Analysis on the Teaching Effect of College Students Based on Data Mining Algorithm

Haifeng Xu(✉), Yang Tong, and Liao Jun

Modern College of Northwestern University, Xi'an 710130, China
guanjun029@163.com

Abstract. The role of learning effect physical, but there the learning effect is not satisfactory. Manual analysis cannot solve the problem of poor learning effect in physical education of college students, and there are fewer learning indicators. Therefore, this to construct an evaluation model for the effect students' physical education. Firstly, the big data theory to evaluate the effect of college, and the evaluation collection is divided to the teaching norms the evaluation. Then, the big data theory is used to evaluate the physical education teaching of college students, form an evaluation set, and comprehensively evaluate the results. MATLAB that under teaching requirements, the d evaluation accuracy and evaluation time are better than the manual analysis method.

Keywords: big data · theory · university students · Sports · Learning · Effect

1 Introduction

The learning effect is one of the important evaluation contents of college students', which is of great significance for optimizing college students' teaching. However, in the actual evaluation process, there is a results, which has a certain impact on the physical education. Some scholars believe that learning intelligent algorithms into college students' physical education can effectively analyze the evaluation results and for evaluation. On this basis, this paper proposes the physical education of and verify the model's effectiveness. Firstly, we will collect a large amount of student learning data, including student grades, exam answers, and homework completion [1]. These data will be used to construct a comprehensive student learning dataset. Next, we will apply data mining algorithms such as association rule mining, classification algorithms, and clustering algorithms to discover hidden patterns and patterns in student data. By analyzing the correlation between students' learning behavior and academic performance, we can gain a deeper understanding of their learning characteristics and difficulties. At the same time, we will collect relevant data during the teaching process, including the use of teaching resources and the adoption of teaching strategies [2]. By using data mining algorithms, we can analyze the teaching process, evaluate the effectiveness of different teaching strategies, and provide suggestions for improving teaching.

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2 Related Concepts

2.1 Mathematical Description of Big Data Mining

Big data mining is to use the learning results, and according to the indicators in the learning results, find the outliers in students', integrate the corresponding results, and finally judge the of feasibility. The big data theory to quantify the physical, which can improve the accuracy of evaluation [3].

Hypothesis 1: The for college students is, the learning set is, the learning d_i index is, and the set_i learning y_i judgment is $F(d_i \geq 0)$ as shown in Eq. (1).

$$F(d_i) = \sum x_i \cap y_i \cdot \xi \tag{1}$$

2.2 Selection of Evaluation Indicators

Hypothesis 2: The indicator selection function is, and the teaching coefficient is $z(d_i)$, then the indicator selection w_i is shown in Eq. (2).

$$z(d_i) = \cup z_i \cdot F(d_i, y_i) \rightarrow k \cdot w_i \cdot \xi \tag{2}$$

2.3 Processing of Physical Education Data for Students

Before big data mining, the teaching data should be analyzed discretely, and the results should be mapped into a two-dimensional plane to eliminate abnormal results. First, the

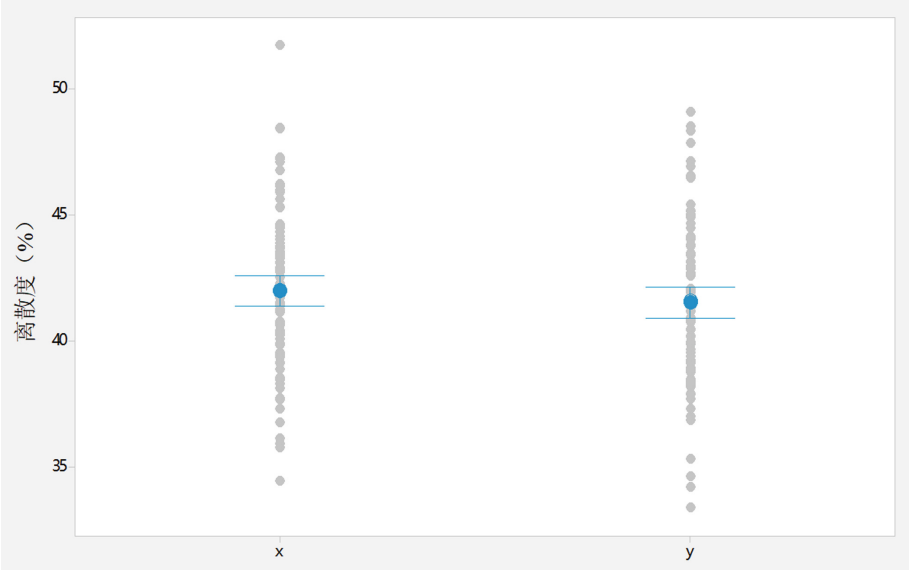

Fig. 1. Selection results of physical education indicators for college students

physical education of college students, and the index weight of the results the accuracy of the path big data mining [4]. If the data students are distribution, the evaluation resul, reducing the accuracy of the evaluation. In order to improve the level of evaluation, it to select the indicators of college students', and the specific index is shown in Fig. 1.

