

Retraction

Retracted: Design of Sports Training Improvement and Evaluation Method under the Background of Big Data

Advances in Multimedia

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1].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] B. Nie, "Design of Sports Training Improvement and Evaluation Method under the Background of Big Data," *Advances in Multimedia*, vol. 2022, Article ID 5651772, 9 pages, 2022.

Research Article

Design of Sports Training Improvement and Evaluation Method under the Background of Big Data

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With the development of economic life, the phenomenon of poor health of human beings has gradually appeared, and sports training has also been paid more and more attention. In terms of improving the quality of sports training for students, physical education teachers must first make students aware of the importance of sports training. We should reasonably arrange sports training time, stimulate students' interest and cultivation in sports, improve the results of sports training with scientific and efficient methods, and comprehensively improve the training quality of sports training. Therefore, the following work has been completed in this paper: (1) after searching and sorting out the relevant literature on the improvement and evaluation of sports training methods, this paper constructs a theoretical basis related to this topic. (2) The sports training promotion strategy and evaluation method are proposed, and the basic principles and structure of the DBN model are introduced. (3) We select the optimal parameters of the DBN model through experiments. We input the experimental data collected by big data into the trained model and compare the results with the evaluation results of experts. The experimental results show that the model in this paper has a high accuracy in evaluating the effectiveness of sports training improvement strategies.

1. Introduction

School sports are an important part of the full implementation of the party's educational policy and the foundation of our national sports undertakings. At present, my country's school sports construction is at a critical stage of deepening reforms, facing many opportunities and challenges, in order to better meet the needs of quality education and meet the needs of "Healthy China" and the "National Fitness Program." Physical training, as an important way to cultivate sports reserve talents for the country, is an extremely important component of school physical education [1]. Physical training is based on physical education, aiming at improving students' sports technical skills and delivering professional sports reserve talents, which can promote the development of school sports. It is an important way to select and transport sports reserve talents for the higher-level sports training organizations to organize students with certain sports special expertise to carry out training and competition activities and improve the sports performance

of the trained students. At the same time, it can stimulate the enthusiasm of students to participate in sports and promote the smooth implementation of sports classroom teaching. Physical training is one of the essential skills of front-line physical education teachers, and it is also an important way for physical education teachers to grow and develop [2]. Physical training is an important part of school physical education. It is a special educational process for students with better physical foundations and technical levels to carry out systematic training through sports teams and representative teams to improve their sports performance. The healthy and sustainable development of Chinese sports undertakings is seriously constrained by the current state of youth physique. Youth physique also affects the main way to improve youth physique and has become the weakest link in accelerating the construction of a sports powerhouse. "Integration of education and sports" was proposed in the new policy, and sports returned to school education [3]. The original national system of the combination of sports and education and the three-level training network can no longer

satisfy the training of reserve talents for competitive sports in the rapidly developing market economy environment. Therefore, it can be seen that the training of sports reserve talents in schools has gradually become an important part of the training of sports reserve talents in my country. School sports training should receive more attention from sports educators and society, and it has become an important area for us to respond to the call of a healthy China and study the training of sports reserve talents in the post-Olympic era [4]. The school stage is also an important stage of life growth. During this stage, students undergo great changes both psychologically and physiologically. Therefore, the research on sports training has important practical guiding significance. Growth education at the school stage directly affects the development of students and promotes their physical and mental health by engaging students in sports, thereby providing students with a good living and learning environment. Sports training refers to a kind of teaching activity carried out by physical education teachers in order to effectively enhance the physical function of students and promote the improvement of students' sports professional skills. In this process, physical education teachers mainly teach students theoretical knowledge, technical movements, and strategies and tactics related to sports training [5]. It is worth emphasizing that students should carry out sports training under the professional guidance of physical education teachers. Focusing just on the enhancement of students' sports abilities while ignoring the teaching of sports theoretical knowledge would be missing the point of sports training, which is to assist students to gain both theoretical information and sports skills relevant to training. Therefore, we need to fully appreciate the significance of sports training as we work to change physical education. We need to invest time and energy into imparting sports theory to pupils and push for their athletic proficiency and cultural understanding to grow in tandem. As a physical education teacher, the teaching of physical education theory should also be regarded as an important content in physical education teaching. If schools and physical education teachers only focus on the cultivation of students' physical skills and ignore the teaching of students' theoretical knowledge of physical education, it will be difficult to achieve a comprehensive improvement in students' comprehensive quality. At the same time, it is easy to cause sports injuries to students in the process of participating in sports training [6]. In the sports training of colleges and universities, the comprehensive quality of physical education teachers is very important, and it is a factor worthy of consideration. It has a very important influence on the effect of sports training. However, relevant survey data show that the current physical education teachers in schools at all stages in our country generally have the problem that their comprehensive quality is not high enough, which is very unfavorable for the improvement of the effect of sports training and physical education. Not only that, the physical education teachers in some schools in our country even have insufficient knowledge and attention to sports training [7]. Moreover, in the process of carrying out sports training, there is no targeted training based on factors such as students' physical

