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Research Article

Data Mining Method Based on Mobile Network Communication in Volleyball Training

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In recent years, volleyball has developed rapidly, and the requirements of athletes' physical fitness have been continuously improved. The way to improve physical fitness is physical training. Therefore, how to improve sports performance and physical fitness level has become a problem that needs to be solved in current volleyball training. This paper adopts the methods of literature materials, expert interviews, testing methods, experimental methods, mathematical statistics, and logical analysis methods and conducts experiments on the actual situation of college volleyball students by using mobile network communication data mining. Comparing the test and experimental data, it was found that the test groups had significant differences in the test scores of agility, jumping ability, lower arm explosive power, upper body power, abdominal strength, back strength, and coordination. The sample T test was performed on the improvement of the experimental group and the control group (boys) in the 30 m running and 9 m × 10 movement test scores, and $P3 = 0.442$ and $P9 = 0.338$ ($P > 0.05$) were obtained, respectively. The posttest score was 0.064 higher than the pretest score.

1. Introduction

As one of the three major ball sports in China, volleyball has always achieved good results in competitive ability, especially the Chinese women's volleyball team, which has been deeply imprinted in the hearts of Chinese people. In the 2016 Rio Olympics, the Chinese women's volleyball team won the championship again after a lapse of 12 years. This is inseparable from the hard work of the Chinese women's volleyball team and never giving up. This spirit inspires the Chinese people and inspires us to move forward. Behind the women's volleyball championship is the exploration and application of volleyball training-related research by coaches and researchers, which not only makes the level of modern competition higher and higher but also plays an important role in the promotion of the entire volleyball movement and the development of the sports industry. From the development of volleyball to the present, human beings have not stopped in their exploration of volleyball training. On the one hand, it benefits from the development of science and technology, and on the other hand, it benefits from the promotion based on the previous research. Therefore, as a coach, it is very important to collect information, master information, and use information to improve the overall level of competition of the team. What is the current research status of volleyball training, and what is the research progress at home and abroad? No one has made a detailed and objective summary and presentation. On the one hand, the amount of domestic and foreign literature and information is huge, and the statistics of scientific researchers alone will inevitably consume a lot of time, material resources, manpower, and financial resources. On the other hand, the research results are subjective, which cannot provide effective information to relevant coaches, scholars, and researchers in the field of volleyball. Nowadays, with the rapid development of informatization, people's mastery and application of science and technology are very mature, and novel technological products are constantly being launched. At the same time, today's society is increasingly showing the trend of network popularization. We can use the existing scientific and technological achievements to serve us. This process is not only efficient but also objective. Especially in

the extraction, mastery, and analysis of information in a certain research field, it has a very high efficiency, and at the same time can eliminate the subjective influence, which is greatly welcomed by researchers, scholars, and researchers in related fields. The same efficient method is used in the field of volleyball, and it will be favored by researchers, and it will greatly promote the development of volleyball. This article attempts to use the advanced scientific research method of scientific knowledge map to sort out, summarize, and analyze the research results of volleyball training at home and abroad, and then the next step is to compare and analyze domestic and foreign research results to find out the differences between domestic and foreign research results. This is of great significance to the promotion of research in the field of domestic volleyball training and also has a great effect on the improvement of the level of volleyball training in China. In general, the evolution paths of hot spots at home and abroad are from macro to micro, from concentrated to extensive.

This paper uses the method of scientific knowledge map to analyze the results of volleyball training research at home and abroad, which can efficiently and objectively sort out and summarize a large number of documents, avoiding the limitations of traditional statistical methods. And it is presented in the form of a map, which can intuitively and clearly present the analysis results for us in a short time. In the course of volleyball training, a large amount of training data is accumulated, which needs to be properly organized and processed. The early network management system can no longer meet the decision-making and analysis needs of planners. In recent years, popular data warehousing and data mining techniques have become the most effective solutions for analyzing volleyball training data.

2. Related Work

In data mining and volleyball training analysis, domestic and foreign experts also have a lot of research. Buczak and Guven describe a focused survey of the engineering learning (ML) and data mining (DM) method literature for network analysis in support of intrusion detection and provide a brief description of each ML/DM method [1]. Looking at data mining privacy issues from a broader perspective, Xu et al. study various methods that help protect sensitive information, and have identified four different types of users involved in data mining applications, namely data providers, data collectors makers, data miners, and decision makers [2]. Kavakiotis et al. believe that in the process of intelligently transforming all available information into valuable knowledge, the use of machine learning methods and data mining methods in biological sciences becomes more important and necessary [3]. Bruzda-Zwiech et al. collected unstimulated saliva samples before and immediately after exercise and analyzed them using ELISA and concluded that one training session resulted in a significant increase in sAA concentrations in all participants as well as in the volleyball group [4]. Horta et al. believe that training load and recovery need to be monitored. The objective was to verify the recovery of volleyball players at the end of one week with and without play [5]. Yan and Zheng found that several standard signals are important predictors of cross-sectional gain even when considering data mining [6]. These studies provide a lot of evidence for our experiments, but there are some doubts about the samples tested due to the short study period.

3. Application of Data Warehouse and Data Mining Technology in Mobile Network

Based on network performance data and network alarm data, the article studies the correlation analysis with performance data and alarm data, selects indicators required for modeling, builds prediction models, and analyzes mobile network data to predict events, and finally, the prediction results are analyzed, and the model is analyzed. The technical route is shown in Figure 1 [7].

3.1. The Concept and Characteristics of Data Warehouse. Data warehouse system is an information providing platform. Divided by functional structure, the data warehouse system should contain at least three key parts: data acquisition, data storage, and data access. It obtains data from the business processing system, then organizes the data mainly by star model and snowflake model, and provides various means to users so that users can obtain useful information and knowledge from the data.

The construction of the data warehouse should be based on the existing system and data collection. Data warehouse is not a static concept. Only by presenting relevant information and data to decision makers who need information in a timely and accurate manner can decision makers make corresponding improvement decisions, understand data, and apply it meaningfully. The basic function of a data warehouse is to collect, organize, and reorganize information and provide it to relevant decision makers in real time. Therefore, building a data warehouse is not only a project but also a process. The entire data warehouse system has a four-level architecture, and we can understand the concept of data warehouse from two aspects. First, the data warehouse is different from the existing operational database of the enterprise. It is oriented to analytical data processing and is used to support decision-making; second, the data warehouse is an effective integration of multiple heterogeneous data sources. After integration, it is reorganized according to a certain theme, which contains historical data, and the data stored in the data warehouse are usually not modified (as shown in Figure 2).

The communication network management system designed in this paper is based on the concept of TMN. The realization of the network management function is to use standard protocols and information interfaces to connect different operating systems and communication devices [8].

System composition: Operating System (OS); Workstation (WS); Data Communication Network (DCN); and Network Element (NE) representing communication equipment.

From the application point of view, the establishment of an integrated communication network management

