

# Application and Development of “Sports Big Data” in Modern Sports

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**Abstract:** With the update of Internet high-tech technology, the target demand for the development of modern sports applications is also constantly optimized. In view of the increasingly competitive modern sports competitions, the construction of an integrated sports management platform data analysis technology has been used more and more widely. In the construction of the whole sports BD (big data) framework, how to improve the athletes' competitive level and the accuracy of the prediction of the on-site results is the key problem that needs to be solved urgently at present. Through the analysis of development of sports BD in modern sports, with the help of the construction of athletes' performance evaluation index system and the discussion of the current problems of sports BD, combined with the general formula of athletes' sports scoring, the following results are obtained from the discussion based on the data results: under the background of BD, the application of the BD integrated sports management platform on the selected six types of athletes has improved the athletes' competitive level, and the overall average increase is about 5%. At the same time, the accuracy of event results prediction has also improved, and the overall average increase is about 12%. This shows that the integrated sports management platform optimization system based on big data technology has a good practical application effect on the development of modern sports.

**Keywords:** Sports Big Data, Modern Sports, Big Data Technology, Integrated Platform

## 1. Introduction

The actual application of sports BD has been accelerating, and people's research and discussion on it has entered a new stage. The main goal of this article is to optimize the modern sports platform with the help of BD technology related theories. Therefore, in the current reality of increasingly fierce sports competition, it is very important to build an integrated sport management platform.

The digital integrated sport management platform should aim at the analysis of athletes' competitive level. There are many research theories about different sports model schemes. Kaur A mainly studied the evaluation scheme of BD technology for the benefit of the sports industry. According to the relevant match and training records of sports, information was extracted from the constructed database and data was collected, and two different databases were constructed, namely, the records of basketball players and football players. With the help of the improved data mining algorithm, the simplified script was used to obtain a visualized table that can be queried. Finally, the scheme was tested to select the best athlete by mining relevant databases [1]. Guan H built a modern sports motor system with a wearable sweat sensor and big data technology. By using the hydrophilic carbon in the analyzer to absorb athletes' sweat during competition or training, and then detect the sweat lactic acid concentration and heart rate data on athletes' skin, the sports physiological information is uploaded to the motor system through sensors and its data is processed and analyzed. Finally, simulation experiments show that the system effectively promotes the development of modern sports BD [2]. Under the background of network era, Justin Zhou analyzed BD technology as a new development power of sports training, and summarized and discussed the application of BD in competition and training from the perspective of sports training through literature review, expert interview and field survey, and studied the application status and shortcomings of BD in sports training. Finally, the development and application trends of the sports training sector were explored based on massive data [3]. Cheng Y mainly introduced the analysis and research of sports BD based on the cloud platform, and intended to provide research ideas and directions for the application and development of modern sports. This study built a Hadoop cloud

platform BD processing system with support vector regression algorithm, and discussed the application case of sports BD based on the cloud platform [4].

The combination of the development of BD technology and sports related theories has prompted sports related departments to re-study the intelligent sports management platform [5-6]. The use of various research theories and methods can effectively improve the competitive level of modern sports athletes, but there is a lack of analysis on the accuracy of athlete competition predictions.

The analysis of the construction of athlete performance evaluation index system is a major focus of this paper. In this paper, the BD technology is used to discuss the relevant elements of sports application and development, and combined with the simulation experiment analysis, the integrated sport management system is designed and researched to optimize the competitive level of athletes and the accuracy of game prediction. The final result shows that the integrated sport management system based on BD technology has a good effect in practical application.

## 2. Evaluation on the Application of BD in Modern Sports

### 2.1 Evaluation of Current Situation of Sports Big Data

In the Internet age, BD leads traditional industries and promotes new vitality. The sports industry is also closely related to it. The continuous progress of data capture and analysis technology is positively affecting all aspects of the sports industry [7-8].

