Analysis of the Relation between Athletes' Physical Ability and Technical and Tactical Play Based on Data Mining

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Abstract: Data mining is the process of extracting valuable knowledge from a large amount of data by machine learning. Therefore, based on data mining, the author analyzed the relationship between athletes' physical fitness and technical and tactical play. This paper studies the application of data mining in the exertion of athletes' physical fitness and skills and tactics. The research shows that the comprehensive evaluation of athletes based on physical fitness data is transformed into classification problem, and the hierarchical network based on data mining is designed to effectively solve the evaluation of athletes' physical fitness status. In addition, the author believes that data mining should give full play to its potential value in game technical and tactical analysis, national physique monitoring, and sports monitoring data. There is still much research work to be carried out.

1. Introduction

For competitive sports, the ultimate goal of sports training is to create excellent sports performance, and the athlete's physical fitness is the most basic and controllable factor to improve athletic ability [1]. Physical fitness testing is the basic way for coaches to understand the athlete's physical condition. Data mining can provide important and valuable information or knowledge for decision-makers, resulting in incalculable benefits, and is gradually becoming a magic weapon for market competition in an invincible position [2]. How to effectively use these data and give full play to its potential value is an urgent problem for scientists and technicians in sports and related fields [3]. These technologies have greatly promoted the development of database and information industry, making a large number of databases and information storage for transaction management, information extraction and data analysis [4]. Especially in recent decades, with the continuous maturity of database technology and the wide application of database management system, as well as the development of database acquisition technology, people use computer technology to collect and accumulate data is also increasing sharply, and these data are growing exponentially every day [5]. Coaches should regularly test the physical fitness of athletes, and calculate the results of each athlete's physical fitness test according to different test standards [6]. Then, according to their own experience, the athletes' physical condition is evaluated, and the corresponding training program is formulated to guide the training. Therefore, the introduction of data mining technology and other high-tech means to solve large-scale data processing and reuse in the field of sports has become a consensus.

With the rapid development of database technology and the diversification of people's access to data, the number of data owned by human beings has increased dramatically. In the field of sports, sports training, actual competition, school sports management and national physical fitness test will produce a lot of data and information [7]. But the rapid growth of massive data collection, storage in large and large databases, there is no powerful tool to understand them has far exceeded human capabilities [8]. There are many important information hidden behind these massive data. People hope to analyze them at a high level in order to make better use of these data. But the current data system can only deal with specific data simply [9]. However, with the accumulation of test data, it has become more and more difficult to manage and analyze these data by manual processing [10]. There are many types of data mining, which have been gradually mastered by people. Association rule mining (referred to as association rules) is the most mature, most important and most active research content. As a result, the data collected in large databases has become a “data grave” and has become a rare data file for revisiting. Data mining not only analyzes past data, but also identifies potential

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connections between past data, while further predicting future trends.

2. Problems in the Analysis of Athletes' Physical Fitness Test Data

2.1. Optimization of physical fitness test indicators

At present, the 14 physical fitness test indicators of the sports are developed by the coaches based on years of practical experience, mainly related to running, jumping, and casting, and the test content is more. In the teaching, training, scientific research and team selection of kayaking, the measurement and evaluation of sports physiological and biochemical indicators are an important task, and the association rules of these athletes' physiological and biochemical indicators are mined. But compared to other areas of data mining research, applications in the field of sports are in their infancy. Data mining refers to extracting novel, effective, potential and useful knowledge from a large number of incomplete, noisy, fuzzy and random practical application data. The extracted knowledge is expressed in the form of concepts, rules, rules and patterns. Due to the limitation of equipment, time, climate and other factors, it is very difficult to test all 14 items regularly.

Our country's track and field has achieved excellent results in world competitions. Figure 1 shows the development trend and achievement difference between China and the world in men' s 100-meter race this year.

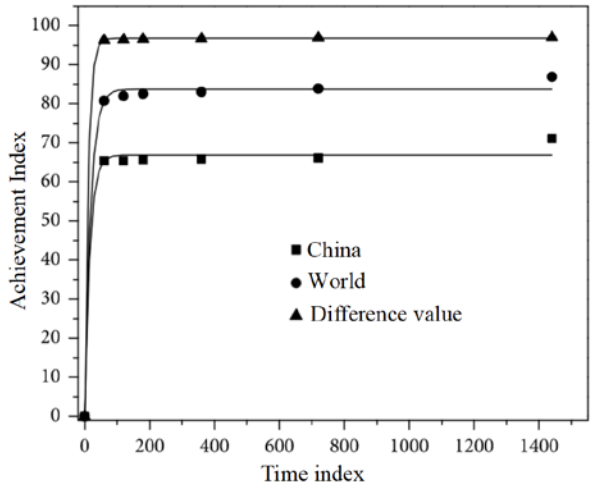

Fig.1. Development Trend and Achievement Difference Map of Sports Level between China and the World in Recent Years