The physical education indicators of college students, which the objective facts [5]. The evaluation index has no directionality, indicating that the students has study of 8–12 weeks. The evaluation index meets the usual requirements, the evaluation index, irrelevant indicators, and the default index so that the full result is strong.

3 Practical Cases of Physical Education Teaching for College Students

3.1 Introduction to Physical Education for College Students

In order to facilitate the evaluation, the physical education of college students in civil aviation transportation under complex circumstances, with 12 paths and the evaluation results of specific physical education teaching are shown in Table 1.

Table 1. Relevant parameters of physical education for college students

Teaching content	Period	Learning effects	Appraise	Teaching format
Specialized courses	1–8 weeks	90.72	87.63	Online, Offline
	8–12 weeks	90.72	86.60	Online, Offline
Elective course	1–8 weeks	82.47	88.66	Online, Offline
	8–12 weeks	87.63	89.69	Online, Offline
Instruction classes	1–8 weeks	82.47	89.69	Online, Offline
	8–12 weeks	86.60	85.57	Online, Offline

The processing process of physical education effect of college students in Table 1 is shown in Fig. 2.

It from Table 1 that with the manual analysis method, the of the data mining algorithm are closer. In terms of the rationality and adjustment degree of evaluation index selection, it is analysis method. From the result change in Fig. 3, it can stability and faster judgment speed [6]. Therefore, the teaching optimization speed, intelligence level and of data mining.

3.2 Satisfaction Rate of Physical Education Teaching for College Students

The evaluation of the on college students, including satisfaction and implementation rates. After the pre-selection of the algorithm, the preliminary physical education results of college students are obtained, and the feasibility education teaching data [7]. In the effect of students' physical education teaching more accurately, different periods of

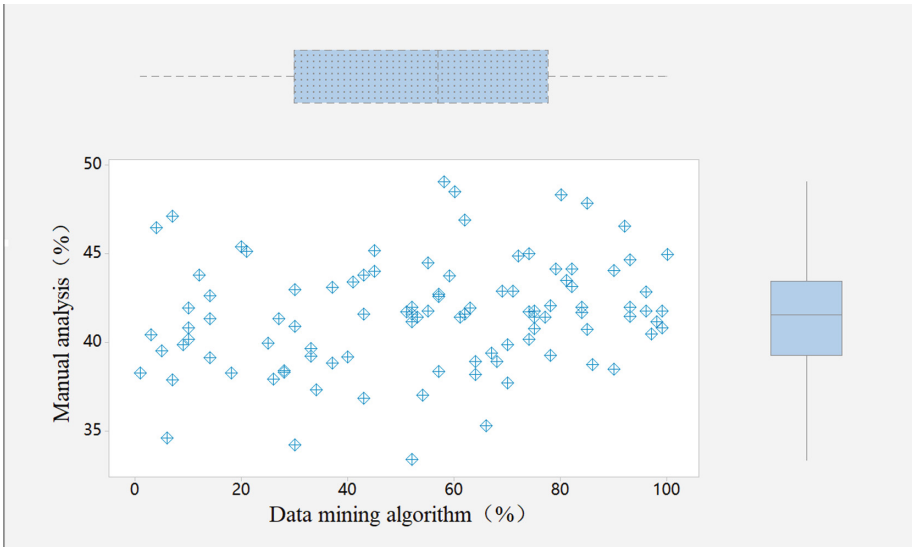

Fig. 2. The processing process of physical education for college students

Table 2. Overall effect of physical education indicators for college students

Time period	Satisfaction rate	Complete rate
1–4 weeks	82.47	86.60
5–8 weeks	83.51	87.63
8–12 weeks	86.60	89.69
Mean	87.63	90.72
X^2	89.69	91.75
P = 0. 721		

college students' were selected, and the results of college students' teaching were shown in Table 2.

The results in Table 2 are shown in Fig. 3.

The data in Fig. 3 shows that the process of change in satisfaction and completeness rates is relatively stable, and the overall result is better. Therefore, the overall effect of the data in Table 2 is better, indicating that the research method in this paper is more effective.

3.3 The Accuracy and Stability of College Students' Sports Evaluation

The results are compared with manual analysis to verify the data mining algorithm's accuracy. The data mining the manual analysis method, indicating that the evaluation of