and mental development needs, interests, and hobbies. Moreover, the training forms used are relatively simple, coupled with the low overall quality and coaching ability, which makes it difficult to achieve significant improvement in the effect of sports training in colleges and universities [8]. Adequate and complete facilities and equipment are an important material basis for ensuring the safe and smooth development of school sports training activities. Nowadays, there are relatively complete training facilities and equipment for sports training in colleges and universities in our country. However, due to the lack of regular renewal and maintenance, many sports training facilities are outdated and damaged, which brings serious potential safety hazards to the development of sports training activities. In addition, because the training facilities are too outdated, many students are afraid to use them with confidence in the process of training certain sports, resulting in some competitive sports not being carried out well [9]. The object of sports training is students, but different students have great differences in physical quality, hobbies, sports level, and so on. Therefore, it is crucial that PE instructors recognize and value their students' unique qualities as they guide them through the process of sports training. The majority of physical education professors at American institutions, however, do not get specialized training to accommodate the unique needs of their pupils. Instead, it is not only counterproductive to enhancing students' training effects but also drastically diminishes students' enthusiasm for engaging in sports practice. In the process of selecting athletes, most colleges and universities only pay attention to the athletes' physical quality, athletic ability, and athletic talent, ignoring the athletes' moral quality and psychological quality. This leads to the uneven phenomenon of the mental quality of the athletes in the current Chinese sports teams [10]. Therefore, based on the background of big data, this paper proposes a method for improving physical training. In order to study the application effect of this method, a grading evaluation method for the teaching effect is proposed, and a neural network evaluation method is designed to evaluate its effectiveness based on the type of exercise. This method uses the student's learning engagement as the dividing standard and conducts a graded evaluation of the teaching effect, and the evaluation results obtained are closer to the actual performance of the students. The proposal of this evaluation method solves the existing contradictions of traditional evaluation methods and provides a more systematic analysis method for improving the teaching mode of improving students' interest and students' performance.

2. Related Work

The authors in [11] pointed out that physical training currently appears in two forms: amateur training and key training, and there are obvious differences in the division of the two. With the improvement of the economic strength of colleges and universities and the enhancement of college physical education teachers and scientific research strength, the two will gradually move towards unity. The popularization of sports projects is handed over to individual sports clubs.

The management of coaches of high-level sports teams should create conditions within the personnel system so that coaches can transition from part-time to full-time. We change the existing coach appointment system and gradually shift to an employment system based on sports performance. We need to get rid of the limitations of the school and expand the scope of employment. In the management of specially recruited athletes, it is necessary to create more flexible standards for athletes between training competitions and learning and examinations and to use sports performance as the basis for regulation. Corresponding credits can be awarded to teams who train hard to complete the performance target, and team members who fail to meet the target and are passively trained must be strictly checked, and a corresponding punishment system should be formulated [12]. The authors in [13] pointed out many existing problems in physical training and proposed to change ideas and raise awareness. We need to give full play to the advantages of comprehensive schools and strengthen scientific training. Relying on socialization and industrialization opens up channels and solves the problem of funding for after-school physical training. We need to improve the quality of the coaching team and promote the training level. We strive to solve the contradiction between learning and training and the other ten ways out for extracurricular physical training. The author in [14] pointed out that a new system of extracurricular physical training in colleges and universities that is efficient and fair should be established that is compatible with the development of my country's higher education system and sports system. The main points are as follows: raising awareness, changing concepts, and establishing a talent concept that meets the needs of social development. We need to innovate the management system of after-school training in the country's colleges and universities. To enrich and improve the functions of the student sports association, it is necessary to dilute the government's power behavior, decentralization, or transfer of the functional departments of the Ministry of Education. We need to strengthen the role of macro management, policy formulation, and legal supervision of the education sector. The Student Sports Association will strengthen its power, readjust, and set up its organizational structure. It is necessary to strengthen the construction of school competitive sports laws and regulations, such as the establishment of school competitive sports institutions and the division of power, the management of student-athlete enrollment, the qualifications of student-athletes, the obligations and responsibilities of member schools, the development of competitive markets, and the formation of competition systems and regulations. [15]. The authors in [16] conduct in-depth research and analysis based on the training form, management status, quality effect, and other issues of after-school training teams in ordinary universities. The qualitative and quantitative indicators are given, the evaluation standards and weight coefficients are determined, and a scientific and effective evaluation system for after-school training and management standards for each sports team are formulated. It provides a reference basis for the standardized and scientific management of after-school training teams and provides an accurate decision-making basis for competent departments at all levels.