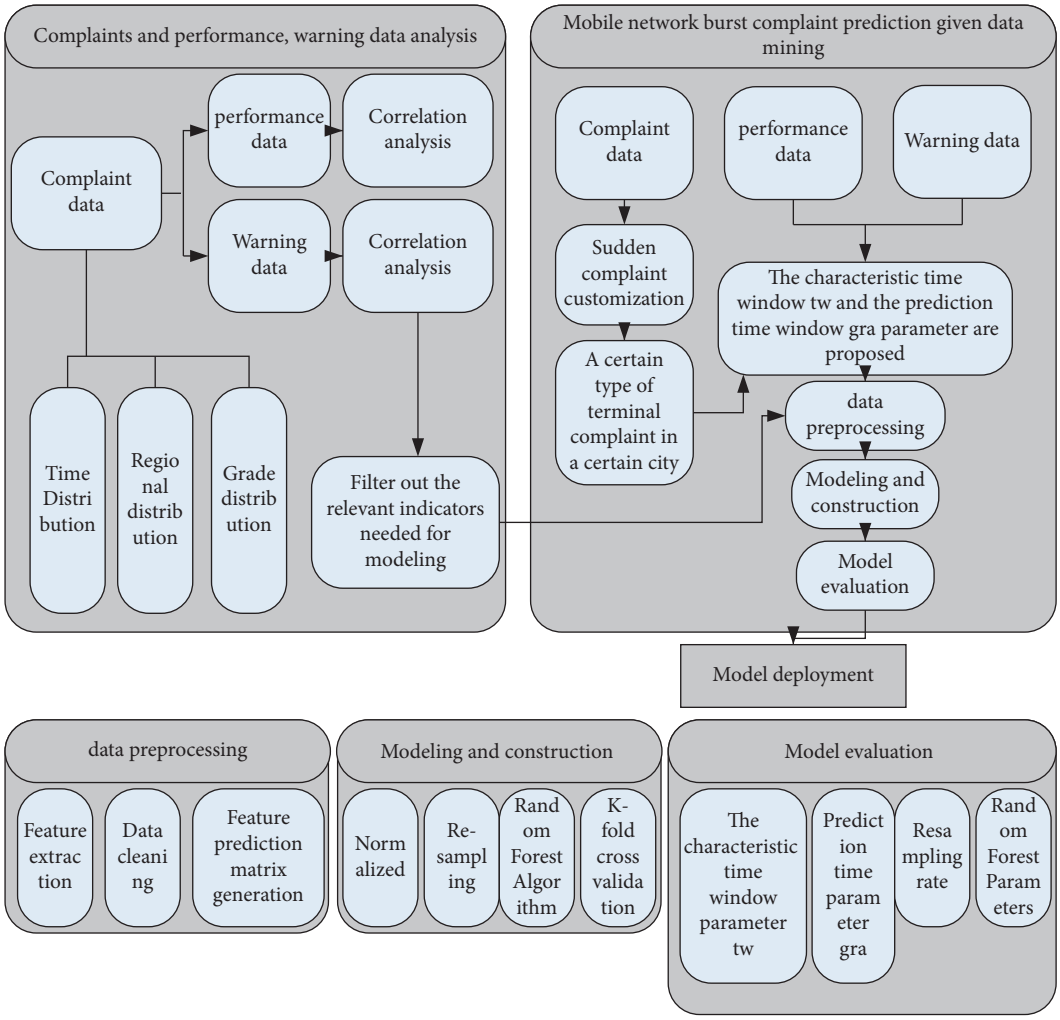

Figure 1: Technical roadmap.

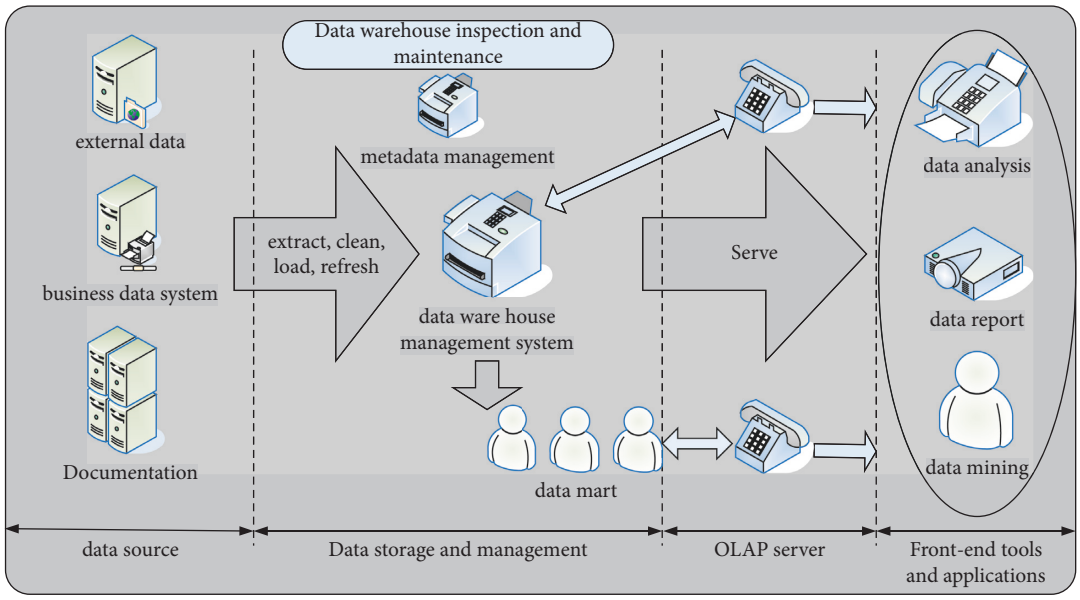

Figure 2: Data warehouse system architecture diagram.

system is to interconnect the professional network management systems of different components running in the selected network range; connect access network, fixed telephone network, packet switching network, mobile communication network, intelligent network, broadband network, etc.; and bring them into the category of unified management to form a unified integrated network management system.

Communication network integrated management system is an integrated network management system built on the top layer on the basis of retaining the original network management system. The working method of the system is to use efficient alarm data analysis method to collect all kinds of effective information in each subordinate professional network management system, so as to realize network support maintenance management and customer service management. The detailed functions and features of the system are as follows:.

(1) Comprehensive monitoring of network-wide performance: the integrated communication network monitoring function system helps network administrators to understand the operation status of the entire network, understand the location of each network element in the network, and help network administrators to determine the network connection rate level, data flow direction, and variable information, as well as the overall network operation efficiency. As an important direction of future communication network construction and line scheduling of the whole network, performance management from the whole to the details is realized.

(2) Unified monitoring of network-wide faults: in order to collect all kinds of alarm information of the whole network, the integrated communication network management system adopts the efficient alarm data analysis method for comprehensive data storage and processing and realizes the alarm analysis of cross-domain, cross-professional, and cross-correlated networks. Find and judge the alarms in the shortest time, find out the cause of the whole network error, quickly eliminate the error, and ensure the quality of service [9].

(3) Comprehensive analysis of the entire network resources: with the help of the integrated communication network management system, the administrator can directly detect and master the use of the entire network resources, and open up new network elements and circuits, to achieve effective control, optimize all network resources, reduce the use time of opening new services, and make the connection between different professional network management systems more efficient.

(4) Unified control of the entire network workflow: the integrated workflow management function enables network administrators to simplify operation and maintenance management; generate data center change work orders, circuit change orders, and error work orders; and record operation time and results in detail, which facilitates network-wide business processing and enables network-wide business operations, and also makes the entire network business data more accurate and consistent [10].

(5) Business monitoring and management: the integrated communication network management system can monitor various business indicators of the whole network, so that network administrators can find problems in time and adjust network resources, implement hierarchical management and services, and ensure the business quality of key customers. The business detection and management function can provide reasonable and effective means of fault monitoring, operation and maintenance, and user service, can solve the current management problems, and can also use data analysis methods to provide a certain degree of decision analysis support capability. Figure 3 is a communication network integrated management system.

3.2. Simulation Results and Analysis. Hardware environment: Core2Dou2.5 GHz, memory 2G, MicrosoftWindowsXP operating system, Microsoft/VisualC++6.0 development tools. Organization: data are accessed in text mode, and each row is a transaction, including transaction TID, the length of the item in the transaction, and all items item. Table 1 shows the characteristics of the experimental database [11].

Performance index: when the data set and the support threshold are the same, the time consumption of all frequent closed itemsets is obtained.

Comparison method: in the case of the same minsup (support threshold), frequent closed itemsets are found for the first time, and the CHARM_SM algorithm improved by the article will run the program on the sparse data set with the support threshold reduced by 0.2% or 0.1% each time. While running the program on the dense data set with the support threshold reduced by 10% or 5% each time, CHARM_SM algorithm will build known frequent closed itemsets for incremental mining. The comparison of the number of frequent itemsets and the number of frequent closed itemsets is shown in Tables 2 and 3 (FI: frequent itemsets, FCI: frequent closed itemsets, FI/FCI: the number of frequent itemsets and frequent closed items ratio of the number of sets) [12]:

Under the condition of the same data set, the comparison of the algorithm running time when the support threshold is reduced is shown in Figure 4 [13]:

When the support threshold increases, the simulation result comparison method is as follows: for the T25I20D100k data set, first run it once with minsup = 0.1%, and the running time is 90.42 S, then the CHARM_SM algorithm is run with a threshold increment of 0.2% each time, and the frequent closed itemsets found in the previous run are regarded as the known frequent closed itemsets; for the connect data set, first run it once with minsup = 20%, the running time is 1796.98 S, and then run the CHARM_SM

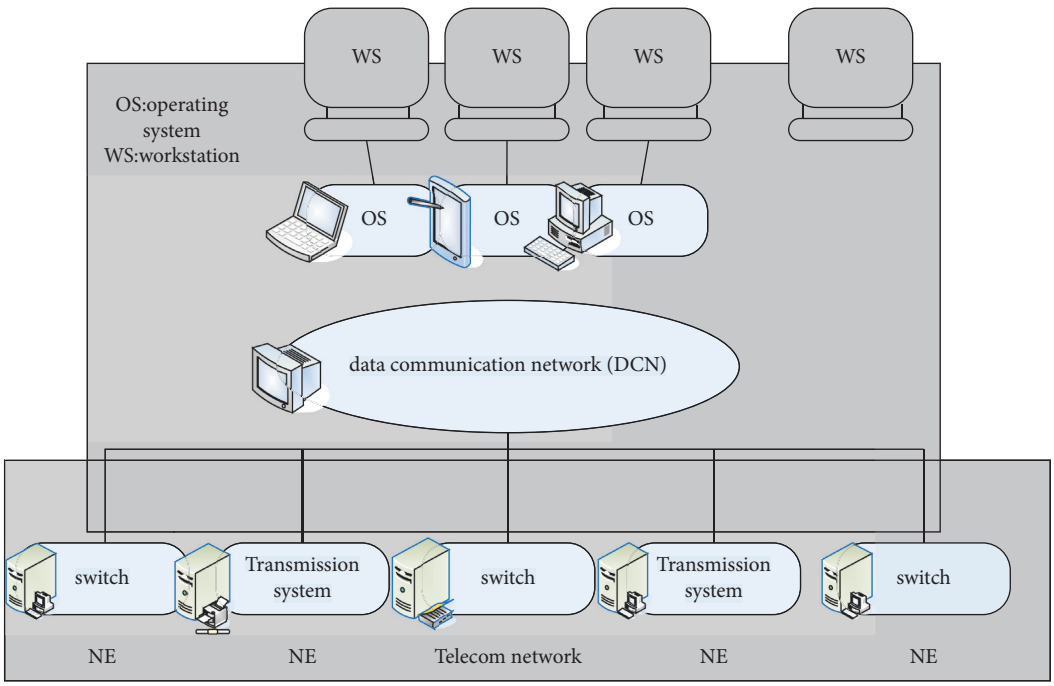

Figure 3: Communication network integrated management system.

