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Retraction

Retracted: Optimal Allocation of Higher Education Resources Based on Data Mining and Cloud Computing

Wireless Communications and Mobile Computing

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] X. Chu, F. Cao, L. Jiao, J. Wang, and Y. Jiao, "Optimal Allocation of Higher Education Resources Based on Data Mining and Cloud Computing," *Wireless Communications and Mobile Computing*, vol. 2022, Article ID 7067676, 9 pages, 2022.

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Research Article

Optimal Allocation of Higher Education Resources Based on Data Mining and Cloud Computing

Xin Chu,[1] Fei Cao,[2] Long Jiao,[3] Jinxue Wang,[4] and Yumei Jiao[5]

[1]*Orthopedics Department of The First Affiliated Hospital of Jinzhou Medical University, Jinzhou 121000, China*
[2]*Medical College of Jinzhou Medical University, Jinzhou 121013, China*
[3]*Physical Education Department of Jinzhou Medical University, Jinzhou 121001, China*
[4]*Graduate School of Jinzhou Medical University, Jinzhou 121001, China*
[5]*Rehabilitation and Sports Medicine School of Jinzhou Medical University, Jinzhou 121001, China*

Correspondence should be addressed to Yumei Jiao; jiaoyumei@jzmu.edu.cn

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With the explosion of information and ever-increasing information resources, humanity has entered a brand-new cloud computing era. We are confronted with a brand-new problem: how to quickly and accurately extract the required information from vast information resources. It is even possible to argue that university educational administration is inextricably linked to university teaching accomplishments. The teaching data mining (DM) technology was created in order to extract the required information from vast information resources. People's ability to find data using cloud computing technology (IT) has improved. This paper analyzes the division and optimal allocation of talent types in universities, in combination with the development strategy and HR characteristics of universities, and provides strategies for the rational allocation of talents in universities, as well as support for the information relationship of HR in universities, using DM technology research. The emergence of DM technology alleviates the problem of data accumulation-induced information explosion. In today's universities, there are an increasing number of talents. In terms of talent allocation, the information-based talent allocation scheme offers new approaches to talent acquisition and university education development in the modern era.

1. Introduction

The 21st century is the era of knowledge economy, and human resources (HR) are the first resources for national development [1]. The social demand for knowledge and intellectual capital is stronger than any other era. Mankind has entered a brand-new information age, with information explosion and increasing information resources. How to quickly and accurately extract the required information from the vast information resources is a brand-new problem we are facing. Universities are important bases for personnel training, scientific research and social service. Under the condition that higher education is increasingly market-oriented, the competition of HR among universities is becoming more and more fierce [2]. People's ability to find information is also strengthened, but more and more data are accumulated, and there is a lack of methods to effectively find valuable information from a large amount of data. People discover that, despite the large amount of information available, finding the valuable information they require is more difficult, resulting in an information explosion while people are in a state of information scarcity [3]. The common working method is to make decisions based on surface data gathered in daily management, resulting in a large organizational structure, unequal salary distribution, low enforceability of performance appraisal, significant brain drain, and low satisfaction among teachers and workers, all of which contribute to HR management's low efficiency and burdensome work [4]. Online education is moving in the direction of recommending appropriate educational resources to users and providing personalized services. In personal learning, constructing the DM system of educational resources is critical. Users do not have to waste time and effort looking for information, making learning more

efficient and convenient. These systems already had basic functions in terms of function, but they are inefficient in terms of efficiency. Furthermore, these systems are not perfect from the standpoint of decision analysis. These flaws frequently cause educational administration in universities to be delayed [5].