The establishment of the evaluation system for extracurricular sports training has changed the previous method of evaluating the quality of sports teams only from sports transcripts and has made the training process organically combined with target evaluation, qualitative and quantitative evaluation, which is advanced and oriented. The research of the authors in [17] pointed out that the management system of after-school training should be innovated, the functions of the student sports association should be enriched and perfected, and the government power behavior of the educational functional departments should be weakened. To actively promote the substantive construction of the Student Sports Association, it is necessary to continuously deepen the system reform of the Student Sports Association, expand the autonomy of the Sports Association, and strengthen its own institutional configuration and organizational construction. We need to improve the internal management system of schools after-school physical training, incorporate after-school physical training into the school's education work plan, and ensure that after-school physical training has a complete management system. The author in [18] believes that the main problems of after-school physical training in schools in my country are as follows: insufficient funds, insufficient time, insufficient number of coaches, low training ability, a small number of students participating in training, and a low level. These problems have greatly affected the effectiveness of school sports training and the improvement of students' sports level. The authors in [19] conducted a comprehensive analysis of many problems currently faced by after-school training. It pointed out that the current shortage of sports funds for after-school training and the single source of colleges and universities affect the normal development of after-school training. The nonuniform enrollment standards have resulted in the disorder of competition and the unbalanced development of pilot work, and the potential advantages of scientific research have not yet been transformed into practical advantages. The author in [20] pointed out that the current situation ignores the cultivation of sports backbone with sports expertise. Due to a one-sided misunderstanding of the purpose and task of physical training, most of the energy and sports funds are devoted to the extracurricular training of a very small number of sports students while ignoring the training of sports backbones to promote the physical exercise of the vast majority of students. The authors in [21, 22] pointed out that physical education training still follows the traditional planned economic operation mechanism, which has a strong administrative color, making physical training a formalism. The facilities of the sports venues are poor, making it impossible for training to be carried out systematically.

3. Method

3.1. Strategies to Improve the Effectiveness of Sports Training

3.1.1. *Enhance the Comprehensive Quality of Physical Education Teachers.* Physical education teachers are the organizers and implementers of sports training activities, and their comprehensive literacy has a very direct impact on the

effect of sports training. Therefore, in order to achieve a significant improvement in the effect of sports training, we should also pay full attention to the improvement of the comprehensive quality of physical education teachers. In order to increase the efficiency of sports training, it is important to proactively recruit and hire qualified individuals to teach physical education. This requires the school to start from the following aspects: first of all, the external employment system of sports coaches should be adopted, and a strict teacher evaluation system should be actively formulated. At the same time, before physical education teachers are officially employed, the training of physical education teachers should be increased to promote the improvement of their professional level. Schools can also regularly organize physical education teachers to study advanced training concepts and training methods in other regions at home and abroad and encourage physical education teachers to optimize and innovate their own knowledge structure and training methods. In addition, schools can also formulate a sound incentive mechanism to appropriately improve the salary level of sports coaches. At the same time, a corresponding competition mechanism should be formulated to implement the survival of the fittest so that physical education teachers have a certain sense of crisis. It keeps a high competitive advantage at all times, increases the enthusiasm of physical education teachers, and encourages them to learn consciously and actively so as to improve their professional level and teaching ability, thereby promoting the effectiveness of sports training in school.