Table 1: Experimental database features.

Database	Number of items	Number of transactions	Tight/sparse
T25I20D100K	9001	89110	Sparse
Pumsb	7007	48348	Close
Connect	110	57200	Close

Table 2: Comparison of the number of itemsets in the sparse dataset T25I20D100k.

Support threshold		1%	0.8%	0.6%	0.4%	0.2%	0.1%
T25I20D100k	FI quantity	52.56	102.30	20278	51138	101843	164386
	FCI quantity	52.56	102.30	20278	51138	99707	150971
	FI/FCI	1	1	1	1	1.021	1.089

Table 3: Comparison of the number of itemsets in the dense datasets pumsb and connect.

Support threshold		95%	90%	85%	80%	75%
Pumsb	FI quantity	172	2067	20527	142156	672390
	FCI quantity	111	1467	8514	33296	101048
	FI/FCI	1.55	1.41	2.41	4.27	6.65
Connect	FI quantity	2201	27217	142127	533975	1585551
	FCI quantity	812	3486	8255	15107	24346
	FI/FCI	2.71	7.78	17.22	35.35	65.13

algorithm with a threshold increment of 10% each time; for the pumsb dataset, first run it once with minsup = 60%, and the running time is 2375.42 S, and then run the CHARM_SM algorithm with a threshold increment of 10% each time [14]. The simulation results are shown in Figure 5:

3.3. The Training Process of BP Neural Network. The training process of BP neural network includes the following steps:

$$H_j = f\left(\sum_{i=1}^{n} w_{ij}x_i - a_j\right), j = 1, 2\infty, I. \quad (1)$$

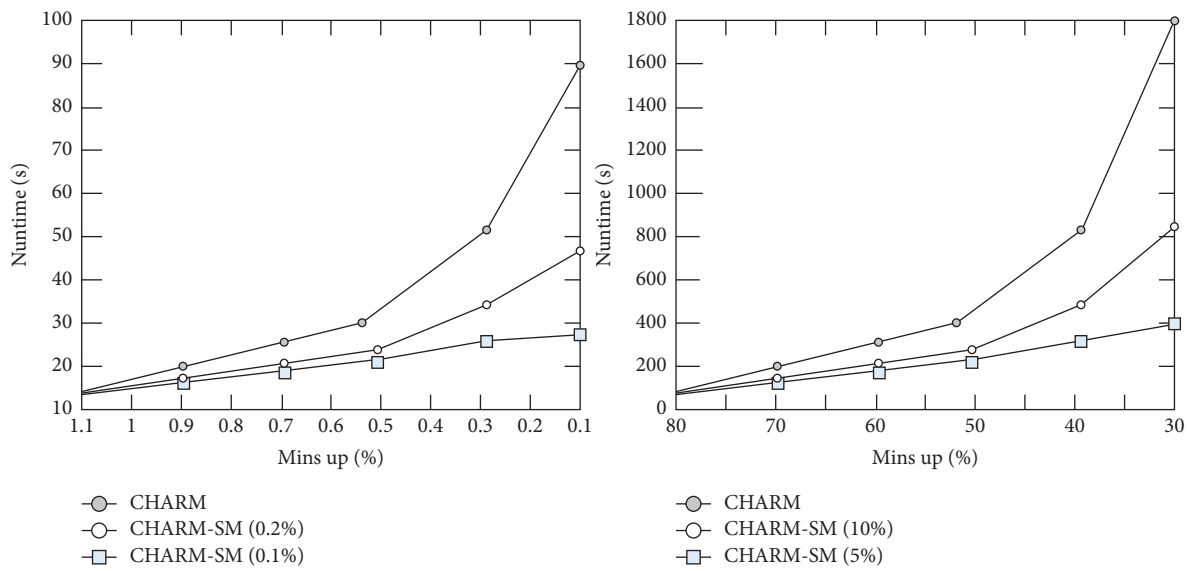

Figure 4: Simulation results on the sparse dataset T25I20D100k and the dense dataset connect.

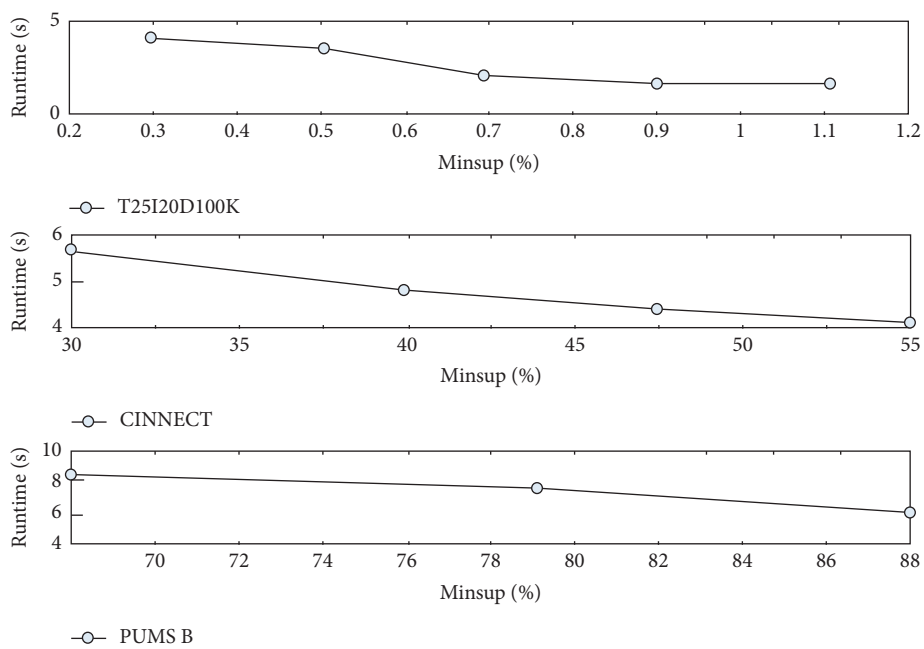

Figure 5: CHARM_SM runtime with minsup increasing.

In the formula, l is the number of nodes in the hidden layer; f is the activation function of the hidden layer, which has many expressions; and the commonly used activation functions are as follows:

$$y = \phi(x) = \begin{cases} 1, & x \geq 0, \\ -1, & x < 0, \end{cases}$$
$$y = \phi(x) = \begin{cases} 1, & x \geq 1, \\ 0.5(1+x), & -1 < x < 1, \\ -1, & x \leq -1. \end{cases} \quad (2)$$

The most commonly used sigmoid function is formula (3), and there is also a commonly used hyperbolic tangent symmetric function such as formula (4):

$$\phi(x) = \frac{1}{1+\exp(-ax)}. \quad (3)$$

The parameter a is the controllable slope.

$$\phi(x) = \tanh(0.5x) = \frac{1-\exp(-x)}{1+\exp(-x)}. \quad (4)$$

The output layer outputs the computation. According to the hidden layer output H, the connection weight ω_{jk}, and the threshold b, the BP network output O is calculated.

$$\mathrm{Ok} = \sum_{j=1}^{I} H_j w_{jk} - b_k, \quad k = 1, 2, \ldots, m. \tag{5}$$

Error calculation. According to the network prediction output O and the expected output Y, calculate the network prediction error e:

$$e_k = Y_k - O_k, \quad k = 1, 2, \ldots, m. \tag{6}$$

Weight update. The network connection weights ω_{ij} and ω_{jk} are updated according to the network prediction error e:

$$\begin{aligned} w_{ij} &= w_{ij} + \eta H_j\left(1 - H_j\right) x(i) \sum_{k=1}^{m} w_{jk} e_k, \quad i = 1, 2, \ldots, \eta, \\ &\qquad j = 1, 2, \ldots, I, \\ w_{jk} &= w_{jk} + \eta H_j e_k, \quad j = 1, 2, \ldots, I, K = 1, 2, \ldots, m. \end{aligned} \tag{7}$$

Threshold update. Updating the network node threshold ab according to the network prediction error e [15]:

$$\begin{aligned} a_j &= a_j + \eta H_j\left(1 - H_j\right) \sum_{k=1}^{m} w_{jk} e_k, \quad i = 1, 2, \ldots, I, \\ b_k &= b_k + e_k, \quad k = 1, 2, \ldots, m. \end{aligned} \tag{8}$$

Determining whether the algorithm iteration is over, if not, go back to step 2.

