Teaching Effect and Improvement Model of College Basketball Sports Based on Big Data Analysis

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Abstract. Basketball has a large audience in colleges and universities (CAU) in China. College basketball has developed rapidly, and its attention has been increasing. It has promoted the disruptive change of Internet technology and brought unprecedented opportunities and challenges to competitive sports information systems. The purpose of this article is to study the effect and improvement model of college basketball sports teaching based on big data analysis (BDA). On the basis of systematically combing the characteristics, concepts, and development trends of big data, this study analyzes the teaching effects and improvement models of basketball sports in China's CAU in the context of the era. The research results show that 60.8% of CAU in China currently use big data technology in basketball sports, which can promote the development of college basketball games, improve athletes' level of competition, and enhance the enjoyment and interest of basketball games. In addition, 90.6% of college physical education teachers believe that teaching based on BDA can also effectively help the team's daily training, arrange training plans for coaches and give guidance.

Keywords: Big Data Analysis, College Basketball Sports, Teaching Effect, Model Improvement.

1. Introduction

It is common to use data mining technology, digital image processing technology and other means to process basketball games. According to these large and accurate data, the coach can make it easier for the coach to formulate or adjust the game strategy in a timely manner. It can also evaluate the status of the player more objectively, and can also simulate and predict the combination between players, so that a more suitable combination of players can play. Not only that, it can also provide these data to the media and fans, so that they can keep abreast of the player dynamics of the teams they care about, and provide big data support for propaganda teams. The conclusions obtained through big data technology can also effectively help the team's daily training, arrange training plans for coaches and give guidance, and provide players with an opportunity to understand their sports status. This is the practical application of big data technology in basketball games. As a result, the popularity of basketball among the people will increase. With the popularity, the construction of stadiums and stadiums will be accelerated, the utilization rate of idle stadiums will be increased, and the
development of the basketball industry system and sports economy will be more rapid.

Whether it is the daily teaching process or the final learning effect detection, they rely on the teacher for demonstration, and then the students practice and display it. The teacher gives results, it is difficult for teachers to truly evaluate the effect of students' learning practice [1, 2]. The advantage of big data is that it is more objective and accurate. It can be comprehensively and objectively evaluated on the effect of physical training of students in the comprehensive use of teaching and testing. The amount of data in college basketball matches is huge, and the data form is generally unstructured. Data mining techniques based on BDA can be used in new data sources. Use perspectives and new methods to find meaningful, valuable, and hidden data in basketball games [3, 4]. It provides reference basis and services for decision-making, has targeted the coaching team to formulate training and competition strategies, and has the function of intelligent decision support and scientific guidance for the team to establish its own team building system [5].

In this paper, based on the analysis of "big data", Shanxi college basketball informatization teaching is taken as the research object, and the current situation of Shanxi college basketball informatization teaching is deeply understood. Through investigation and analysis on the basic conditions, teaching content, teaching process, teaching methods, teachers and students' attitudes and needs for basketball informatization teaching in Shanxi CAU based on BDA, analyze and find out the CAU in Shanxi Problems existing in the development of basketball informatization teaching.

2. Method

2.1 Big Data and Basketball Big Data

4V characteristics of big data. Volume: The amount of data is large and new data may be generated. The scale of big data is in an increasing process. The scale of a certain industry field's data set ranges from several terabytes to tens of petabytes; Variety: With the development of technology and changes in people's living habits, many new types of multi-structure data have appeared, such as the network and smart terminals. A new processing model is required. Information assets that make data more detailed, comprehensive, and systematic [6-8].

2.2 Algorithm Research

2.2.1 Dynamic Neighborhood Radius

The original CABBWAD algorithm, the reason why the variable density distribution of data objects cannot be effectively processed, is mainly because the algorithm uses the global neighborhood radius, that is, the neighborhood radius is required to remain unchanged during the entire clustering process. However, in practical applications, if the distribution density is closely surrounded in the process of processing clustering, and the neighborhood radius is gradually adjusted and controlled, data clusters with different distribution densities can be better clustered. That is to say, in the process of cluster analysis, different data clusters have different domain radii due to different distribution densities [9]. Therefore, in the clustering process of the improved algorithm proposed in this paper, it is necessary to abandon the global neighborhood radius adopted by the original algorithm and use a dynamic neighborhood radius. Specifically, its mathematical description formula is: The dynamic neighborhood radius adaptive density reachable distance is defined as:

\[ R_A = R \cdot \frac{A_i}{A_{i+1}} \]  \hspace{1cm} (1)

In the above formula, R is the reachable distance of the initial density, and \( A_i \) and \( A_{i+1} \) respectively represent the density values of the two cluster density attraction points determined in succession [10].

2.2.2 Data point density
The formula can be expressed as:

\[Density(x_i) = \sum_{j=1}^{n} e^{-\frac{(d(x_i, x_j))^2}{2 \sigma^2}}\]  

(2)

In the above formula, the Gaussian function of the right formula represents the influence of each data point on the point. It is a density parameter and determines the gradient of the density function.

2.2.3 Density reachable distance

It refers to any data object X in the data cluster space, and the distance R between the data, a circular area centered on a certain data and the data distance is a radius, corresponding to the reachable density distance field of the data object.

\[R = Coref R \times mean(D)\]  

(3)

In the above formula, CorefR refers to the adjustment coefficient of distance, and its coefficient value is greater than 0 and less than 1; it refers to the average distance of all data objects; mean(D) is the object collection of data. It can be found during the execution of the algorithm that calculating the density of data points takes a long time. However, in practice, it is not necessary to calculate the density values of all data points. You only need to randomly extract a certain amount of data, calculate the density values of the samples, and then calculate the dense reachable packet. As long as the selected sample size is appropriate, the final clustering results will not be affected [11-12].