3.1.2. *Improve Sports Training Facilities and Equipment.*

In view of the problem of outdated and damaged equipment in current sports training facilities, schools should start with the following aspects: first of all, schools should not only speed up the construction process of sports training facilities but also regularly inspect, repair, and maintain the venue equipment. Training facilities and equipment that are outdated should be replaced in time. At the same time, students can also be encouraged to actively participate in the maintenance of sports training facilities and equipment and to replace and repair facilities and equipment that have been seriously damaged in time. They can work with teachers to rectify the training grounds and repair the damaged sports training grounds in time and do the corresponding cleaning work to ensure that the training grounds are clean and tidy. Secondly, schools should reasonably select training venues according to the characteristics of sports events. For example, for some sports with intense running, a flat and soft ground should be selected to prevent students from falling and falling as much as possible so as to provide a high-quality hardware environment for the development of sports training activities in school.

3.1.3. *Stimulate Students' Interest in Training.* Strong interest is an important driving force for students to actively participate in sports training. Therefore, physical education instructors should actively implement defining tasks that are context-specific and relevant to their students' lives. We

need to encourage kids to get invested in sports practice by giving our undivided attention to this matter. Specifically, physical education teachers should actively communicate and exchange with students and deeply and comprehensively understand students' physical qualities, personality characteristics, interests, and hobbies. Next, children are taught in a way that best suits their individual abilities, taking into account their current circumstances in a variety of areas, with the goal of fostering a lifelong love of physical activity. Teachers of physical education should be able to adapt to their selection of sports equipment to meet the needs of their pupils. For example, for students with good physical fitness and a high sports level, some highly competitive and difficult sports can be arranged. For students with thin stature, some skilled sports can be arranged. In addition, students often have a strong sense of self-awareness and competition. Therefore, physical education teachers can organize students to carry out various types of sports competitions. Through the method of promoting training through competition, it creates a tense sports competition atmosphere, stimulates students' interest in sports training, and cultivates students' good sports spirit. At the same time, certain material and spiritual rewards can be given to students who have made great progress and performed well. For students who are not good enough at sports training, they should pay attention to observing their daily performance and actively communicate with them to find out their problems and their causes and timely help students find solutions to problems so that they fully understand their own shortcomings and then guide them to improve continuously.

3.1.4. *Strengthen the Management of Sports Training.*

Sports teams mainly include coaches and athletes. Therefore, the process of managing sports teams mainly starts from two aspects: coaches and athletes. Regarding the management of coaches, we can learn from the USA. The physical education system and sports competition systems in the USA are independent of each other. In addition, there is a very strict system in the selection and appointment of coaches. The coaches do not need to engage in heavy teaching work and can devote themselves to sports training. Therefore, the professional level of sports coaches is relatively high. Therefore, China should also carry out corresponding reforms in the selection and appointment of sports training coaches, strictly distinguish and clearly divide the sports coaches and teachers, and pay attention to the improvement of the professional level of sports coaches. Regarding the management of athletes, we can also fully learn from the practice and experience of the USA. In the process of focusing on the cultivation of sports skills of college athletes, American schools also pay full attention to their cultural knowledge education. In the process of selecting athletes, it is required that college students must be qualified and excellent in order to be eligible to become athletes. We need to also treat all athletes equally. However, our country has always been difficult to deal with the contradiction between college athletes' learning and training, and it usually pays too

much attention to the improvement of school athletes' sports skills while ignoring their cultural knowledge and education. Therefore, our country should also learn from the experience of the USA and pay full attention to the cultural knowledge education of athletes. We need to improve their cultural literacy, train students into qualified and excellent students, and treat athletes fairly and equitably. One of the reasons for the high level of sports competition in Americans is that they have a high level of management of sports teams. Therefore, our country should actively learn from its successful management experience, strengthen the management of school sports teams, and then realize the improvement of the effectiveness of sports training.

3.2. Deep Belief Networks. A DBN is a deep learning generative model, which is composed of RBM stacks. DBN can be used to learn the probability distributions of samples and can also be used to classify data.