At present, universities have been studying the educational administration system for some time. With the development of IT in society, the educational administration system of universities has not only been limited to a certain university, but also started networking to share more information among different campuses and even different schools. At the same time, a large number of relevant university data have been accumulated. The relationships and laws with relevant values are obtained by analyzing a large number of historical data related to university HR using efficient cloud computing technology [6]. A large amount of data information is required as support to realize non-static people management in human resource management and to build a system of related human resource management activities. The data analysis method, on the other hand, can only obtain the surface information of these data, not existing knowledge or potential information. As a result, we must shift our thinking, tentatively apply the DM theory, and adopt relevant new technologies to analyze these data in order to make massive data information useful and provide decision support. How to rationally optimize talents in colleges and universities and formulate a Reasonable information-based talent management system, improving the utilization rate of talents, and improving the level of human resources management are all issues that the human resources management in colleges and universities must consider under the guidance of "people-oriented" thought. Teachers and students benefit from data-based education, and it also stores a large amount of data generated when teachers and students use the platform, which is the most important feature of the data-based teaching method itself [7]. On the other hand, by incorporating Internet technology into an educational administration management system, the traditional query and processing process of educational administration management information is no longer limited by geography, and educational administration management is more flexible [8]. Domestic educational DM research is later, and more prone to descriptive introductions of theories and methods, rather than modeling and feasibility analysis [9]. The use of DM in the selection of teachers' teaching methods, the evaluation of students' learning effects, the rational setting of courses, and other aspects of teaching and management are the main aspects involved. However, with the development of society, colleges and universities have expanded their enrollment on a large scale, which has led to the rapid increase of educational administration management in Colleges and universities, resulting in the failure to complete the original educational administration management on time, even disorder, extremely low efficiency and insufficient utilization of resources, Often makes the educational administration staff busy, and can not solve the problem well. It is necessary to make full use of the foundation of computer-related technology to ensure the security of data, and promote the leaders of educational administration departments to make clear the division of labor among all employees in practical application [10]. The research on DW has been paid more and more attention by academic circles and government departments, and the research results of DW are obviously increasing. However, there are still a few high-quality breakthrough scientific research papers, most of which are limited to general theoretical introduction, summary and improvement and application of DW algorithms [11].

The use of DW technology provides a great deal of technical support for the optimal allocation of talents in universities, which is increasing as the number of talents in universities grows. It also offers a number of practical solutions for maximizing talent allocation in universities. This paper examines the issues that exist in the educational administration system, then investigates related data warehouse theories, introduces related DM algorithms, and investigates related papers and documents about HR in universities. The use of DM and data warehouse in the educational administration system improves university administration's decision-making abilities. Help university administrators make better decisions, and the data-mining information can be fed back to teachers' teaching and students' learning in real time, laying a solid foundation for teachers and students' common progress.

2. Related Work

Literature [12] applies DM technology to student information administer, college teaching evaluation, student performance analysis and examination system, which plays a good guiding role in improving the level of school teaching management. Literature [13] DW technology is a new interdisciplinary subject of database theory and machine learning, which has received extensive attention from the educational circles since it came out, and its major content is effectiveness improvement algorithm. Furthermore, DM technology is widely used in businesses and the financial sector, particularly in product analysis, fraud early detection, and market forecasting. Literature [14] combined with visual data technology can create a data sharing platform, classify and integrate all data, and sort it to assist university administrators in making better decisions. The information gleaned from the literature [15] can also be fed back to teachers' teaching and students' learning in real time, laying a solid foundation for teachers and students' mutual progress. [16] Literature Developing a customer segmentation strategy Customer segmentation is the process by which universities categorize customers based on their needs, preferences, and other factors, such as business strategy and business model. The key technology of DM, according to literature [17], is association regulation, which expresses data rules through transaction database generation, frequent item sets generation, and association rule database generation. According to literature [18], the use of DM technology provides a lot of technical support for the optimal allocation of talents in universities, which leads to an increase in the number of talents in universities. It also offers a number of effective solutions for the most effective allocation of talents in universities, such as classified management of teachers or students in

