Characteristics of Aerobics Teaching Based on Big Data Analysis

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Abstract. With the rapid development of big data, it plays an increasingly important role in college teaching. The application of big data technology to the analysis of college aerobics teaching data can not only help teachers understand the current learning situation of students, but also help students' own development and improve students' academic performance in a targeted manner. The purpose of this article is to analyze and study the characteristics of college calisthenics teaching based on big data technology. This article prepares and preprocesses student's course score data, analyzes association rules, and obtains a certain correlation between courses, so as to guide and suggest students to study and choose courses, and provide certain reference; this article is for colleges and universities. The curriculum is analyzed and researched. This article analyzes and evaluates the classroom learning behavior of learners of different grades and majors; analyzes the classroom content and technical effectiveness, and then conducts multi-dimensional analysis and evaluation of the classroom. This article uses literature method, questionnaire method, mathematical statistics method, etc., taking 20 aerobics teachers and 1,000 students of a certain university in this city as the survey objects, and conducts a more in-depth and detailed aerobics teaching status of the current aerobics optional courses in the school. The research, find out the existing problems and influencing factors, and then put forward the corresponding development countermeasures, provide a useful reference for the college aerobics teaching reform. Research shows that there are 328 students who have never participated in extracurricular aerobics exercises, accounting for 38.6% of the total number. It can be seen that the situation of students participating in extracurricular aerobics activities is not optimistic. Relevant departments of the school should strengthen the construction of aerobics campus culture to urge students to actively participate in extracurricular aerobics activities.

Keywords: Big Data, Aerobics Teaching, Teaching Behavior, Multidimensional Analysis

1. Introduction
At present, in order to adapt to the development of social economy, the number of college students is increasing [1-2]. The school must not only ensure that students complete their studies smoothly, but also ensure the quality of school aerobics teaching [3-4]. Every year, the Academic Affairs Office of universities accumulates a large amount of data, including students' admission information, online registration, course selection information, and grade information. How the educational administration department should analyze and use these accumulated data is directly related to the level and quality of aerobics teaching in colleges and universities [5-6]. With the deepening of database technology research and application, big data technology is gradually being applied to education research by educators. The use of this information can not only help students arrange learning plans, but also guide teachers to improve aerobics teaching methods, thereby improving the school teaching level of aerobics promotes the overall development of students [7-8].

In the research on the analysis of the characteristics of aerobics teaching based on big data analysis, many scholars have conducted research on it, and achieved good results. For example, Qin X in the article "Research and Application of Data Mining Technology in Student Performance Analysis" uses the improved Apriori algorithm in data mining analyzes the aerobics teaching level of different teachers [9]. Zhao P performed cluster analysis on the teacher evaluation of the teachers in optical experiment of the 2008 physics majors, and obtained clusters with higher similarity of the students’ evaluations of the teachers, and found that the teachers' deficiencies in the aerobics teaching process have promoted teachers’ improvement [10].

This paper installs Weka as an analysis tool for data mining, applies Apriori algorithm in the association rule analysis method, preprocesses and discretizes the aerobics performance of a university student in this city, realizes association rule mining, and obtains the result of association rule. According to the results of the analysis, it provides guiding suggestions and help for students' aerobics learning.

2. Characteristics of Aerobics Teaching Based on Big Data Technology

2.1 Data Analysis of College Calisthenics Teaching Based on Data Mining

(1) Weka platform of data mining tool

The general data mining tool does not distinguish the specific meaning of the data, and the data field it targets is also not specific, but uses general data mining algorithms to process common data types. Currently, general data mining tools occupy a large share in the data mining market.

(2) Analyze association rules on student performance

The learning process is gradual and requires a good foundation. Due to the inherent relationship and sequence relationship between courses, if the basic courses are not learned well, it will inevitably affect the learning of subsequent courses. Therefore, the correlation between courses plays an important role in both student learning and teachers' aerobics teaching. Using association rule analysis in data mining technology, you can find the correlation between courses based on student test scores, remind students that when a course fails, it may affect the subsequent courses of study, thereby strengthening students' learning awareness.