3.2.1. RBM Structure. RBM is the basic model that constitutes DBN, and its structure is shown in Figure 1.

RBM is a two-layer structured model consisting of a visible layer and a hidden layer. It is assumed that the visible layer has m nodes, and the hidden layer has n nodes. $v = (v_1, v_2, \dots, v_m)^T$ represents the state vector of the visual layer, where v_i represents the state of the i th neuron in the visual layer. $h = (h_1, h_2, \dots, h_n)^T$ represents the state vector of the hidden layer, where h_j represents the state of the j th neuron in the hidden layer. $a = (a_1, a_2, \dots, a_m)^T$ represents the bias vector of the visual layer, where a_i represents the bias of the i th neuron in the visual layer. $b = (b_1, b_2, \dots, b_n)^T$ represents the bias vector of the hidden layer, where b_j represents the bias of the j th neuron in the hidden layer. The neuron node has only two states of activation and inactivation, which are binary variables. ω is used to represent the connection weight between layers, and RBM transfers the information between the visible layer and the hidden layer through the connection weight and activation function.

3.2.2. Restricted Boltzmann Machine Training Algorithm. RBM is an energy-based model, which means that the total state of all model variables corresponds to a scalar energy, and model training is the process of continually modifying the scalar energy. A function that takes into account both visible and hidden neuronal states is defined as

$$C_\delta(v, h) = -\sum_{i=1}^m a_i v_i - \sum_{j=1}^n b_j h_j - \sum_{i=1}^m \sum_{j=1}^n h_j \omega_{ij} v_i. \quad (1)$$

The joint distribution of RBM is defined by the energy function as

$$Q_\delta(v, h|\delta) = \frac{1}{Z(\delta)} \exp(-C_\delta(v, h)). \quad (2)$$

Here, δ is the parameter of the network, m and n represent the number of visible layer nodes and hidden layer nodes,

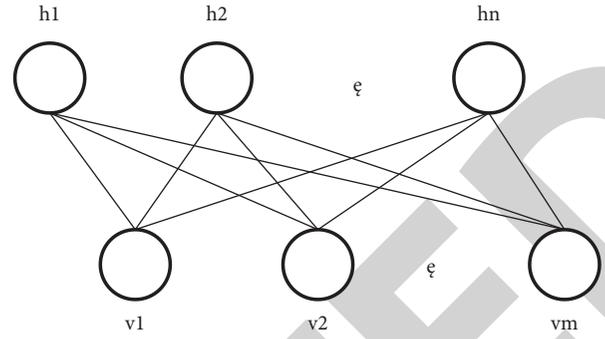


FIGURE 1: The structure of the RBM model.

respectively, and ω_{ij} represents the weight between the visible layer node i and the hidden layer node j . a_i represents the bias of node i in the visible layer, and b_j represents the bias of node j in the hidden layer. $Z(\delta)$ is the partition function, which acts as a normalization factor in the energy function.

The calculation formula of the conditional probability can be derived, that is, the probability that the neurons in the visible layer or the hidden layer are activated:

$$Q(h_j = 1|v) = \text{sigmoid}\left(\sum_{i=1}^m \omega_{ij} v_i + b_j\right). \quad (3)$$

$$Q(v_i = 1|h) = \text{sigmoid}\left(\sum_{j=1}^n \omega_{ij} h_j + a_i\right). \quad (4)$$

Since the neurons in the same layer are not connected to each other, the neurons in the same layer are independent of each other, which can be expressed as

$$Q(hv) = \prod_{j=1}^n Q(h_j|v),$$

$$Q(vh) = \prod_{i=1}^m Q(v_i|h). \quad (5)$$

As shown by the previous calculation of conditional probability, RBM is a network model whose activation function is sigmoid. RBM may use formula (3) or (4) to determine the activation probability of neuron nodes in a different layer if the distribution of neurons in the first layer is known (4). The neuron's state is then determined by comparing it to a random integer that is equally distributed between 0 and 1. The neuron node is active if the activated probability value exceeds the produced random number, which is represented by 1. The neuron node has not been triggered, as shown by the value of 0. The training process of RBM is to continuously adjust the model parameters so that under the adjusted parameters, neurons can generate training data with the maximum probability, that is, the probability distribution represented by RBM is as consistent as possible with the training data so as to fit well with training samples. Therefore, the goal of training an RBM is to maximize the following likelihood function:

$$L(\delta) = \prod_{l=1}^N L(v\delta) = \prod_{l=1}^N p(v). \quad (6)$$

Here, N is the number of samples. The gradient ascent algorithm is used to maximize the log-likelihood function, and the parameters are updated iteratively.