3.4. GA Optimizes BP Neural Network Process. The optimization of the initial weights and parameters of the BP neural network by the genetic algorithm is shown in Figure 6 [16]. It involves the interaction between a part of the genetic algorithm and a part of the BP neural network, finally getting the optimal weights and criteria of the BP neural network and detecting them as initial values in the BP classifier simulation and prediction. BP neural network optimization genetic algorithm is to use genetic algorithm to optimize the initial weights and parameters of BP neural network so that the optimal BP neural network can be better classified. The optimization elements of BP neural network genetic algorithm include initial population optimization, fitness function, selection operation, mutation operation, and crossover function [17].

$$\begin{aligned} F &= k\left(\sum_{i=1}^{n} abs\left(y_i - o_i\right)\right), \\ f_i &= k \mid F_i, \\ P_i &= \frac{f_i}{\sum_{j=1}^{N} f_j}. \end{aligned} \tag{9}$$

Which is

$$\begin{aligned} a_{ij} &= a_{kj}(1 - b) + a_{ij} b, \\ a_{ij} &= a_{ij}(1 - b) + a_{kj} b. \end{aligned} \tag{10}$$

Crossover

$$\begin{aligned} a_{ij} &+ \left(a_{ij} - a_{\max}\right) f(g), r > 0.5, \\ a_{ij} &+ \left(a_{ij} - a_{\max}\right) f(g), r > 0.5. \end{aligned} \tag{11}$$

The particle updates its own speed and position through the individual extremum and the global extremum and is calculated by the formula:

$$\begin{aligned} V_{\mathrm{id}}^{k+1} &= wV_{\mathrm{id}}^{k} + c_1 r_1\left(P_{\mathrm{id}}^{k} X_{\mathrm{id}}^{k}\right) + c_2 r_2\left(P_{gd}^{k} - X_{gd}^{k}\right), \\ X_{\mathrm{id}}^{k+1} &= X_{\mathrm{id}}^{k} + V_{\mathrm{id}}^{k+1}. \end{aligned} \tag{12}$$

4. Application of Data Mining Method in Volleyball Training

56 undergraduates who specialize in volleyball specializing in sports training in a university were selected as the research objects.

4.1. Methods

4.1.1. Literature Method. In literature, through the university library and e-books, look up books with related content, mainly refer to books such as "Functional Physical Training," "Functional Training – Action Exercises and Program Design to Improve Sports Performance," "Body Functional Training Manual," "Chinese Youth Volleyball Training Syllabus," and other books. In the literature retrieval, through the database resources such as Chinese journals and BAIDU search engine, the relevant papers, journals, conferences, and other literature materials related to the research on functional training were consulted. Using "functional training," "functional action screening," "sports training major," "volleyball specialization," etc. as key words to search, mainly read the "Functional Action Screening for Basketball Specialized Students of Sports Training Major of Capital Institute of Physical Education," "Research on Findings," "Research on the Application of Functional Training in Physical Training of Men's Volleyball in Colleges and Universities," "Empirical Research on Functional Physical Training of Women's High-level Volleyball Players in Nanjing University," and "An Empirical Study on the Effects of Functional Training Methods on the Basic Sports Ability of College Students." According to the needs of the research, the literature is screened, by sorting out and analyzing the results of previous research, mastering the current research status of functional training, reasonably citing and drawing on relevant research results, and providing a favorable theoretical basis for the writing research of the article [18].

4.1.2. Test Method

(1) Test purpose: to evaluate and analyze the students' basic athletic ability and physical quality according to the test results.

(2) Test objects: 56 undergraduates (34 boys and 22 girls) specializing in volleyball specializing in sports

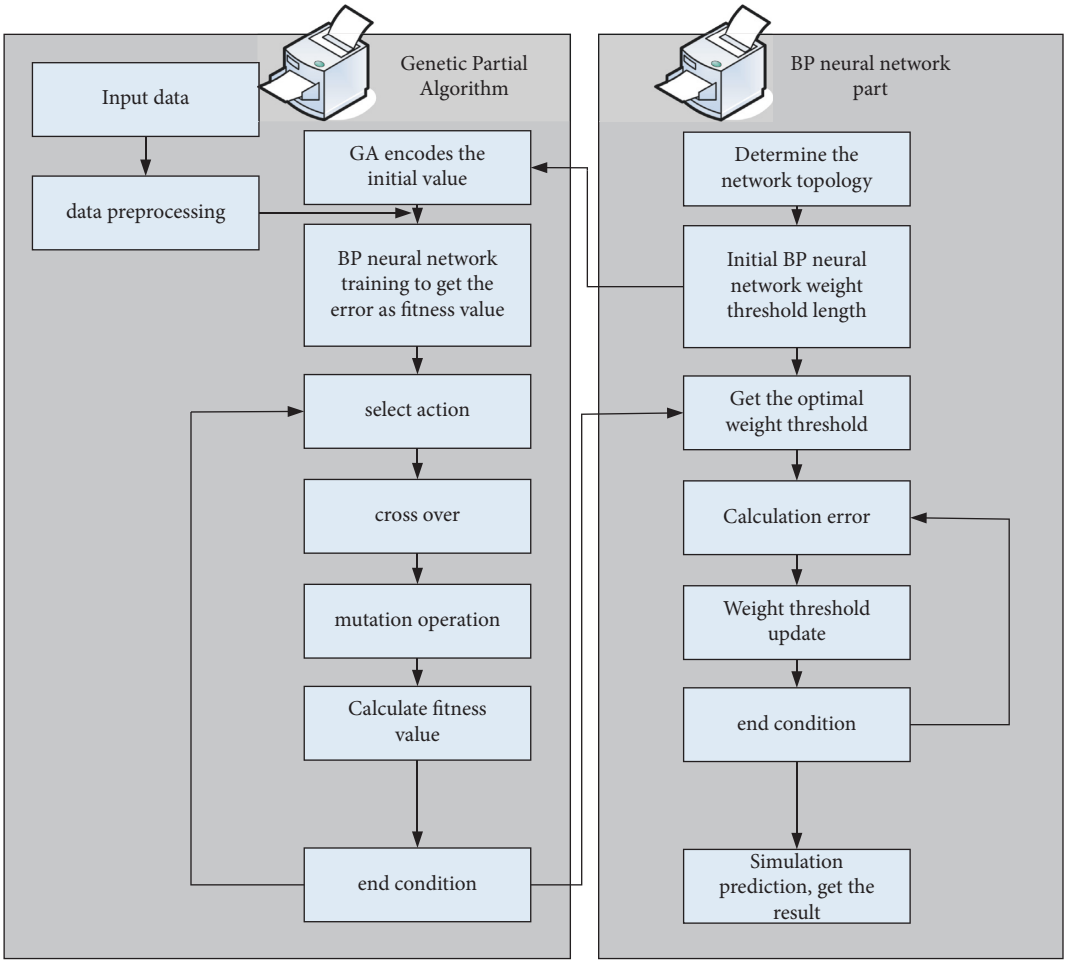

Figure 6: GA optimizes BP network process.

training in a university were selected as test objects to participate in the test.

(3) Test indicators: by consulting volleyball experts, analyzing relevant documents such as "Outline of Chinese Youth Volleyball Coaches," "Analysis of Physical Fitness Test Items of National Men's Volleyball League Players," etc., finally, the special physical fitness test was determined, and the basic exercise ability test and evaluation suitable for different groups of people were selected as the basic exercise ability test index.

(4) Test time and place: the test will be conducted from September 4 to September 8, 2020 at the volleyball hall of the College of Sports Science of the University.

4.1.3. Experimental Method. Experimental purpose: Whether the students in the experimental group can significantly improve their performance in functional movement screening and special physical fitness, so as to achieve the purpose of preventing sports injuries; how to choose a functional training method that is conducive to improving the functional movement screening performance and special physical quality of college students; explore the feasibility of the development, promotion, and application of functional training in college sports training volleyball specialization.