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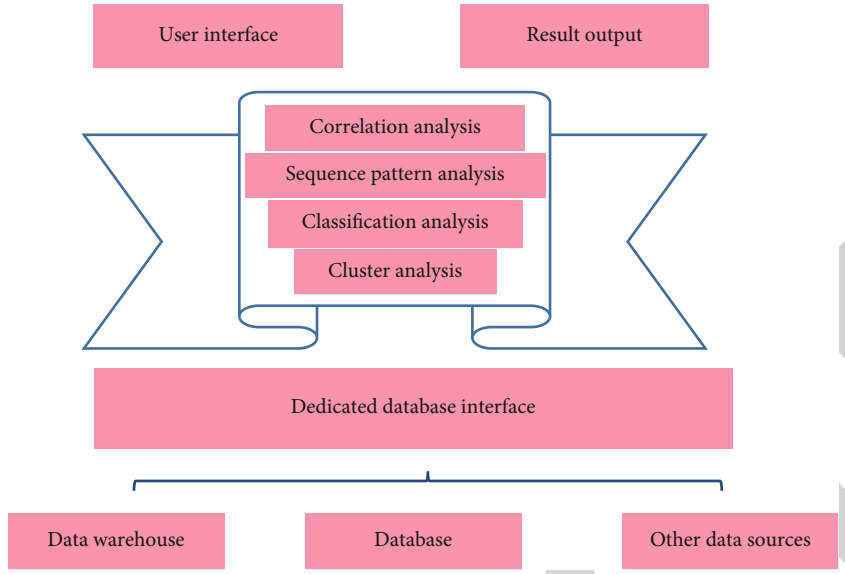

Figure 1: DW structure diagram.

universities via DM, followed by performance evaluation. Literature [19] uses big data to perform semi-automated student evaluations. Big data meets the teaching needs of higher vocational teachers and provides targeted teaching training, resulting in big data teaching providing a multidimensional perspective for teachers' future teaching. Literature [20] Use DM system. In the process of user login, by entering the user name and password in this module, after being verified by the server, you can enter the main interface of College Students' employment information system to realize the query function of College Students' various employment information. Document [21] describes in detail the clustering algorithm in DM, which mainly refers to dividing big data, establishing different categories and dividing big data into them.

The above research shows that DM has been put into in-depth research in universities. This paper explains the research content and essence of DM, DM and traditional data analysis methods, which are embodied in the user login system, graphic management system, talent optimization allocation system and so on. This paper focuses on the scale of HR in universities, deeply digs and analyzes the relevant indicators of HR in universities, and changes ideas to solve the above-mentioned related problems, and reasonably verifies and predicts the ratio of students to teachers, which is an important indicator of the scale of HR in universities.

3. Introduction to data mining and various algorithms

3.1. Definition of numerical control mining. As a new interdisciplinary subject, it involves many fields such as statistics, machine learning, data warehouse, mathematical statistics, database technology, visualization, information retrieval and so on. Other related fields include pattern recognition, spatial data analysis, artificial intelligence (AI), graph theory, probability theory, image processing and so on. The application of DM in college teaching The application of DW technology in college teaching is mainly to help teachers to fully understand the characteristics of students, and then to teach students in accordance with their aptitude, formulate reasonable teaching plans and set up reasonable courses, so as to improve the efficiency and quality of learning and the level of teaching management. [22]. At present, DM technology is widely used in enterprises and financial fields, especially in product analysis, fraud early warning and market prediction. The structure of DM is shown in Figure 1.

College and university informatization now includes all aspects of office, teaching, scientific research, finance, library management, and so on. The problem of information islands, on the other hand, is easy to occu [23] r early in the development of information management. We can build a data sharing platform, classify and integrate all the data, and sort it out to help university administrators make better guiding decisions, and the information mined from data can also be fed back to teachers' teaching and students' learning in real time, laying a good foundation for teachers and students' common progress. We use artificial intelligence, set theory, statistics, and other technologies to extract hidden, overlooked, but extremely useful information from a large number of random data piles, based on a clear understanding of the goal of DM. Sort the gathered big data into groups and look for commonalities and differences among them. We can determine which itemsets are associated with them by analyzing frequently occurring itemsets, and we can determine the internal relationship between itemsets by analyzing the same content in each itemset [24].

From the perspective of business, DM is a new method to deal with business IT. The main processing method of DM is to process, extract, transform, analyze and model the massive business data in the database related to business, and extract the key business decision data from the analysis results. DW is obtained from the database, as shown in Figure 2

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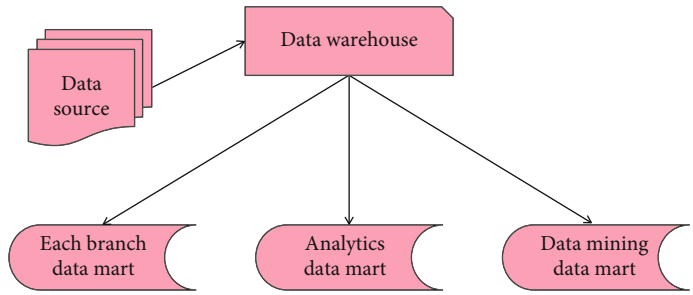

Figure 2: DW obtained from the database.