The reconstruction error is used by RBM to check for errors throughout the training phase. After a Gibbs transfer of the RBM, the difference between the reconstructed visual layer state vector and the original data input vector is used to calculate the reconstruction error. The training sample is used as the beginning state. This method is simple to calculate and to a certain extent reflects the likelihood of the RBM to the training samples. The smaller the reconstruction error is, the better the training effect is when the features extracted by RBM are similar to the original data. Training parameters such as training durations and the learning rate may be tweaked based on the model's reconstruction error to maximize its effectiveness.

3.2.3. Deep Belief Network Training. A DBN is a deep learning model composed of multiple RBMs stacked. The learning process is mainly divided into two stages. First, the RBM is used for unsupervised layer-by-layer pretraining to effectively mine the hidden features of the data. This is a greedy layer-by-layer training algorithm that only trains one RBM at a time. When its training is complete, the next RBM is trained and stacked on the previous RBM. The back-propagation algorithm is then used, and supervised tuning is carried out in combination with the label data of the samples. The complex nonlinear relationship between features and state labels is established to optimize the performance of the DBN and realize its classification function. The specific training process is as follows:

- (1) Initialize the visual layer unit with training samples, that is, use it as the input data of the first RBM for training.
- (2) Use the CD algorithm to fully train the first RBM and repeat the training until the initial maximum number of training times is reached, thereby completing the training of the first RBM.
- (3) Fix the weight value and bias of the first RBM that has completed the training, combine the activation function to get the state output of the neurons in the hidden layer, and then use it as the input of the second layer of the RBM to train the next RBM.
- (4) When the original maximum number of times to train the second RBM has been reached, the CD method is employed again to train the second RBM. On top of it, add the second RBM.
- (5) Pass it layer by layer in sequence until all RBMs are trained. The above is the first stage of the DBN training process, which is an unsupervised greedy layer-by-layer training process, also known as pre-training. A single RBM is trained at a time, and its trained output is used as the input to a higher RBM. The next RBM is then trained until all RBMs are

trained. Through the layer-by-layer training method of RBM, the hidden features of the original data can be extracted, and the deep-level expression of the features can be obtained. This results in features that are more abstract, more representational, and more sensitive to sample labels. The first stage of pretraining is not only the process of adjusting parameters such as weights and biases in an unsupervised manner but also the second stage of DBN training. That is, the initialization of the parameters of the supervised learning process provides the prior knowledge of the input data for the supervised learning process.

- (6) A label layer is attached to the top layer for supervised fine-tuning through a back-propagation algorithm. This process uses known labels to gradually fine-tune the parameters of the model from the last layer of the network to lower layers and repeats the back-propagation algorithm until the set maximum number of iterations is reached. The fine-tuning phase of the DBN algorithm is a supervised learning process, which is different from the layer-by-layer training algorithm in the first phase. The second stage of training is to consider all layers of the DBN model at the same time and adjust the network parameters from top to bottom. Therefore, the error between the model output and the actual label is reduced, the accuracy of the classification result is improved, and the model training result is further optimized.

As can be seen from the above two-stage training process of DBN, DBN is a deep model that combines feature learning and classifiers in the training process. Through model training, features can be independently extracted from sample data without traditional and complex signal processing. It avoids the interference and influence of human factors on feature extraction and solves the complexity of feature selection and the uncertainty of diagnostic results. Moreover, the deep network structure of DBN and the combination of layer-by-layer pretraining and fine-tuning algorithms can make the DBN learn more fully. It avoids the limited ability of the shallow model to mine the hidden features of complex data so as to obtain accurate training results.

4. Experiment and Analysis

4.1. Data Sources and Preprocessing. In order to verify the effectiveness of the model proposed in this paper, the data sets for the evaluation of sports training improvement methods were collected and sorted through big data technology, including 1100 sets of data. Preprocessing is required before using the data, and the formula used is as follows:

$$P_i = \frac{x - x_{\min}}{x_{\max} - x_{\min}}. \quad (7)$$

4.2. Parameter Selection of the Model. ---

- (1) Selection of the activation function: this paper selects the three functions mentioned above for comparison, and the specific experimental results are shown