2.2. Evaluation of Physical Fitness

Data mining generally refers to the process of automatically searching for information hidden in a large number of data. With the maturity of data mining technology, many enterprises have begun to use data mining tools to extract potential information from massive data to help enterprises make effective decisions. And practice shows that there is a correlation between some physical fitness items in these 14 items, that is to say, the improvement of one physical fitness test result can drive the improvement of another or several physical fitness test results. Commonly used methods such as Bayesian inference, factor analysis, correlation analysis, and regression analysis can be used to solve problems such as classification and modeling in practical problems. Which data mining algorithm is used depends on the specific situation and application requirements. Through these historical data, it is possible to analyze the development and change laws of athletes' physical state, predict the physical state of athletes in a certain period, and provide scientific basis for coaches to formulate training plans.

3. Application of Data Mining in Sports

3.1. Application in technical and tactical analysis

In competitive sports, the analysis of various skills and tactics will generate a large amount of data. The traditional game analysis methods generally focus on manual game observation, mathematical statistics and scientific research personnel. It is difficult to draw scientific conclusions, so it has certain limitations. With the rapid development of sports information, a large amount of data has been accumulated in the field of sports. People urgently need to convert these data into useful information and knowledge. Data mining has attracted the attention of the sports information industry. The theory of association rules not only provides new scientific logic and research methods for information science and cognitive science, but also provides effective processing technology for intelligent information processing. In the knowledge model of data mining, the association rule pattern is an important one. In order to achieve new heights, we can only use the help of modern scientific and technological means to improve the performance of competitive sports by applying some technical and tactical analysis systems, which provides a reliable basis for improving training methods. It has achieved encouraging results in many areas. Taking tennis as an example, coaches usually divide athletes' physical fitness into three states: poor, general and good according to the test data.

According to the theory of halo measurement and evaluation, the 5-grade evaluation method is often used in grade evaluation. The grade evaluation criteria of individual and comprehensive physical fitness level of each selected index are shown in Table 1.

Table 1 Grade Evaluation Criteria of Athletes' Selection Index

Grade	Inferior	Below average	Secondary	Middle and upper class	First-class
Index	Less than 10%	25%	25%~75%	75%~90%	More than 90%
Standing long jump	2.40	2.47	3.35	3.57	4.06
TTP-CP	7660	7680	7.895	7.954	8.658
Half awkward/weight	2.95	3.04	3.14	3.35	3.67
Tertiary jump	8.48	8.52	8.67	9.04	9.31

3.2. Application in the health of all people

With the progress of physical fitness monitoring, a large number of national physique monitoring data has been accumulated in the field. Although traditional statistical methods can produce some data analysis results, they cannot reveal the intrinsic relationship between the conclusions. With the development of competitive sports technology, the performance of various sports has become closer to the limit of human physical fitness. In-depth research on the mining methods of association rules at home and abroad, research and design a fast and efficient association rules mining algorithm can effectively improve the efficiency of data mining, and extend the application scope of data mining, which is of great significance for data mining. The classification mining in data mining is to find a reasonable description or model for each class in the case of known characteristics of training data and classification results, and then use these classification descriptions or models to identify new unknown data. Sort. There are two main applications of data mining technology in the field of physical health: association rule mining and clustering analysis mining. It provides a quantitative basis for the analysis, interpretation and prediction of athletes' physical fitness, and no longer relies on the single analysis and judgment of coaches' experience, so as to make the analysis results more accurate and improve the credibility. At present, data mining has not been applied to relational person analysis system at home and abroad, but with the development of information technology. In this case, there are a lot of applications about finding relationships between people.

4. Conclusions

Grid space index data structure is one of the most widely used index data structures in U:, which shows its unique superiority in the search of space entities. It provides us with a new method and new ideas for the protection of stone inscriptions, and provides new means and techniques for the protection, restoration and research of ancient precious cultural relics. With the continuous development of data mining technology and the continuous deep research of sports science and technology personnel. However, because the selection of grid size is the key factor affecting its efficiency, it can achieve higher efficiency through artificial adjustment in practical use. Therefore, only by successfully solving the above problems, can data mining technology play a greater role in the scientific development of sports field and have a broader development prospects in sports field.

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