The initial purpose of sports is to better improve the level of high-performance sport. With the innovative application experiment of BD, sports analysis based on data mining can often influence the direction of the game, but sports big data still has its shortcomings in some scenes [9-10]. The research found that the current problems of sports big data are shown in Table 1:

*Table 1. Current problems and improvements of big data in sports*

The Problem	Improvements
Complexity of athletic training systems and sports	Improve data collection techniques
Extreme shortage of elite interdisciplinary talent in sports data analysis	Popularize sport-specific theoretical and practical principles
Uneven development between dominant and weak sports	Increase budgets for disadvantaged sports
Uncontrollable training process and uncertainty of competition	Improve the prediction accuracy of sports systems

At present, the concentration of BD development in major sports fields is mainly reflected in four aspects: high complexity of sports training, lack of interdisciplinary basic theoretical talents, uncontrollable process of sports training, and unbalanced development of sports events [11-12]. These sports big data problems can be improved by building a new integrated sport management platform system, and the promotion of sports BD project can be achieved with data analysis and data application functions [13-14].

### 2.2 Relevant Applications of Sports Big Data

With the rapid development of information and communication technology, media communication and event promotion cannot be separated from professional services of big data. However, the impact of BD on the sports industry is more reflected in the statistical training of athletes' physical fitness and the management and analysis of sports performance [15-16]. In the application process of sports big data, the basic motivation is to mine knowledge from the sport management platform [17-18]. According to the development direction of modern sports, the actual application and content of sports big data are shown in Table 2:

To sum up, the application of sports big data in modern sports mainly includes the improvement of competitive level, sports injury prevention, evaluation of coach results and prediction of athletes' performance. These studies are important directions to explore sports big data in the modern sports system [19-20]. Therefore, sports big data application aims to solve problems in modern sports and improve the level of athletes and the ability of coaches.

Table 2. Practical and concrete applications of big data in sports and its contents

Applications	Explanatory notes
Athletic improvement	Refine data collection techniques
Sports Injury Prevention	Avoid chronic strain injury due to local overload
Assessing coaching results	Establishing a work performance index system
Athlete performance prediction	Designing a sports management platform

### 3. Construction of Integrated Sport Management Platform

#### 3.1 Performance Evaluation Index System for Athletes

After researching and discussing the applications related to big data on sports in modern sports, this paper applies the McKinsey Global Institute to process and analyze the data information collected from sports. With the help of its big data feature description, sports big data can be defined as five specific characteristics of a sports data collection: type, quantity, speed, competition results and prediction accuracy. Since the most prominent feature in sports is the performance of the competition, this study only discusses the performance characteristics of athletes and related factors using big data. The performance evaluation index system of athletes built with football as an example is shown in Figure 1:

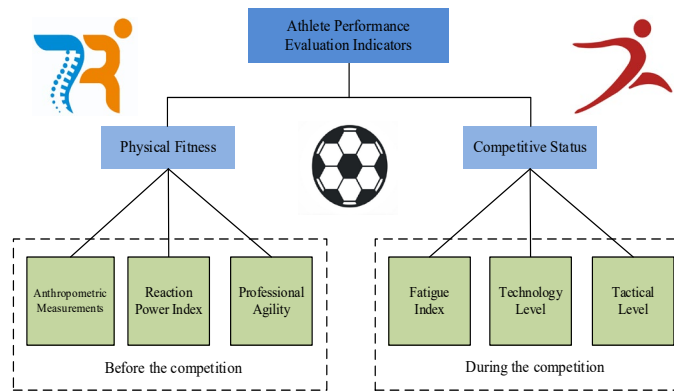


Figure 1. Athlete performance evaluation index system - soccer

From the above athlete performance evaluation index system, it can be seen that the application of sports BD to athletes usually consists of two parts. The improvement of physical fitness level before the competition consists of anthropometry, reaction force index and professional agility index. The competitive state during the competition remains stable, consisting of fatigue index, technical level and tactical level.