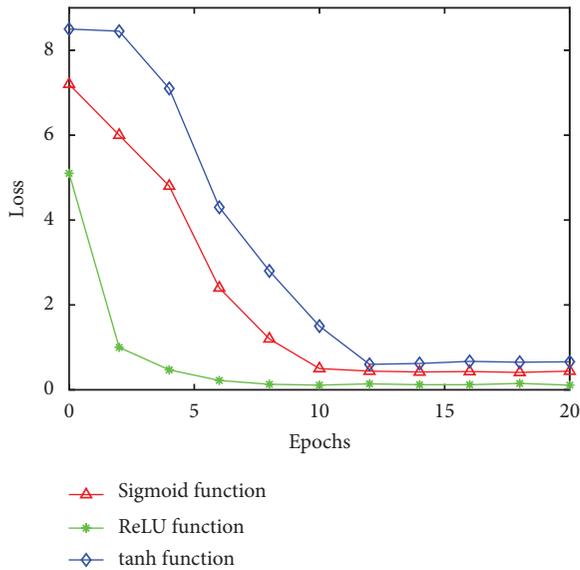


FIGURE 2: The effect of different radial basis functions on model training.

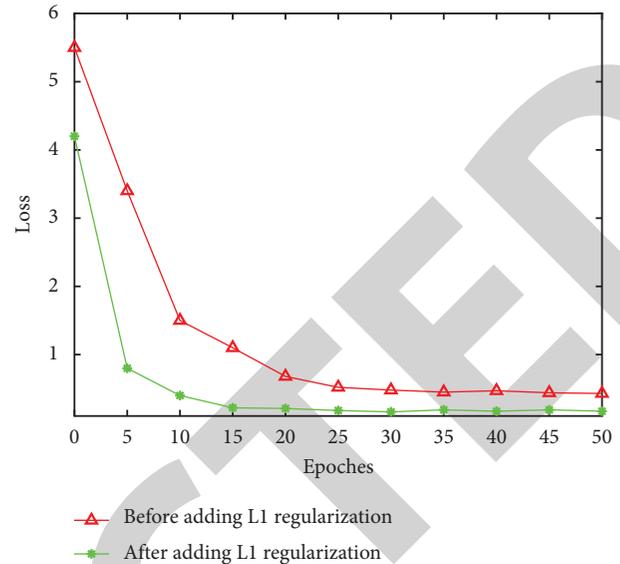


FIGURE 5: Comparison of training effects before and after adding L1 regularization.

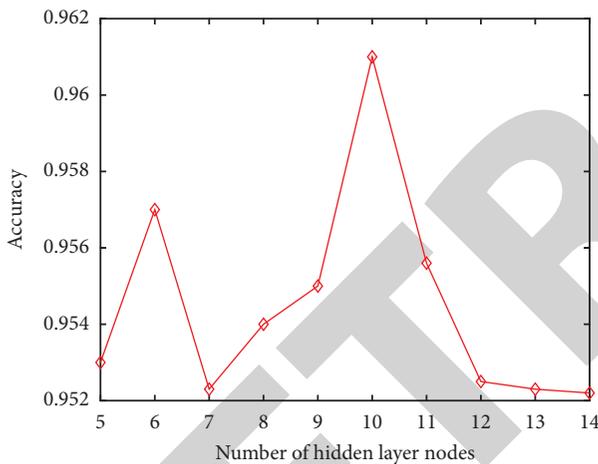


FIGURE 3: The effect of a different number of hidden layer nodes on model training.

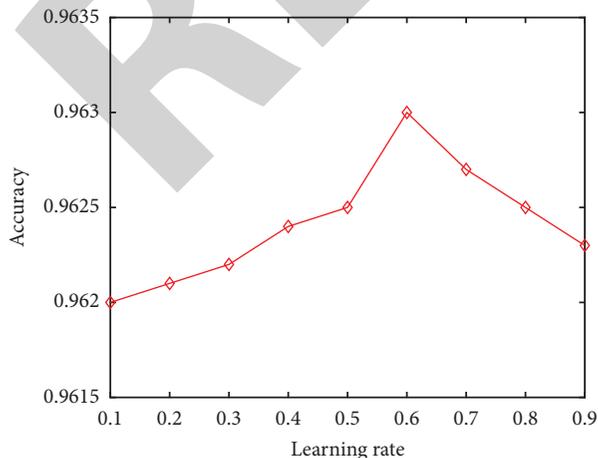


FIGURE 4: The effect of different learning rates on model training.

in Figure 2. It can be seen that the effect of the ReLU function is better. Therefore, the activation function selected in this paper is the ReLU function.