For example, in the economic field, the stock economic man needs to find the law of the change from the long-term historical records of a large number of stock market changes as the basis for predicting the future; The manager of the supermarket hopes to analyze customers' consumption habits and behaviors from the sales in the past few years, so as to adopt appropriate marketing strategies; In the field of scientific research, astrophysicists and astronauts need to get correct analysis results when faced with data with orders of magnitude higher than Gigabit, and so on. At present, in DM technology, universities pay attention to the optimal allocation of talents, and DM algorithms in DM technology are constantly applied to the cultivation and management of talents in universities.

3.2. The content and nature of data mining. With the further development of DM and knowledge discovery, the research of DM and knowledge discovery has formed three mainstream technical pillars: artificial intelligence, database and mathematical statistics. ArtificialIntelligence (AI) [25], which can efficiently solve problems in the real world by simulating the macroscopic thinking mode of human beings. DM has used some mature algorithms and technologies in AI, such as ArtificialNeuralNetworks, GeneticAlgorithms, Decision Trees, Nearest Neighbor Method, RuleInduction, Fuzzy Logic, particle swarm optimization, etc.

3.2.1. Research on related algorithms of artificial neural network. The neural network (NN) method mimics the structure of human brain neurons and performs statistical functions such as discrimination, regression, and clustering. It's a nonlinear model, to be sure. Feedforward network, feedback network, and self-organizing network are the three main NN models. Currently, the feedforward back propagation network is used by the majority of artificial NN applications (BP). It can learn from the data and form knowledge on its own. Some of this knowledge has never been discovered before, indicating a high level of innovation. The following is the standard BP algorithm:

(1) Network node output

Hidden layer node:

$$k_i = f_1\left(\sum W_{ij} \times x_i - a_j\right) \quad (1)$$

Output layer node:

$$y_k = f_2\left(\sum T_{jk} \times O_j - b_k\right) \quad (2)$$

where x_i, o_j is the output; k_i, y_k is output; W_{ij}, T_{jk} is the weight; a_j, b_k is the node threshold.

(2) Excitation function

In the established BP network, the transfer function of hidden layer is hyperbolic tangent function:

$$f(x) = (1 - e^x)/(1 + e^x) \quad (3)$$

Transfer function of output layer selects linear function:

$$f(x) = x \quad (4)$$

Computational network error:

$$E_k = 1/2 \times \sum (t_{ki-} y_k)^2 \quad (5)$$

where t_{ki} is the expected output of the network; y_k is the actual output of the node; E_k is the network error.

Web-based learning

$$W_{ij}(n+1) = W_{ij}(n) + \alpha \times E_i \times y_j \quad (6)$$

where $W_{ij}(n+1)$ is the weight of the next cycle; $W_{ij}(n)$ is the weight of this cycle; α is the learning rate; E_i is the calculation error of output node i; y_j is the calculated output of output node j.

3.2.2. Particle swarm optimization and process. Particle swarm optimization (PSO) simulates the process of a flock of birds capturing food. Each bird is a particle in the basic PSO algorithm, that is, we need to solve the possible solution of the problem. In the process of searching for food, birds constantly change their flying speed and position in the air. The algorithm flow of particle swarm optimization to optimize BP neural network is shown in Figure 3.