3. Experiment

3.1 Literature Method

According to the research content, research purpose and task needs of this article, the relevant documents related to information teaching issued by the State and the Ministry of Education were consulted through Internet resources. Then collect books and articles about Internet +, big data-based information-based teaching, basketball information-based teaching, etc., through a college library in Shanxi, the Superstar Digital Library, China HowNet Full-text Database, and Wanfang Database. Relevant information.

3.2 Questionnaire

Based on the relevant literature and the guidance of experts, combined with the research content of this article, design a questionnaire survey index, and finally form a "questionnaire for the study of college basketball sports teaching effects and improvement models based on BDA". The questionnaire involves Basketball is based on the existing problems of informatization teaching based on big data. It is divided into school questionnaires, teacher questionnaires, and student questionnaires. The content of the questionnaires should be as comprehensive as possible. Finally, an interconnected and focused content section and survey system are formed.

3.3 Mathematical Statistics

For research on student enthusiasm, student satisfaction, student attendance, and late arrival rate, use excel and other software to sort and analyze survey data; research on basketball comprehensive performance, use SPSS22.0 to analyze data, and compare pretested experimental groups In the basketball results of the control group, the homogeneity test of the basketball skills of the two groups of students (independent sample t test) is compared; the basketball results of the experimental group and the control group are compared before and after to determine whether basketball teaching has improved. The basketball scores of two groups (paired sample t test) were compared; the basketball scores of the experimental group and the control group were compared to determine which basketball teaching mode had a more significant effect on improving basketball scores (independent sample t test).
4. Results

4.1 Effect Analysis of Basketball Informatization Teaching Based on BDA

In a university in Shanxi, 100 people were selected from the traditional teaching method and big data-based information teaching, respectively. After one semester, the number of students’ progress and regression was counted and made into tables.

Table 1. Statistics on the number of students

| Blank | Improved greatly | Progress | Constant | Step back |
|-------|------------------|----------|----------|-----------|
| Traditional teaching | 8 | 12 | 60 | 20 |
| Informatization teaching | 30 | 35 | 25 | 10 |

According to Table 1, it can be found that the effect of information-based basketball teaching based on big data is significantly better than that of traditional basketball teaching methods. Based on the data in Table 1, the algorithm proposed in this paper is used to process and study the relevant data. It can be seen that the number of people who have progressed in information-based teaching is more than the number of people who have improved in methods.

Most of the students are in the situation where basketball performance remains the same, and there are few students who have improved, and the percentage of progress is 20%. The percentage of students progressing in information-based teaching is 65%, which is obviously much stronger than the traditional teaching method, and the proportion of progress is more than three times that of the traditional. The teaching method is more flexible than the information-based teaching application form. It should be more extensive in scope and more flexible in teaching methods. Teachers can use modern education media to publish curriculum-related information for students whenever and wherever possible, and accept student learning feedback information.

4.2 Improved Analysis of Basketball Informatization Teaching Based on BDA

Using BDA method to improve basketball informatization teaching, the results are shown in Figure 1.

![Figure 1](image-url)

Figure 1. Factors Affecting Basketball Informatization Teaching

According to the data in Figure 1, it can be found that the main factor affecting informatization teaching is that the physical education teachers of CAU based on BDA of information teaching ability accounted for 39% of the major factors, followed by the teacher's enthusiasm for teaching, Accounting for 29%. This shows that a large part of the reason is the teacher's, accounting for 68%.
According to the questionnaire survey, the main reasons that affect basketball teachers 'enthusiasm for informatized teaching are mainly the following: teachers' backward ideas, insufficient leadership, lack of encouragement policies in schools, personal lack of information-based teaching theories and skills, and lack of information-related teaching equipment. Lack of information-based teaching curriculum resources, teaching design does not require the use of information-based teaching, unsuitable subjects taught, heavy teaching tasks, information-based teaching wastes time, and lack of information technology operation skills. The implementation of basketball informatization teaching not only requires basketball teachers to have advanced informatization teaching consciousness, but also requires basketball teachers to have good information literacy. Therefore, the school should organize and carry out a wealth of information-based teaching learning or training, based on the existing training system, enrich the school-based training form of teachers' information-based teaching capabilities, fully understand the needs of each participating teacher, and conduct targeted training. Training, improving training forms, and organizing informatization-related competitions, hiring relevant informatization experts to give lectures, establishing QQ groups for informatization exchanges in schools, etc. to communicate, communicate, participate and share with each other. Only in this way can we ensure that informatization teaching based on BDA can play its lasting and efficient role.

5. Conclusion
The analysis of students' physical fitness and academic performance through the big data platform, can effectively realize the specific analysis of the student's sports situation, obtain multi-faceted data of students in motor skills learning, and strengthen Targeted guidance to ensure students' attendance in class, reduce lateness, and finally improve their basketball skills. However, on the basis of BDA, we also found that there are some shortcomings in improving the teaching mode, such as the lack of enthusiasm and ability of teachers. Therefore, CAU must make full use of the advantages of BDA to find out more deficiencies in taking some measures to change these deficiencies can make leaps and bounds progress in basketball teaching, thereby promoting the advancement of basketball sports in China.

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