Subjects: 56 undergraduates (34 boys and 22 girls) of the 2017, 2018, 2019, and 2020 sports training majors of a university in the volleyball program were selected as experimental subjects to participate in the experiment. 56 people were randomly divided into experimental group and control group [19]. Tables 4 and 5 are shown below.

Table 4: Analysis of age, height, and weight of subjects in the experimental group before the experiment (male).

	Age	Height (cm)	Weight (kg)
Test group	20.29 ± 0.85	189 ± 4.63	77.3 ± 8.08
Control group	21.35 ± 1.32	186.8 ± 3.98	84.1 ± 8.39
T	2.782	−1.669	2.396
P	0.059	0.105	0.928

Table 5: Analysis of age, height, and weight of experimental subjects before the experiment (female).

	Age	Height (cm)	Weight (kg)
Test group	19.91 ± 1.04	173.3 ± 4.63	61.5 ± 6.65
Control group	20.36 ± 1.29	174.8 ± 5.27	62.9 ± 6.25
T	0.910	−0.731	−0.528
P	0.068	0.933	0.805

As can be seen from Figure 7: before the experiment, the functional movement screening data and various special physical fitness test data of the experimental group and the control group passed the *T* test. There were no significant differences in test data.

Experiment time: From September 11 to December 8, 2020, according to the curriculum arrangement of the special volleyball special course for the sports training major of the university, there are two special courses per week, and the experiment is arranged in the last physical training part of each special course. The class experiment time is 30–40 minutes, a total of 12 weeks (except October 1–6 holiday time). Since the school does not offer volleyball special courses during the freshman year of the 2020 volleyball students, 4 boys from the 2020 grade will take classes during the 2017 special course, and 2 girls from the 2020 grade will take classes during the 2019 special course. The 2019-level sports training volleyball program has a large number of students, and they are divided into two specialized classes for classes [20].

Experimental location: Volleyball hall of a college of sports science of a university.

Experimental steps:

① Students were randomly divided into experimental group and control group. The experimental group had practical training in the last 30–40 minutes of each professional course. In the control group, the content of the classes remained the same throughout, trying to ensure the same amount and intensity of exercise in both groups.

② Before the experiment, functional exercise screening and special physical fitness test were performed on the students to obtain pretest data.

③ According to the results of functional exercise screening and special physical fitness test, a functional training program was formulated, and the experimental group was subjected to a 12-week intervention experiment by designing the training program.

④ After a 12-week intervention trial, the experimental group and the control group underwent functional exercise screening and special physical fitness test, respectively, obtained posttest data, and obtained pretest and posttest data for comparative analysis.

Experimental control: The number of activities in the experimental group and the control group should be as consistent as possible with the amount of activities in their spare time.

Using EXCLE and SPSS20 software for statistical processing and analysis of the obtained data, all the statistical work of the test data is completed by the tester independently, and the purpose is to ensure the validity and authenticity of the statistical data in the indicators. By synthesizing, summarizing, comparing, and analyzing the test data before and after the experiment of the experimental group and the control group, the analysis and research are conducted in a dialectical and unified manner. In this way, it is concluded and analyzed whether functional training is suitable for volleyball students in college sports training majors, and further proposes a way for the healthy development of college sports training majors [21].

4.2. Volleyball Sports. The completion of technical actions such as serving, spiking, and blocking in volleyball requires athletes to be able to burst out a powerful force at the moment of the game. The working principle of the phosphoric acid energy supply system is to provide it with the energy needed for instant movement at the initial moment of any movement that requires high intensity or strong explosive force. In volleyball matches, especially women's volleyball matches, there are multiple rounds of competition, which are more common in volleyball matches. In the game, the form of movement such as offensive and defensive conversion, continuous jumping, and continuous movement makes the phosphoric acid energy supply system unable to fully recover in a short period of time. At this time, the anaerobic glycolysis energy supply system will take over the work of the phosphoric acid functional system and provide a part of the energy for the completion of the action. The more intense the competition, the more scrambles in multiple rounds, the higher the level of confrontation between the two players, and the greater the proportion of anaerobic glycolysis. During the interval phase of the game (dead ball, timeout, substitution, inter-inning rest, etc.), the athlete's high-intensity movements are suspended and the body gets a moment's rest. At this time, the aerobic system begins to function, providing energy for the body. Excellent aerobic exercise plays a very good role in delaying exercise fatigue and maintaining a good competitive level, and it also plays a pivotal role in improving the training level during physical training. Excellent anaerobic exercise such as phosphoric acid supply and anaerobic glycolysis plays a decisive role in the performance of athletes during competition. After the implementation of the scoring system for each ball in volleyball, the game time is shortened, the rhythm is accelerated, the competition is becoming more and more intense, the game load is reduced, and the load intensity is significantly increased. Status is more prominent [22].

The biomechanical analysis of sports events mainly summarizes and summarizes the movements of the trunk and limbs during sports. The analysis mainly includes the spatial position of the body, the timing and coordination between different parts of the body when performing the required action, the speed of the body or body parts during the movement, and the time of the movement. Movement patterns, joint movement patterns, muscle movement patterns, and the plane in which the action occurs are all things that need to be focused on during training. Basic biomechanical analysis of a volleyball event enables the determination of key factors of movement, including the type of movement, the range of motion of the joints during the movement, the speed of movement required, the way the muscles are moved, and the demands of the metabolic system for the project based on the duration of the

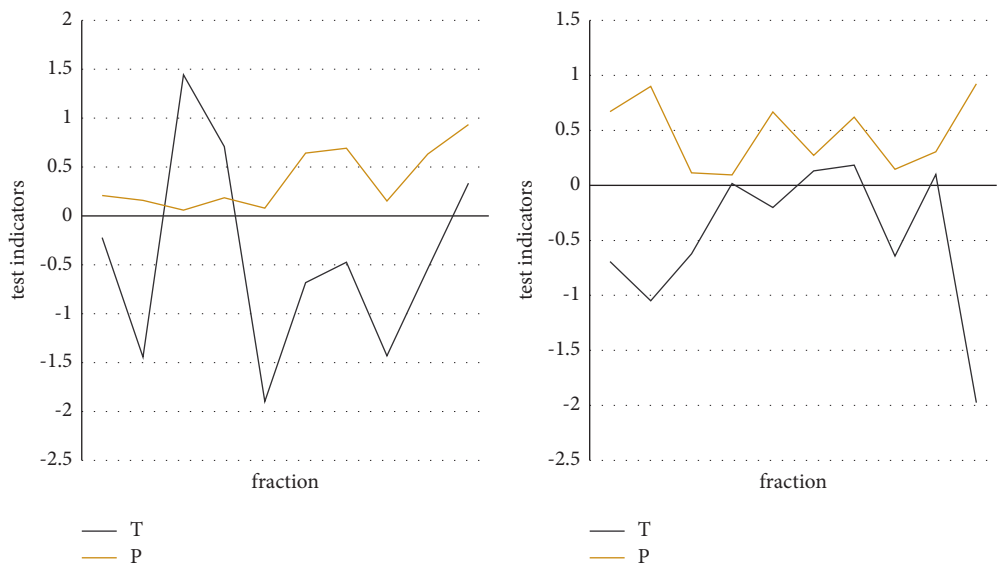

Figure 7: Test data analysis table of the experimental group and the control group before the experiment for men and women.

movement. These factors are very important when choosing training methods and means, and the plane of movement and the type of muscle work can help select resistance training that is similar to the biomechanical requirements of the program [23, 24]. By summarizing and summarizing the action patterns, we can pay more attention to the needs of special movements and then improve the special skills.

4.3. Construction of Functional Physical Fitness Training System. Regular physical fitness tests are essential, and this is because the physical fitness test can effectively assess the athletic talent and athletic ability of athletes, evaluate the success of the exercise experimental plan, and can also be used as a reference to provide a control for the target setting of the testee. During the testing process, it is necessary to pay attention to safety factors and environmental factors, to ensure the safety of the subjects during the testing process, and to ensure the reliability and validity of the testing results. At present, the physical fitness test of body function mainly refers to the methods and means in the field of rehabilitation, but it cannot meet the needs of functional training well, and the means that can accurately evaluate are still relatively scarce [25, 26].

Test content:

(1) Measurement of height and weight.

(2) Functional movement screening.

(3) Volleyball special physical fitness test: Volleyball special physical fitness test: V-shaped movement, long jump, 30-meter run, badminton long shot, supine 60 seconds, prone 30 seconds, double rope jumping for 30 seconds, 9 m × 10 fast run.