At every specific moment, every particle has a speed and position. The position vector of each particle represents a possible solution of the problem. The basic algorithm flow is as follows:

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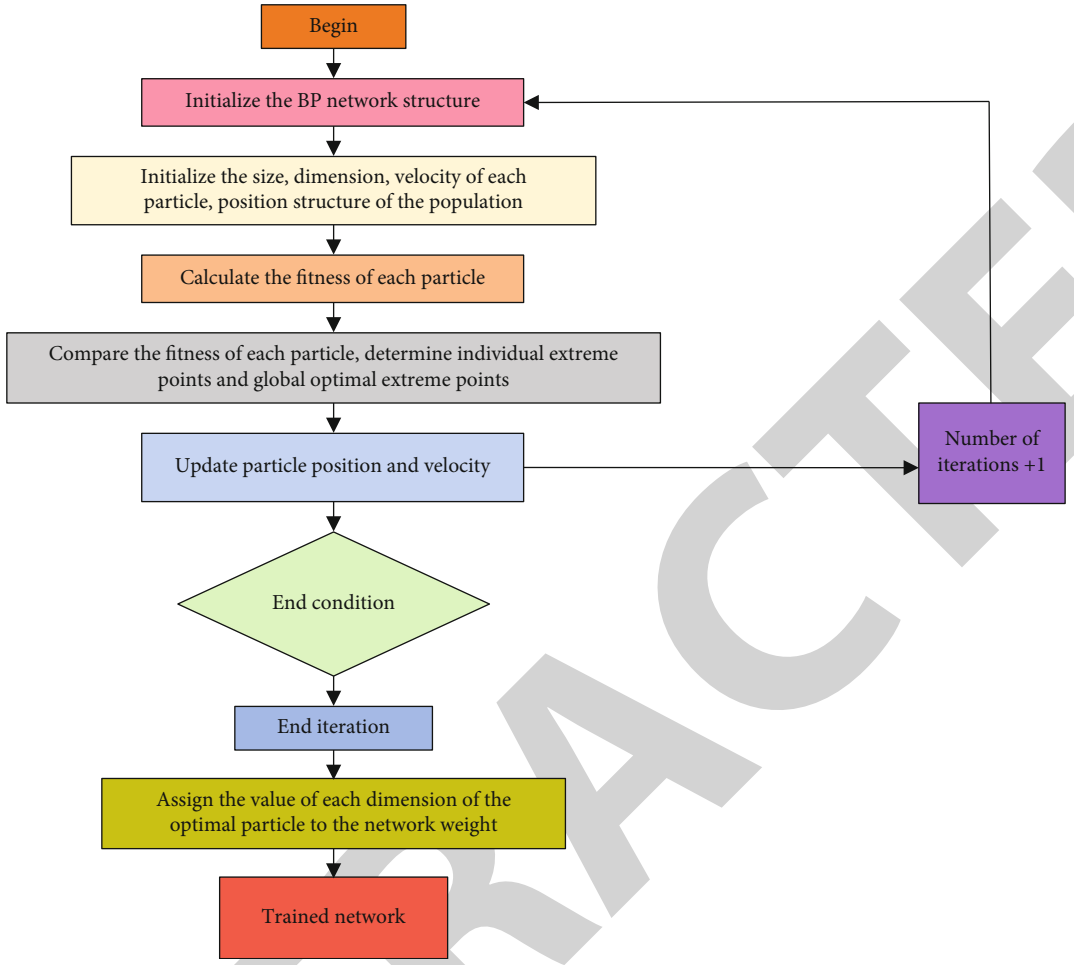

Figure 3: The algorithm flow of particle swarm optimization optimization BP neural network.

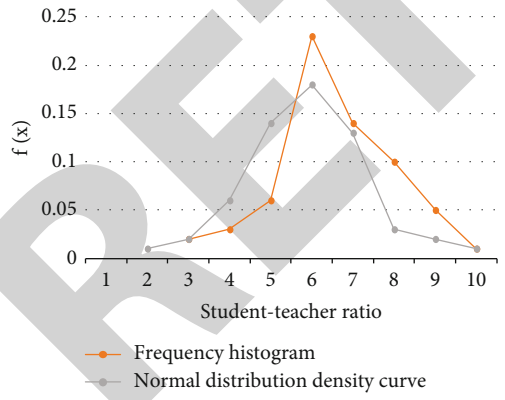

Figure 4: Processing of memory frequency and empirical distribution of sample values.