#### 3.2 Sports Platform System Design Based on Big Data

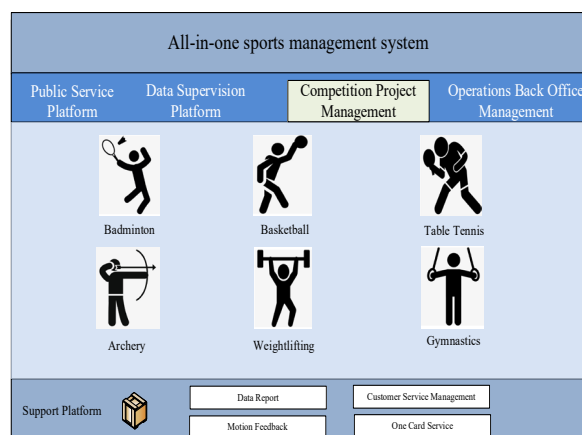


Figure 2. Sports management platform system design

According to the analysis of the athletes' performance evaluation index system, combined with the improvement and optimization of the traditional sport management system, the sports management system is divided into public service platform, data supervision platform, competition project management and operation background management module. Meanwhile, combined with the integration and innovation of BD information technology, the sport management platform system integrating service, diligence and regular games is built. The system design of sport management platform based on BD technology is shown in Figure 2.

When analyzing and predicting the level of athletes using the optimized sports management platform, athletes' sports scoring is an important part of the modern sports big data research process. Therefore, the general formula for calculating athlete sports scores is shown in Formula 1:

$$s = a + b + c \quad (1)$$

Among them,  $a$  represents the technical level score of the athlete in the competition;  $b$  represents the difficulty score of the athlete's movements in the competition;  $c$  represents the artistic performance score of the athlete in the competition. To ensure the health and safety of athletes during competitions, the heart rate calculation for sports activities is shown in Formula 2:

$$HR = (m - n) \times r + n \quad (2)$$

Among them,  $HR$  represents the athlete's target heart rate during the competition;  $m$  represents the athlete's maximum heart rate;  $n$  represents the athlete's static heart rate;  $r$  represents the intensity percentage.

#### 4. Simulation Experiment Results and Evaluation

After the completion of the design of the integrated modern sport management platform system based on big data technology, in order to test the actual effect of the system in specific cases, the simulation experiment is used to test, and the athlete's competitive level and the accuracy of the game result prediction are set as parameters for experimental analysis.

This experiment selects six different types of athlete sample parameters, namely football player A, basketball player B, table tennis player C, gymnastics player D, weightlifter E, and badminton player F, as the dataset for training and testing. The simulation method was used to test and analyze 500 rounds of data within a certain period of time, and the accuracy of athletes' competitive level and match results prediction using the integrated sport management platform system was obtained. The improvement results of athletes' competitive level using the integrated sport management platform system based on BD technology are shown in Figure 3:

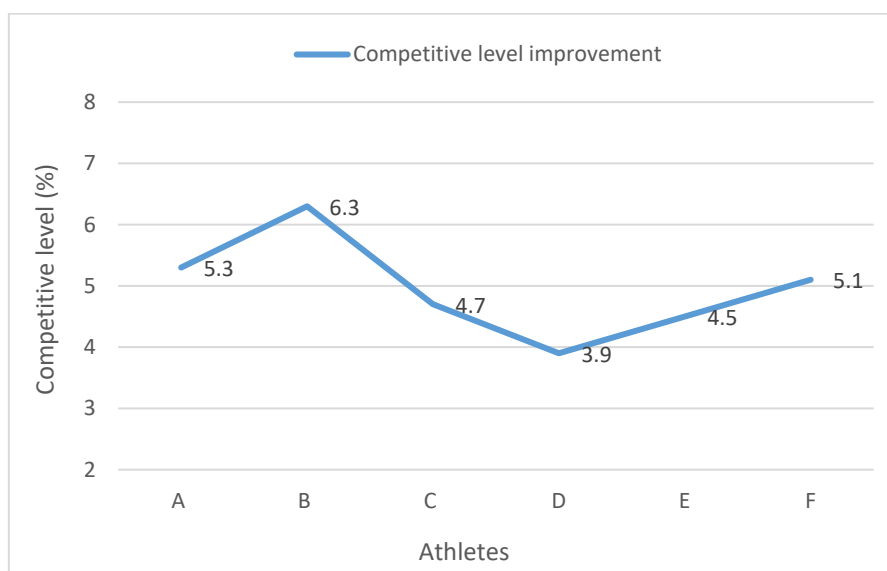


Figure 3. Athlete athletic level improvement results

Among them, the blue line indicates the improvement of athletes' competitive level by applying the big data integrated sport management system compared with the traditional sports platform. It can be