As can be seen from Figure 8, in the seven test movements, girls scored higher than boys in straight lunge, active straight knee raise, and trunk rotation strength, indicating that women's body flexibility, joint flexibility, body coordination, and core strength are stronger than men. By reading the literature, it is found that women are more flexible than men, and women need to strengthen upper body strength and core strength exercises. Boys scored higher than women in squatting, striding, shoulder flexion, and push-up trunk stability across seven exercise attempts [27]. It shows that boys' physical strength, trunk strength, and shoulder movement are stronger than girls', and men should increase the flexibility and stretching and relaxation exercises of corresponding parts at the end of training. The students in the experimental group usually scored higher on shoulder flexibility, and the movements lower than 2 points from high to low were active straight knee, bending, standing obstacle, straight lunge, push-up, and rotational stability of trunk strength. The screening performance in functional movement is poor, usually manifested as: limited movement pattern, asymmetric movement pattern, insufficient motor control ability, and limited or asymmetrical movement ability.

According to the corresponding scores of the physical fitness score table in the "Chinese Youth Volleyball Training Syllabus," it can be seen that the boys and girls in the experimental group have lower scores in various scores, indicating that the volleyball special physical fitness is poor, and there is usually a lack of related exercises (as shown in Figure 9).

The construction of sports training goals is very important for the improvement of the project's competitive ability. The correct formulation of a training goal plays a vital role in stimulating students' positive emotions and avoiding negative emotions, allowing coaches to better control students' ideal results. The construction of training objectives should follow certain principles. Among the many principle analysis, the rationality principle is the most common. If the training objectives are set too high or too low, it will affect the training process and training results. Among the

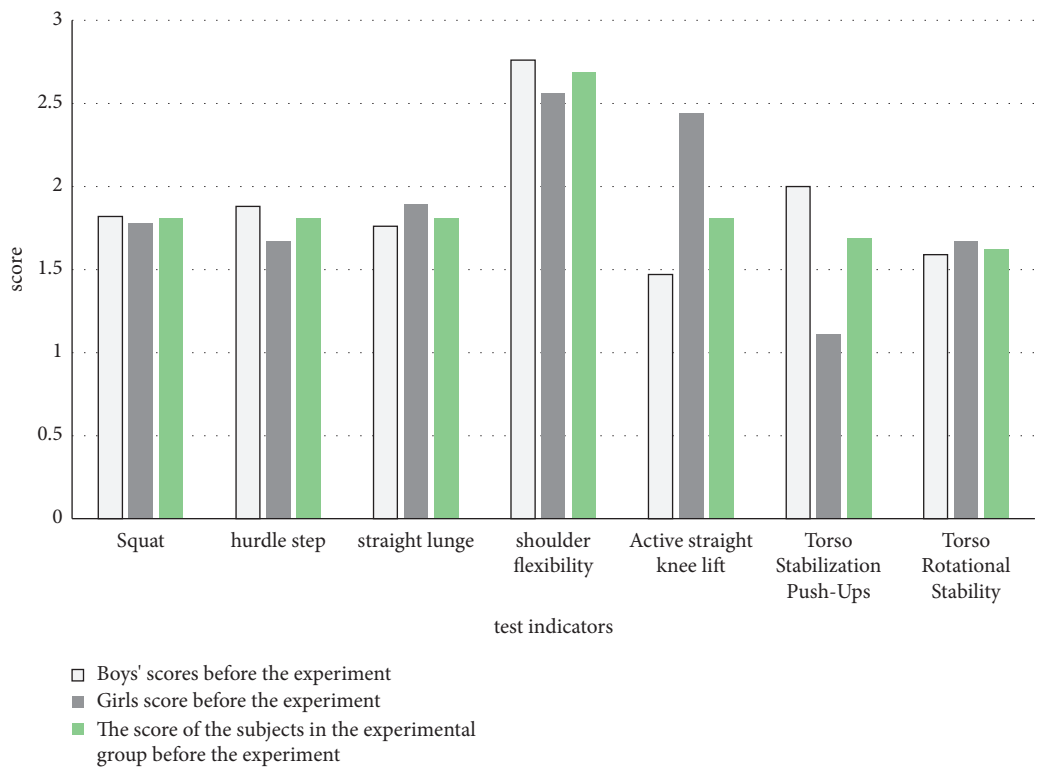

Figure 8: Analysis table of functional movement screening scores of different genders.

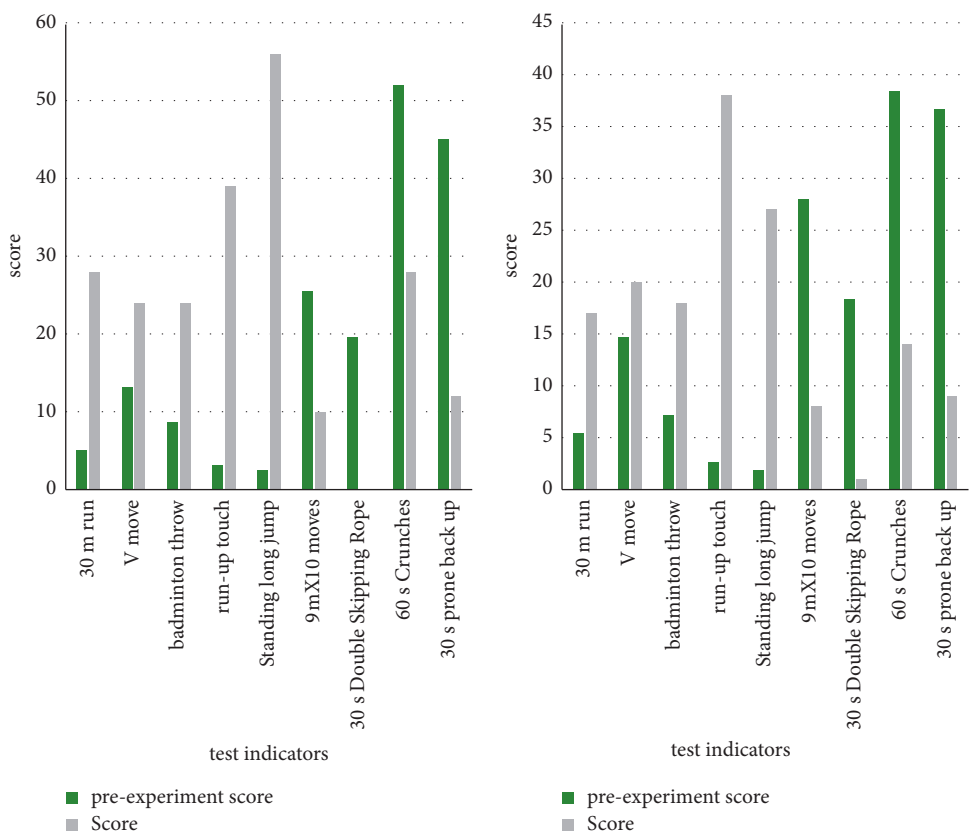

Figure 9: Special physical fitness test data score table.

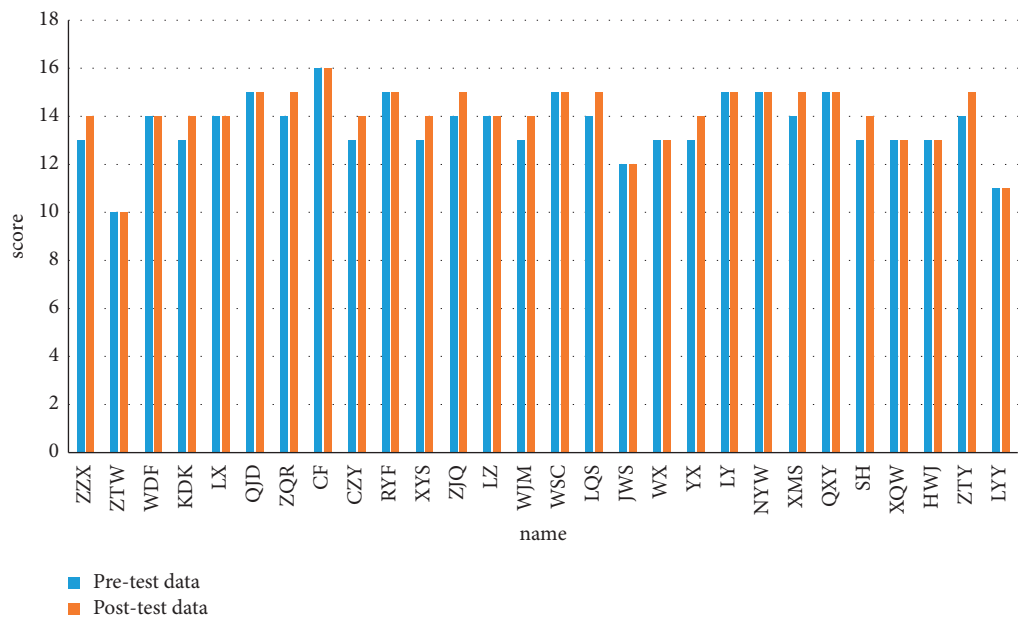

Figure 10: List of functional motor screening scores before and after the control group experiment.

principles of setting training goals, the most commonly used is the principle of starting from reality and seeking truth from facts. The formulation and construction of training goals should be based on the actual athletic ability and technical and tactical level of students. From the perspective of the content division of training objectives, there are mainly two forms. The first is to divide the content of the training objectives, and the second is to combine the various elements of athletic ability into the overall goal of training. The second division method is mostly, for example, the training and teaching objectives and tasks are elaborated from the six elements of physical fitness, technology, tactics, psychology, style, and theory. The article expounds the construction of goals from two aspects of physical fitness and theory. In terms of physical strength, on the basis of the comprehensive development of joint flexibility and physical strength, increase the body's ability to control movements, focus on explosive training, and appropriately increase the intensity of strength training. In theory, the basic content is called action screening, functional training tools, training action requirements, and basic content to improve practical training. The goal of functional activity screening is not to achieve a full score, to rule out limited mobility and body asymmetry, while all mobility tests will score at least 2 and maintain bilateral symmetry. If it experiences pain during the test, it should be treated by a medical professional, and if there is no pain, the flexibility and asymmetry of the body should be addressed first. The second is strength. Insufficient strength cannot ensure correct posture and movement and, finally, the ability of the body to control movement.