(1) Randomly initialize the position and velocity of each particle in the population

(2) Calculate the fitness value of each particle according to the fitness function, record the position and fitness value of each particle and assign it to the individual extreme value, and assign the position and fitness value of the individual with the best fitness value among all individual extreme values Assign value to the global extremum

(3) Update the velocity and position of each particle according to formulas (7) and (8); the position vector X and velocity vector V of the particle can be expressed as: $X_i = [x_{i1}, x_{i1}, \cdots, x_{id}]$, $V_i = [v_{i1}, v_{i1} \cdots, v_{id}]$。

$$v_{ij}(t+1) = ww(t)c_1r_1\left[\left(p_{ij}\right)_j(t) - x_{ij}(t)\right] + c_2r_2\left[p_{gj} - x_{ij}(t)\right] \tag{7}$$

$$x_{ij}(t+1) = x_{ij}(t) + v_{ij}(t+1) \tag{8}$$

Where $1 \le i \le n, 1 \le j \le d$, is a positive constant, called the acceleration factor; r_1, r_2 is a random number between [0,1]; w is called the inertia factor.

(4) Calculate the fitness value of each particle again according to the fitness function

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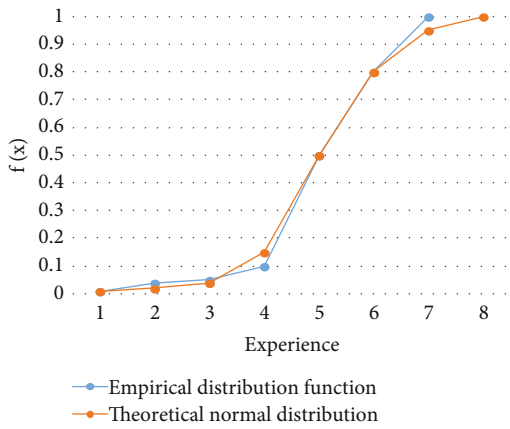

Figure 5: Empirical distribution function and theoretical normal distribution function diagram.

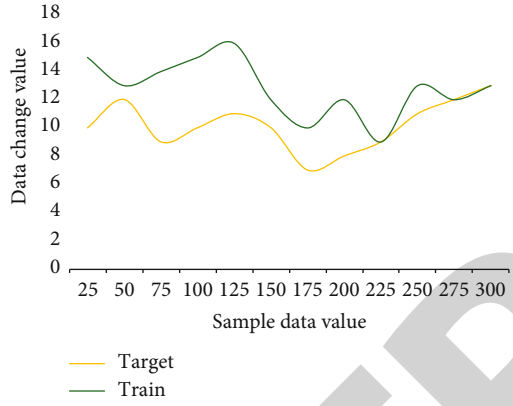

Figure 6: Standard error value of BP training.

(5) Update the particle's individual extreme value and global extreme value: If the particle's current fitness value is higher than the individual extreme value, the current value is determined by the particle's current position and fitness value; if the particle has the best fitness value in the population, the current value is determined by the particle's current position and fitness value. The position and fitness value of the optimal particle of the fitness value are used to assign the global extreme value, and the fitness value of is better than the global extreme value

(6) Record data such as global extreme values

3.3. Overview of genetic algorithm. Genetic algorithm (GA) is derived from the computer simulation of the mechanism of heredity and evolution in the biological system. GA is an algorithm that simulates the process of biological evolution. It consists of three basic processes: reproduction (selection), crossover (recombination) and mutation (mutation). It is a random and global search and optimization method developed by imitating the elimination mechanism of the law of the jungle in biology, and draws lessons from crossover and mutation phenomena in genetic theory and the principle of survival of the fittest in evolution theory.

GA can produce excellent offspring. After several generations of inheritance, the offspring that meet the requirements will be obtained, that is, the problem can be solved. Its main research direction is basic theory; Parallel distributed GA; Classification system; Genetic NN; Evolutionary algorithm; Artificial life and GA. Based on GA mode theorem, GA is based on building block hypothesis and mode theorem. Combined with each other, a model with high value and long-distance average fitness can be generated, that is, the global optimal solution can be formed.