seen that the athletes who apply the big data integrated sport management system to basketball players (B) have the most obvious improvement in their competitive level, with an increase of 6.3%. The competitive level of other types of athletes samples has increased by 5.3%, 4.7%, 3.9%, 4.5% and 5.1% from left to right, respectively. It can be seen that the integrated sport management system after optimization has improved by about 5% on average. This shows that the application of big data integrated sport management platform system is an optimization scheme in terms of athletes' competitive level.

After discussing the above impact results, the simulation experiments were continued. Based on the analysis of the accuracy of the optimization system on sports athletes' game prediction, the improvement results of the accuracy of athletes' game prediction of the integrated sport management platform system based on BD technology are shown in Figure 4.

Among them, the blue column represents the improvement of the accuracy of athletes' game prediction by applying the big data integrated sport management system compared with the traditional sports platform. It can be seen that the accuracy of competition prediction has been improved for various types of athlete samples. The improvement ranges from bottom to top for each group of different samples are 12.4%, 13.1%, 13.3%, 11.8%, 10.9%, and 11.2%, respectively. It can be seen that the optimization system has comprehensively improved the accuracy of competition prediction by about 12%. This shows that the application of big data sport management optimization system has a good application effect in the prediction of athletes' competitions.

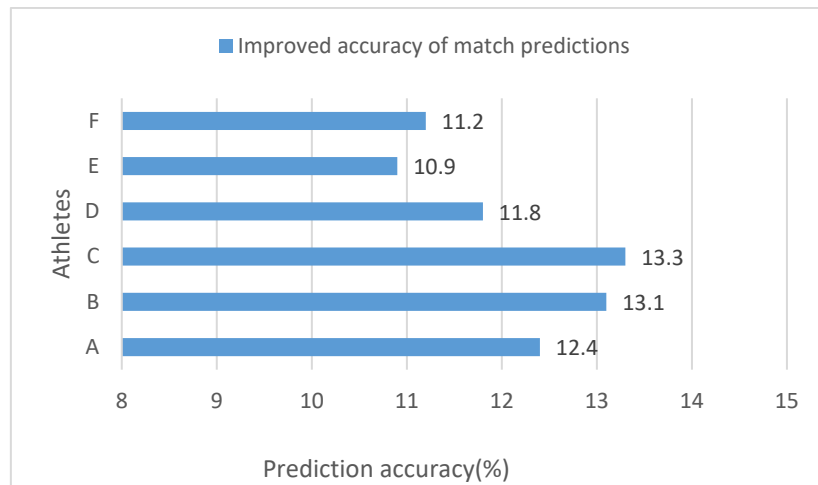


Figure 4. Athlete game prediction accuracy improves results

## 5. Conclusions

In the context of increasingly fierce competition in current sports competitions, all kinds of athletes are increasingly demanding the application of BD technology, which has attracted much attention in the field of modern sports management aimed at informatization. Based on the practical application research of modern sports based on BD technology, this paper constructs an integrated sport management platform system, and conducts simulation experiments on it. It is concluded that the modern sports management platform based on BD technology has a good application effect in the test samples of athletes in each group. On the premise of the wide spread of sports nowadays, a sports BD platform can lay a stable foundation for the athletes' competitive level and the accuracy of game prediction. This paper expects to provide an integrated sports management platform system design based on BD technology for China through theoretical and empirical research. Due to the limited selection and quantity of remote mobilization samples, as well as inadequate analysis of athlete performance evaluation indicators, the integrated sports management platform system designed in this article still has many shortcomings and shortcomings. Further improvement and improvement would be made in future research.

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