The results of data analysis showed that there was a significant difference in the improvement of functional screening scores between the experimental group and the control group. In the first trial, none of the 56 subjects felt pain. In the control group, 13 people were below 14 points, 8 people were 14 points, and 7 people were above 14 points. In the experimental group, 15 people were below 14 points, 6 people were 14 points, and 7 people were higher than 14 points. In the second test after the experiment, 6 people in the control group were still below 14 points, 10 people were 14 points, and 12 people were above 14 points; none of the experimental group scored less than 14 points, and the performance of the movement screening was significantly improved. This suggests that functional training methods are very effective in improving performance screening of functional movements (as shown in Figures 10 and 11).

5. Discussion

The results of data analysis showed that there was a significant difference in the progress rate of the V-shaped exercise test data between the two groups of men before and after the experiment, $P = 0.043$ ($P < 0.05$), and the average value of the test data increased from 12.75 s to 12.61 s, and the average improvement was −0.14. The improvement rate of the experimental group was better than that of the control group. After functional training, the V-shaped exercise performance of the experimental group (male) was significantly improved, and the effect of functional training was significant.

There is a significant difference in the improvement rate of the V-shaped exercise test data between the two groups of women before and after the experiment. The improvement rate of the experimental group was better than that of the control group. After functional training, the V-shaped exercise performance of the experimental group (women) was significantly improved, and the effect of functional training was significant.

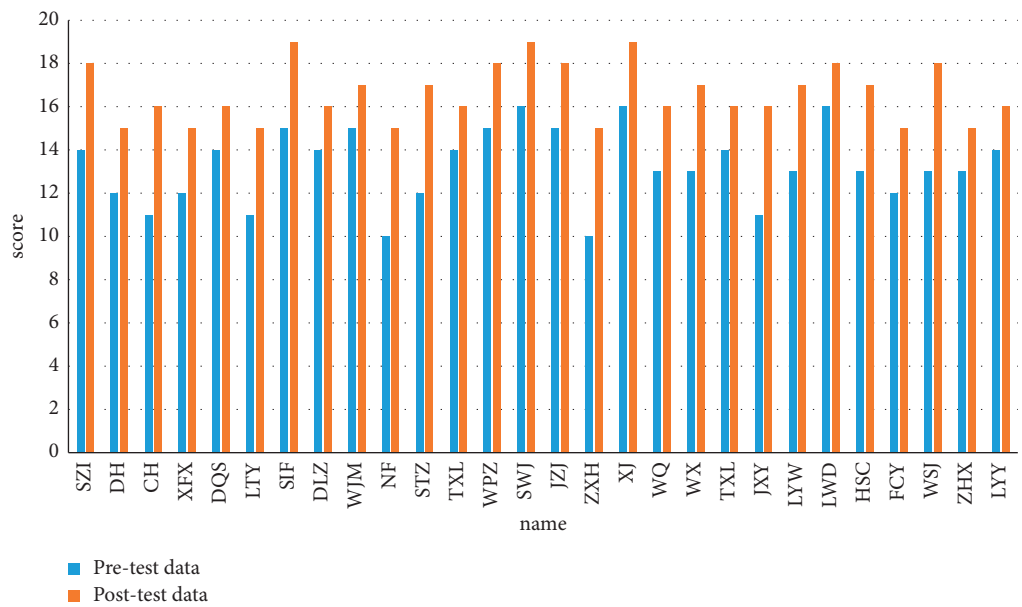

Figure 11: List of functional motor screening scores before and after the experiment in the experimental group.

The basic movements of the human body are divided into movement, level change, push and pull, and rotation. Mobility is the first pillar of human movement, and its main components are single-leg strength and rotation, which are the most important motor skills. Horizontal change is the second pillar of human movement, and its main parts are the movement of the trunk, the movement of the calf, and the change of the upper and lower center of gravity of the body. Push-pull is the third pillar of human movement and part of the biomechanical system. Rotation is the most important part of the human motor backbone regarding neural cross-connections. The seven movements in the functional movement screening are mainly tested for the four basic movements of the human body. According to the test results, the reasons for the wrong movements of the body are found, and corresponding functional training methods are formulated. According to the analysis of experimental data, before the experiment, in the first test, none of the 56 subjects experienced pain. In the control group, 13 people were lower than 14 points, 8 people were 14 points, and 7 people were higher than 14 points; in the experimental group, 15 people were lower than 14 points, 6 people were 14 points, and 7 people were higher than 14 points. Before the experiment, the test data of the two groups were tested by independent samples T test, and there was no difference, and the experiment could be carried out. After the experiment, in the second test, there were still 6 people in the control group with a score below 14, 10 people with a score of 14, and 12 people with a score above 14; none of the experimental group had a score below 14. Since the experimental subjects included boys and girls, the data analysis and comparison of boys and girls were carried out separately, and the functional exercise screening scores of the experimental group and the control group were improved. However, after the independent sample T test was performed in both groups to improve the score, the male group $P = 0.01$, the male group female $P = 0.02$ ($P < 0.05$), and there was a significant difference between genders. The average performance improvement scores of men and women in the experimental group were 3.41 and 3.27, respectively, and the average scores of men and women in the control group were 0.47 and 0.36, respectively. 12 weeks of functional training can effectively improve the performance of functional movement screening, improve the basic exercise ability of the human body, correct incorrect limb movements, and prevent and reduce sports injuries.

The development and progress of volleyball tactical level mainly depend on the development level of special physical fitness in volleyball. Physical fitness in volleyball includes agility, coordination, speed, strength, and endurance. According to experts' suggestions, the article selects nine test methods that can accurately reflect the characteristics of volleyball. Since the experimental subjects included men and women, men and women were separated for data analysis and comparison. According to the analysis of the experimental data, the test scores of the experimental group and the control group (men) were tested by the T-test of V-shaped movement, running touchdown, running and jumping, badminton long shot, 60 s lying on the back, 30 s tilting back, and 30 s double-swing rope skipping test, $Pv = 0.043$, P assist $= 0.01$, P stand $= 0.005$, P feather $= 0.027$, P belly $= 0.001$, P back $= 0.048$, P double $= 0.001$ ($P < 0.05$); the experimental group and the control group (women) V-shaped exercise, running and bouncing, standing jump, badminton long shot, 60 s two-headed supine, 30 s prone, 30 s double-rocking rope skipping test scores were tested by sample T test, $Pv = 0.006$, P help $= 0.022$, P stand $= 0.047$, P feather $= 0.012$, P belly $= 0.037$, P back $= 0.029$, P double- $= 0.014$ ($P < 0.05$). The experimental conclusion was drawn: there were significant differences between the experimental group and the control group in the test scores of sensitivity, jumping ability, lower body strength, upper body strength, abdominal strength, back strength, and coordination. The

sample T test was performed on the improvement of the experimental group and the control group (boys) 30 m running and $9\,\mathrm{m} \times 10$ times moving test scores, and $P3 = 0.442$ and $P9 = 0.338$ ($P > 0.05$); the sample T test was conducted on the improvement of the experimental group and the control group (girls) in the 30 m running and $9\,\mathrm{m} \times 10$ movement test scores, and it was obtained that $P3 = 0.813$ and $P9 = 0.065$ ($P > 0.05$). There were no differences between groups.

