptive parallel associative reasoning and data mining of the financial system, improving the science, standardization, and intelligence of financial management, decision-making, and execution. This study proposes and develops new financial management and decision-making model for institutions of higher education using the DL method. According to the experimental findings, this model’s prediction accuracy can reach 95.78%, which is higher than the traditional model’s accuracy of 12.03%. The outcomes support the validity and dependability of this study’s proposed DL-based college financial management and decision-making model. In a practical setting, the system can be modified and adjusted in accordance with the unique circumstances to realize more applications. Good results have been obtained when the DL algorithm is applied to the financial management and decision-making analysis of a higher education institution in this study. These results can serve as a point of reference for related research.

Data Availability

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

Conflicts of Interest

The author does not have any possible conflicts of interest.

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