Compared with the traditional optimization method, the advantages are as follows:

(1) The method has strong convergence and good robustness

(2) independent of the problem domain, with the ability of fast, random, global and local search

(3) Starting from the population of the population, the search is characterized by potential parallelism, and multiple individuals can be compared at the same time

(4) Inspired by the search evaluation function, the process is very convenient

(5) Easy to expand and combine with other algorithms

(6) Iteration adopts probability selection method, which is random

Disadvantages:

(1) The realization of coding is complicated

(2) The realization of the other three operators also has many parameters, most of which are set by experience

(3) It depends on the initialization and selection of population

(4) The capability of potential parallel mechanism has not been effectively applied in related application fields

(5) The selection method should keep the diversity of excellent individuals and populations, which is a major shortcoming of genetic algorithm

4. BP network optimization and prediction

In recent years, with the further reform of education, higher requirements have been put forward by universities, and the education management needs to be updated. Use effective mining methods to analyze historical data, extract potential, deep-seated and valuable information hidden in it, model and analyze related data that affect the scale of universities, and judge whether the index is reasonable or not, if not, give a more reasonable index value. The memory frequency and empirical distribution processing of this sample value is shown in Figure 4.

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Figure 7: The second training of BP neural network.

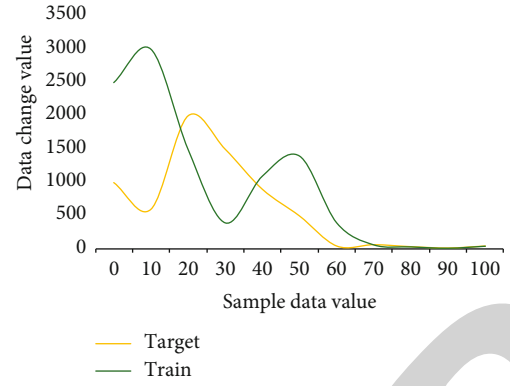

Figure 8: The process of particle swarm optimization BP neural network.

Teachers play an important leading role in the teaching process of universities, and "student-teacher ratio" has always been an important data in school teaching. It is an important indicator of the scale of higher education in China and the utilization rate of HR in universities, and it also reflects the quality of universities from one aspect. The reasonable orientation of a school is to have a reasonable structure of teachers, and the school teaching and the construction and development of disciplines and specialties of the school need a reasonable structure of teachers to support it. The empirical distribution function and theoretical normal distribution function are made, as shown in Figure 5.

The input layer, hidden layer, and output layer make up a typical BP neural network. Forward network propagation from front to back and backward error propagation from back to front. However, the structure of a neural network has an impact on its application and performance in practice. Unreasonable network structure can lead to a network's poor generalization ability, inability to solve problems accurately, and non-convergence or slow convergence speed. The convergence speed and training results are affected by the learning speed of the BP algorithm. Although a high learning rate can improve convergence speed, it can also cause oscillation or non-convergence. Although a low learning rate can ensure stable training and good convergence, it will also result in slow learning speed. We modeled and simulated 70% of the data in engineering, agriculture, and forestry university databases, and constructed a $5 * 11 * 1$ network model. The training standard error curve for the BP neural network is shown in Figure 6 below.

According to the above Figure 6, we make dimensioning, normalization and principal component analysis on the original samples in the database constructed by comprehensive, normal and ethnic universities, exclude the unqualified sample data and fit the missing data. Train the BP neural network again, and the training standard error curve is shown in Figure 7.

The focus is on comprehensive, normal, and ethnic universities; engineering, agriculture, and forestry colleges; reasonable indicators, and verification indicators for the student-teacher ratio based on the above Figure 7. The accuracy of the data is not high enough because the BP neural network has flaws such as slow convergence, easy fall into local minima, and low prediction accuracy. To optimize and improve the structure of the BP neural network, we plan to use the particle swarm algorithm. Preprocess university sample libraries, such as comprehensive, normal, and ethnic universities; engineering, agriculture, and forestry universities, before modeling. We must first determine some parameters in the particle swarm algorithm before the particle swarm algorithm can optimize the BP neural network. Because the network's input layer node is 5, the hidden layer node is 11, and the output layer node is 1, the particle's dimension is $5 * 11 + 11 * 1 + 11 + 1 = 78$, with $c1 = c2 = 2$ as the maximum number of iterations. It max =200, the maximum rate is $v \max = 0.5$, and the process of particle swarm optimization BP neural network is shown in Figure 8.