2.2 Data Mining Algorithm

(1) Apriori algorithm

Association rules have two basic metrics of interest: support and confidence. Among them, support represents the availability of the rule's existence, and confidence represents the certainty of the rule's existence. The Apriori algorithm is one of the more influential algorithms in association rules. The algorithm divides the discovery of association rules into the following two processes:

1) Find all frequent itemsets: Find all frequent itemsets from a given data set, that is, the support degree is greater than or equal to the defined minimum support count.
2) Generate strong association rules from frequent itemsets: According to the obtained frequent itemsets, find out all the rules, and then select the rules whose confidence is not less than the minimum confidence threshold from these rules, that is, the strong association rules.

(2) Cluster analysis
In data mining, cluster analysis is an important analysis method. It can divide data into different classes or clusters, so that there are great similarities between objects in the same cluster, but objects in different clusters have great differences. In fact, cluster analysis is to group many different cases. Cases with similar characteristics are grouped together. The principle of grouping reflects the high degree of aggregation between the same groups and the low degree of aggregation between different groups. Cluster analysis is the main feature of "things clustering together", requiring objects in the same classification to be as similar as possible.

(3) Typical algorithm of decision tree
The essence of the decision tree algorithm is to obtain classification rules on the basis of instance learning. It describes or predicts data with rules in the form of graphics or text. The main decision tree algorithms are: ID3 algorithm, C4.5 algorithm.

Suppose that the set S contains s data samples, and $S_i$ is the number of samples in the class $C_i$. When the class label has m different values, defining m different classes $C_i (i = 1, 2, ..., m)$ gives:

$$I(S_1, S_2, ..., S_m) = - \sum_{i=1}^{m} p_i \log_2(p_i)$$

(1)

Among them, $P_i$ is the probability that any sample belongs to $C_i$, which can be estimated by $S_i/S$ in general. Since the information is expressed as a binary code, it is based on the logarithmic function 2.

Let attribute A have v different values $\{a_1, a_2, ..., a_v\}$. The attribute A can be used to divide S into v subsets $\{S_{1j}, S_{2j}, ..., S_{vj}\}$, where $S_j$ contains such samples in S, which have the same value $a_j$ ($j = 1, 2, ..., v$). Let $S_{ij}$ be the number of samples of class $C_i$ in the subset $S_j$. The information entropy divided into subsets by A is given by:

$$E(A) = \sum_{j=1}^{v} \frac{|D_j|}{|D|} \cdot \text{Inf}o(D_j)$$

(2)

$$D_j = S_{ij} + S_{2j} + ... + S_{mj}$$

(3)

$$D = S$$

(4)

Here $\frac{|D_j|}{|D|}$ serves as the j-th division weight. The smaller the entropy value, the higher the purity of the subset division.

2.3 Countermeasures for the Development of Aerobics Optional Courses
(1) Efforts to increase the importance of school leaders
Bodybuilding operation is a sports project and an organic part of college physical education curriculum, which has positive significance and effect on the realization of school physical education goals. The high attention of school leaders can make the funds needed for aerobics teaching, training, competitions, and the purchase of various software and hardware equipment continue to be met, and then better promote the sustainable development of aerobics in colleges and universities.

(2) Continuously strengthen the physical education of students
In the aerobics teaching of the aerobics optional course, students choose their favorite sports independently. Due to the unevenness of students' physical fitness, physical education foundation, technical level and other aspects, there is a big difference among students in the aerobics course. Therefore, in the teaching of aerobics, teachers should continuously strengthen the physical education of students and continuously improve the quality of aerobics teaching.

(3) Establish an intramural club
The construction of college sports clubs provides a new model and reference for further deepening the reform of college sports aerobics teaching and improving the quality of sports aerobics teaching, so that students can freely and independently arrange time, actively and actively participate in activities, and develop Good physical exercise habits lay a good foundation for lifelong sports. The aerobics teaching of our school's optional aerobics courses can also learn from the form of clubs to better promote the popularization of aerobics and the improvement of the quality of aerobics teaching.

3. Analysis and Experimental Research on the Characteristics of Aerobics Teaching Based on Big Data Technology

3.1 Experimental Method

(1) Document law
According to the research needs, through the method of combining computer retrieval and reading books, periodicals and other materials, with "universities, independent colleges, aerobics, optional courses, current status of aerobics teaching, etc." as the subject words, keywords or titles, the collection and fitness Operate optional courses to carry out related journals and dissertations. Reading books on the evaluation of aerobics teaching, sorting out and summarizing the data, fully understanding the research results of the aerobics optional courses, providing important theoretical support for this research.