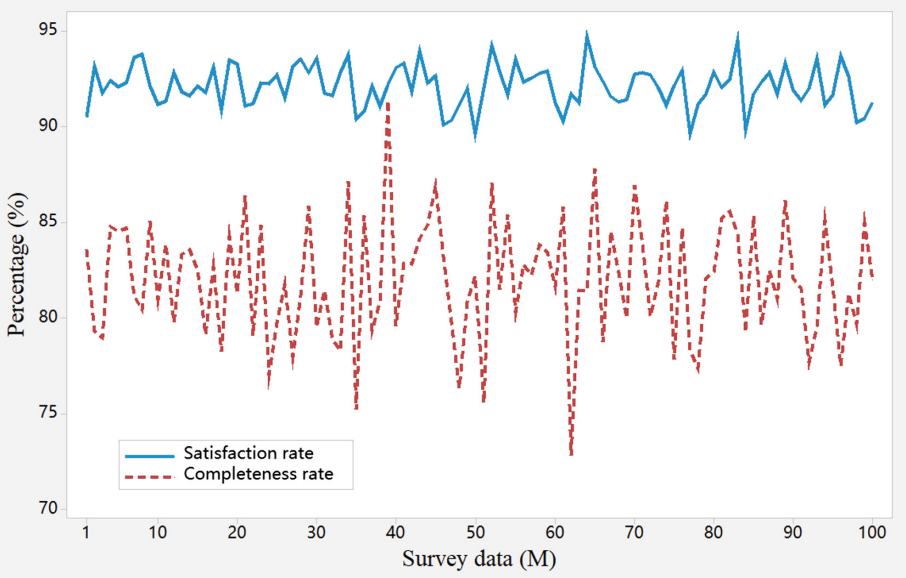

Fig. 3. The change process of physical education indicators of college students

the data mining, while the evaluation of the manual analysis method is relatively stable Uneven. The average results of the are shown in Table 3.

Table 3. Comparison of evaluation accuracy of different methods

Algorithm	Precision	Magnitude of change	Error
Data mining algorithms	92.78	3.51	2.78
Manual analysis	83.51	7.63	3.51
P	7.231	7.633	4.612

From Table 3, it can be seen that the analysis of teaching effectiveness for college students based on data mining algorithms can provide in-depth insights into the teaching process and student performance. The comprehensive results of data mining algorithms have higher accuracy than manual analysis methods. By analyzing the teaching process, the effectiveness of different teaching methods and strategies can be evaluated, and suggestions for improving teaching can be provided. The accuracy of data mining algorithms is greater than 90%, and there is no significant change in accuracy. In order to further verify the superiority of the data mining algorithm, the data in Table 3 was analyzed, and the results are shown in Fig. 4.

It Fig. 4 that the change range of the is small, while the change range of the manual analysis method is small, which further proves the advantages of the algorithm.

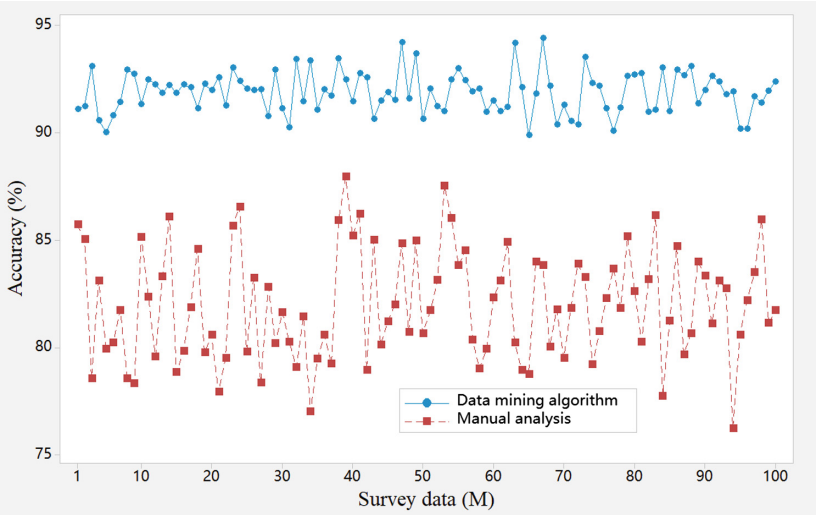

Fig. 4. Research accuracy of different methods

4 Conclusion

Under the condition of philosophical teaching, this proposes a algorithm for the physical education and the theory of big data to optimize the physical education. At the physical education standards of are the effect collection of physical education of college students. The research physical and synthesize college students' physical education Evaluation. However, in big data mining, too is paid to evaluation and analysis, in the lack of index correlation analysis.

References

1. Cai, B.: Cultivation of innovative ability of college physical education students based on the Internet of Things multimedia environment. Int. Trans. Electr. Energy Syst. (2022)
2. Ding, X.F., Tang, N.: Investigation on depression of college students majoring in physical education and nonphysical education: a study based on the age region and gender of 374 students. Evid-Based Complement. Altern. Med. (2022)
3. Du, X.F., Liu, Z.X.: Influence of physical education on the mental health of college students. Revista Brasileira De Medicina Do Esporte **28**, 311–314 (2022)
4. Li, F.Z., Liu, J.X., Qiu, F.S., Liu, H.T., Xin, S.F., Yang, Q.: Changes in mental health levels among Chinese physical education college students from 1995 to 2019. Front. Psychol. **13** (2022)
5. Liu, X., Dong, M.Y., Li, Y.C., Gao, S.S., Ye, M.H.: Analysis and research on influencing factors of college students' satisfaction with physical education. J. Environ. Public Health (2022)
6. Wang, P.P.: Construction and effect analysis of college students' physical education teaching mode based on data mining algorithm. J. Sens. (2022)
7. Wu, C., Liu, G.: Analysis of physical education based on deep learning on college students' mental health and social adaptability. Front. Psychol. **13** (2022)