- (2) For the number of hidden layer nodes, this paper verifies the performance of the algorithm by setting the number of neurons from 5 to 14 different. We calculate the loss to get the optimal number of neurons. The experimental results are shown in Figure 3. It can be seen that the error is the smallest when the number of hidden layer nodes is 10, so the number of hidden layer nodes is selected to be 10.
- (3) Selection of the learning rate: the learning rate is also an important factor affecting the training effect of the neural network. This paper selects different learning rates for testing. The results obtained are shown in Figure 4. It can be seen that the training effect of the model is best when the learning rate is 0.6, so the selected learning rate is 0.6.
- (4) L1 regularization: in order to avoid the overfitting phenomenon of the model, this paper chooses L1 regularization for optimization. The loss comparison before and after optimization is shown in Figure 5.

4.3. Performance Test of the Optimal Model. After selecting the optimal parameters of the DBN model through the above experiments, in order to verify the performance of the model in evaluating the effectiveness of the sports training improvement method, the test data are input into the model. The obtained results are compared with the expert results, and the obtained results are shown in Table 1. It can be seen from the experimental results that the output of the model proposed in this paper is very close to the evaluation results of experts, and the error is small, indicating that the model in

TABLE 1: Experimental comparison between model output and expert evaluation results.

Number	1	2	3	4	5	6	7	8
Model output	0.589	0.827	0.714	0.695	0.831	0.845	0.876	0.825
Expert results	0.587	0.828	0.715	0.696	0.832	0.845	0.877	0.824

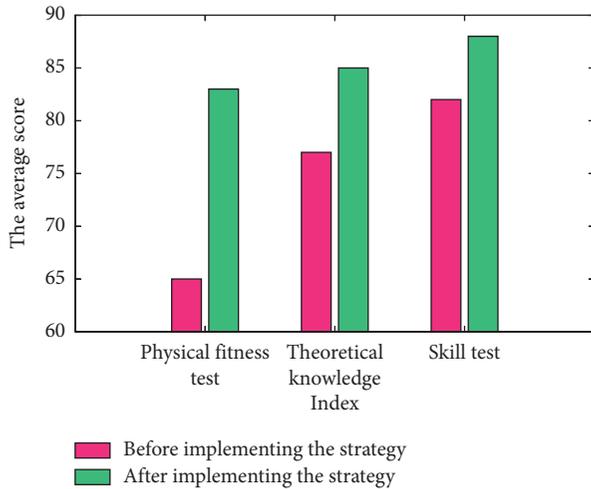


FIGURE 6: The average score of each indicator before and after implementing the strategy.

this paper has a high accuracy rate in evaluating the effectiveness of the sports training improvement method.

4.4. Effectiveness Verification of the Sports Training Promotion Strategy. We select a class to compare the indicators before and after the implementation of the strategy. There are three indicators selected, namely, the physical fitness test, theoretical knowledge, and the skill test. The average score of each index before and after the implementation of the strategy is obtained, and the results are shown in Figure 6.

5. Conclusion

With the current economic and social development, many people not only pay attention to the improvement of living standards but also start to pay attention to their own health. Therefore, sports training has penetrated into the daily lives of the masses. In recent years, relevant departments in our country have also applied the main ideas of sports training to the teaching of schools. As far as sports training itself is concerned, the improvement of training quality not only refers to the improvement of training intensity but also refers to the relaxation of trainers physically and mentally so that the best training effect can be achieved in such a relaxed environment. However, judging from the current training situation of students, many students cannot really enjoy the process of sports training. There is a fear of sports learning, so improving the quality of sports training has also become the main research goal of physical education teachers. Therefore, the following work has been completed in this

paper: (1) after searching and sorting out the relevant literature on the improvement and evaluation of sports training methods, this paper constructs a theoretical basis related to this topic. (2) The sports training promotion strategy and the evaluation method are proposed, and the basic principles and structure of the DBN model are introduced. (3) We select the optimal parameters of the DBN model through experiments. We input the experimental data collected by big data into the trained model and compare the results with the evaluation results of experts. The experimental results show that the model in this paper has a high accuracy in evaluating the effectiveness of sports training improvement strategies.

Data Availability

The datasets used during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest

The author declares that there are no conflicts of interest.

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