(2) Interview method
Interviewed 20 aerobics teachers from a certain university in this city to further understand the aerobics teaching situation of the entire aerobics optional course. Combining the needs of this research, sorting out and screening the information obtained from the interviews, broadening the writing ideas, and writing this article to provide important reference.

3.2 Questionnaire Distribution and Recovery

According to the research needs, design aerobics teaching questionnaire for an optional aerobics course in a university in this city. Part of the questionnaires were distributed and collected on site, and partly distributed and collected by mail. Teachers of the optional aerobics course distributed 32 questionnaires and collected them. 32 valid questionnaires, 100% effective. 100 questionnaires were distributed to the freshman and sophomore aerobics elective course students. 885 questionnaires were returned, the recovery rate was 88.5%, 50 invalid questionnaires were excluded, and the effective response rate of 835 valid questionnaires was 94.4%.

4. Characteristics of Aerobics Teaching Based on Big Data Technology

4.1 Improvement of Students' Aerobics Optional Courses
Table 1 reflects the detailed situation of the students' gains after learning aerobics. The students' choices are in order: coordination, flexibility, body shape, sensitivity, self-confidence, cooperation and mutual aid ability, and creative ability.

Table 1. The improvement of students studying aerobics optional courses

| Improve content                  | Boys | Girls |
|---------------------------------|------|-------|
| Flexibility                     | 117  | 114   |
| Sensitivity                     | 71   | 69    |
| Body shape                      | 125  | 121   |
| Coordination                    | 136  | 141   |
| Self-confidence                 | 61   | 69    |
| Cooperation and mutual assistance| 36   | 55    |
| Creative ability                | 11   | 14    |
As shown in Figure 1, from the above data, it can be concluded that aerobics teaching has a great promotion effect on the coordination, flexibility, and body shape of the students' body, and improves their basic physical fitness as a whole, but it needs attention: Yes. Compared with the improvement of students' physical fitness, students have a low level of experience in how aerobics can cultivate a sense of music, creative ability, and exercise habits. This requires aerobics teachers to make corresponding improvements in the future aerobics teaching process.

4.2 Students' Participation in Aerobics Extracurricular Activities
Extracurricular activities and sports aerobics teaching share the task of basic physical education for students: sports aerobics teaching is to impart relevant sports knowledge and skills to students; extracurricular sports activities mainly integrate the relevant knowledge and skills learned by students in physical education classes. It is more specifically used in extracurricular activities to train students to improve their knowledge of sports, strengthen their physical fitness, and develop good habits of physical exercise. This article investigates students' participation in aerobics extracurricular activities. The experimental results are shown in Table 2.

Table 2. Statistics of students participating in aerobics extracurricular activities

| Participation | Boys | Girls |
|---------------|------|-------|
| Often         | 61   | 63    |
| Occasionally  | 100  | 110   |
| Rarely        | 98   | 90    |
| Never         | 146  | 182   |
As shown in Figure 2, in the survey of students participating in aerobics extracurricular activities, there are 144 students who can regularly participate in extracurricular aerobics exercises, accounting for 14.6% of the total number; while students who rarely participate in extracurricular aerobics exercises 188 students, accounting for 22.1% of the total number; 210 students who occasionally participate in aerobics extracurricular exercises, accounting for 24.7% of the total number; 328 students who have never participated in extracurricular aerobics exercises, accounting for 38.6% of the total number. It can be seen that the situation of students participating in extracurricular aerobics activities is not optimistic. Through the communication with the students, it is learned that when most students do aerobics exercises outside of class, they mainly use the complete sets of movements learned in the classroom; due to the lack of corresponding organization and leadership, some students usually do not participate in aerobics exercises outside of class. Relevant departments of the school should strengthen the construction of aerobics campus culture in order to urge students to actively participate in extracurricular aerobics activities.

5. Conclusions
This article has studied the Weka data mining platform, using the association rule Apriori algorithm of the platform and the classification analysis decision tree algorithm to analyze the student performance and teacher evaluation of different majors in our school, and obtained some meaningful knowledge, which helped me School aerobics teaching provides theoretical and data support.

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