6. Conclusion

Before the experiment, most exercise screening scores were low, mainly manifested as: limited movement patterns, incorrect movement patterns, insufficient movement control, movement limitations, or asymmetry, and the reasons include: poor joint function, excessive tension of related muscle groups, incorrect movement patterns, core strength, trunk strength and strength, etc., which are related to the body. Women's body flexibility, joint flexibility, body coordination, and core strength are stronger, and they need to strengthen upper arm strength, core strength, and endurance training. Men have greater upper arm strength, trunk strength, and shoulder mobility, and flexibility and extension need to be strengthened, as well as corresponding relaxation exercises in the post-workout phase. Before the experiment, according to the physical fitness score table, the special physical fitness score was at a low level, and all aspects of the quality need to be strengthened. After training, the sports activity screening scores of the experimental group and the control group were significantly different. Practical training techniques can effectively improve the ability of movement screening, improve the physical fitness of athletes, correct incorrect body movements, and prevent and reduce sports injuries. The 12-week training improved students' agility, jumping ability, lower body ability, abdominal muscle strength, back strength, and effective coordination. But there was no noticeable improvement in speed and endurance because speed and endurance training were not part of the actual training. Introducing functional training into the specialized volleyball classes of sports training majors in colleges and universities can effectively promote the healthy development of students' special physical quality. With the gradual improvement of the society's requirements for the professional and technical level of volleyball special talents in sports training, introducing functional training into college classrooms can find a physical training method suitable for volleyball students majoring in sports training, promote the improvement of professional skills of volleyball students majoring in sports training, and improve the overall quality of volleyball students majoring in sports training.

Data Availability

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

Conflicts of Interest

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

References

[1] A. L. Buczak and E. Guven, "A survey of data mining and machine learning methods for cyber security intrusion detection," *IEEE Communications Surveys & Tutorials*, vol. 18, no. 2, pp. 1153–1176, 2016.

[2] L. Xu, C. Jiang, J. Wang, J. Yuan, and Y. Ren, "Information security in big data: privacy and data mining," *IEEE Access*, vol. 2, no. 2, pp. 1149–1176, 2017.

[3] I. Kavakiotis, O. Tsave, A. Salifoglou, and N. I. I. Maglaveras, "Machine learning and data mining methods in diabetes research," *Computational and Structural Biotechnology Journal*, vol. 15, no. C, pp. 104–116, 2017.

[4] A. Bruzda-Zwiech, M. Konieczka, A. Hilt, M. Daszkowska, J. Grzegorczyk, and J. Szczepanska, "Salivary cortisol, alpha-amylase and immunoglobulin a responses to a morning session of basketball or volleyball training in boys aged 14-18 years," *Journal of Biological Regulators & Homeostatic Agents*, vol. 31, no. 1, pp. 105–110, 2017.

[5] T. A. G. Horta, D. R. Coimbra, R. Miranda, F. Z. Werneck, and M. G. Bara Filho, "A carga interna de treinamento é diferente entre atletas de voleibol titulares e reservas? Um estudo de caso," *Brazilian Journal of Kinanthropometry and Human Performance*, vol. 19, no. 4, pp. 395–405, 2017.

[6] X. Yan and L. Zheng, "Fundamental analysis and the cross-section of stock returns: a data-mining approach," *Review of Financial Studies*, vol. 30, no. 4, pp. 1382–1423, 2017.

[7] Q. Wang, G. Z. Yao, G. M. Pan, J. Y. Huang, Y. P. An, and X. Zou, "Analysis of on medication rules for Qi-deficiency and blood-stasis syndrome of chronic heart failure based on data mining technology," *Zhongguo Zhong yao za zhi = Zhongguo zhongyao zazhi = China journal of Chinese materia medica*, vol. 42, no. 1, pp. 182–186, 2017.

[8] M. Gordan, H. A. Razak, Z. Ismail, and K. Ghaedi, "Recent developments in damage identification of structures using data mining," *Latin American Journal of Solids and Structures*, vol. 14, no. 13, pp. 2373–2401, 2017.

[9] L. Zheng, W. Hu, and Y. Min, "Raw wind data preprocessing: a data-mining approach," *IEEE Transactions on Sustainable Energy*, vol. 6, no. 1, pp. 11–19, 2015.

[10] K. Ravi and V. Ravi, "A novel automatic satire and irony detection using ensembled feature selection and data mining," *Knowledge-Based Systems*, vol. 120, no. Mar.15, pp. 15–33, 2017.

[11] C.-J. Tseng, C.-J. Lu, C.-C. Chang, and G.-D. C. Chen, "Integration of data mining classification techniques and ensemble learning to identify risk factors and diagnose ovarian cancer recurrence," *Artificial Intelligence in Medicine*, vol. 78, no. may, pp. 47–54, 2017.

[12] T. Pérez-Palacios, D. Caballero, T. Antequera, M. L. Durán, M. Ávila, and A. Caro, "Optimization of MRI acquisition and texture analysis to predict physico-chemical parameters of loins by data mining," *Food and Bioprocess Technology*, vol. 10, no. 4, pp. 1–9, 2017.

[13] M. Bakon, I. Oliveira, D. Perissin, and J. J. J. Sousa, "A data mining approach for multivariate outlier detection in post-processing of multitemporal InSAR results," *Ieee Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, vol. 10, no. 6, pp. 2791–2798, 2017.

[14] A. Chinchuluun, P. Xanthopoulos, V. Tomaino, and P. M. Pardalos, "Data mining techniques in agricultural and environmental sciences," *International Journal of Agricultural and Environmental Information Systems*, vol. 1, no. 1, pp. 8–12, 2017.

[15] D. CaBallero, A. CaRo, M. d M. Avila, and P. T. T. Garcia Rodriguez, "New fractal features and data mining to determine food quality based on MRI," *IEEE Latin America Transactions*, vol. 15, no. 9, pp. 1777–1784, 2017.

[16] O. Rahmati and H. R. Pourghasemi, "Identification of critical flood prone areas in data-scarce and ungauged regions: a comparison of three data mining models," *Water Resources Management*, vol. 31, no. 5, pp. 1473–1487, 2017.

[17] R. Francaviglia, C. Di Bene, R. Farina, and L. Salvati, "Soil organic carbon sequestration and tillage systems in the Mediterranean Basin: a data mining approach," *Nutrient Cycling in Agroecosystems*, vol. 107, no. 1, pp. 125–137, 2017.

[18] R. J. Oskouei, N. M. Kor, and S. A. Maleki, "Data mining and medical world: breast cancers' diagnosis, treatment, prognosis and challenges," *American journal of cancer research*, vol. 7, no. 3, pp. 610–627, 2017.

[19] J. Ramos, J. A. Castellanos-Garzón, J. F. de Paz, and J. M. Corchado, "A data mining framework based on boundary-points for gene selection from DNA-microarrays: pancreatic Ductal Adenocarcinoma as a case study," *Engineering Applications of Artificial Intelligence*, vol. 70, no. APR, pp. 92–108, 2018.

[20] D. Wilk-Kolodziejczyk, K. Regulski, G. Gumienny, and B. S. K. Kacprzyk, "Data mining tools in identifying the components of the microstructure of compacted graphite iron based on the content of alloying elements," *International Journal of Advanced Manufacturing Technology*, vol. 95, no. 9-12, pp. 3127–3139, 2018.

[21] H. Vathsala and S. G. Koolagudi, "Prediction model for peninsular Indian summer monsoon rainfall using data mining and statistical approaches," *Computers & Geosciences*, vol. 98, no. jan, pp. 55–63, 2017.

[22] C.-J. Lin, C. Wu, and W. A. Chaovalitwongse, "Integrating human behavior modeling and data mining techniques to predict human errors in numerical typing," *IEEE Transactions on Human-Machine Systems*, vol. 45, no. 1, pp. 39–50, 2015.

[23] L. Li and J. Zhang, "Research and analysis of an enterprise E-commerce marketing system under the big data environment," *Journal of Organizational and End User Computing*, vol. 33, no. 6, pp. 1–19, 2021.

[24] R. Kanniga Devi, M. Gurusamy, and P. Vijayakumar, "An efficient cloud data center allocation to the source of requests," *Journal of Organizational and End User Computing*, vol. 32, no. 3, pp. 23–36, 2020.

[25] V. Sathiyamoorthi, P. Keerthika, P. Suresh, Z. Zuopeng (Zuopeng), A. P. Rao, and K. Logeswaran, "Adaptive fault tolerant resource allocation scheme for cloud computing environments," *Journal of Organizational and End User Computing*, vol. 33, no. 5, pp. 135–152, 2021.

[26] M. Zheng XuReza, "PariziMohammad HammoudehOctavio loyola-gonzález. Cyber security intelligence and analytics," *Proceedings of the 2020 International Conference on Cyber Security Intelligence and Analytics CSIA*, vol. Volume 1, 2020.

[27] S. H. Liao and C. H. Ho, "Mobile payment and mobile application (app) behavior for online recommendations," *Journal of Organizational and End User Computing*, vol. 33, no. 6, pp. 1–26, 2021.