The training of a BP neural network optimized by particle swarm optimization has a good prediction effect, as shown in Figure 8. Particles can be seen to have good memory and the ability to find good weights and thresholds. The general BP neural network and the improved BP neural network are used to investigate 210 groups of training sample data, and the correct rate of 35 groups of questions is then predicted. Take the results of a single model execution at random, compare the predicted value to the expected output value, and calculate the correct rate of general and improved network prediction. Figure 9 depicts the results.

As can be seen from Figure 9, the scores of more than 70% in the implementation of the standard BP network are three times, and the accuracy of the improved network is six times. Therefore, the improved NN can better predict whether the students' questions are correct or not. Next, 35 groups of learning samples are used for prediction, as shown in Figure 10

It can be seen from the Figure 10 that 70% of the 35 groups of questions reached 0.7, 70% of the prediction results were consistent with the actual results of students, and the remaining 30% had inconsistent predictions, indicating that the prediction results of the model were much more stable than the traditional data analysis. Using BP neural network, we can absolutely master the knowledge points of most students, so that teachers can pay more attention to the problems that students cannot easily grasp when giving lectures and commenting exercises, which plays an important role

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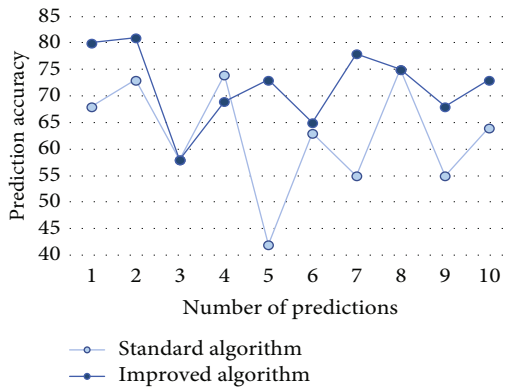

Figure 9: The accuracy of general and improved network predictions.

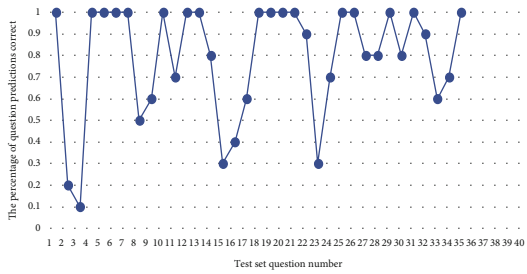

Figure 10: Prediction results of 35 groups of samples.

in teachers' guidance. In this chapter, through the use of NN and the optimization and update of particle swarm optimization algorithm, the students have made a detailed test on the predictability of the examination questions. Through the analysis of the modeling results, the application of this model in practice will make the students know which part they should improve their training for later, so as to achieve the purpose of adaptive learning and further realize the advantages of the "online homework" function.

5. Conclusions

DW technology employs a variety of mining and analysis techniques to extract useful information from a large amount of unstructured data, which can be used as a reference for people's daily lives and work. This paper examines the talent introduction, talent training, and salary system of various types of talents for the classification of talents in colleges and universities, solves problems in talent allocation, and proposes targeted strategies for the optimization of various types of talents using DW technology. The simulation and prediction results of BP network in artificial neural network and BP digging network optimized by particle swarm optimization, which are used in human resources of colleges and universities, are analyzed in detail in this paper, and the effect test is carried out using college students' learning samples. In light of the problems that exist in students' mathematics and science learning at the elementary school level, for example, a lack of prior knowledge will affect their current or future studies, but most students are unable to identify the gaps in time. Also, think about how enthusiastic you are about teaching, how much space you have for research, how competitive your research team is, and so on. Only when the educational administration system reasonably organizes and manages these limited teaching resources can the whole teaching process be truly normal and orderly, thus achieving the goal of high-quality and efficient personnel training. DW can provide a more scientific and reasonable management mechanism for the optimal allocation of talents in colleges and universities by integrating various factors.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors do not have any possible conflicts of interest.

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