

Retraction

Retracted: Student Behavior Analysis and Research Model Based on Clustering Technology

Mobile Information Systems

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] G. Li, R. Alfred, and X. Wang, "Student Behavior Analysis and Research Model Based on Clustering Technology," *Mobile Information Systems*, vol. 2021, Article ID 9163517, 6 pages, 2021.

Research Article

Student Behavior Analysis and Research Model Based on Clustering Technology

Guozhang Li ^{1,2}, Rayner Alfred,² and Xue Wang³

¹College of Information Engineering, Hainan Vocational University of Science and Technology, Haikou 571126, China

²fakulti Komputeran Dan Informatik, Universiti Malaysia Sabah, Kota Kinabalu, Sabah, Malaysia

³Department of Public Courses, Hainan Vocational University of Science and Technology, Haikou 571126, Hainan, China

Correspondence should be addressed to Guozhang Li; 201914040001@zkn.edu.cn

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Now, entering the 21st century, with the continuous improvement of my country's higher education level, the enrollment rate of all colleges and universities across the country is increasing year by year. Faced with the information management of a large number of students, the workload and work pressure of consultants at various universities have doubled. The rapid and effective development of modern computer software and hardware has also initiated and effectively developed the informatization process of universities. The student management system is the core and foundation of the entire school education management system. This study mainly introduces the application of student behavior analysis and research models based on clustering technology. This paper uses the application research of student behavior analysis and research model based on clustering technology, uses clustering technology to analyze student behavior, and reasonably analyzes the feasibility of KMEANS algorithm and campus data mining. The cluster analysis algorithm is used to divide students into different groups according to the characteristics of the students, and then, data analysis and data association rules' mining are performed on each group of students. At the same time, the decision tree algorithm is used to predict the future of students based on the historical data of the students and the current data of the students. The development status of the school helps the school to understand the situation of the students in real time, make predictions and warnings for possible situations, provide personalized applications for teachers and students, and provide decision-making support for the management. It can be seen from the experimental analysis that the application of student behavior analysis and research models based on clustering technology has increased the efficiency of student education by 17%. The limitations of student behavior analysis and research on clustering technology provide good applications for the KMEANS algorithm. Analysis, discussion, and summary of the methods and approaches are obtained to enrich the academic research results.

1. Introduction

In recent years, the development of information science and technology has been very rapid, and the development of science and technology has led to the progress of the Internet and multimedia technology [1, 2]. In the face of scientific and technological progress, university teaching management must also keep up with the pace of the times and can no longer manage in accordance with the traditional methods and use modern technology to improve traditional management methods and the level of teaching management [3, 4]. At present, the main function of the electronic

information management system adopted by most colleges and universities in China is to store the original paper version of the document in the computer in a digital form and use the clustering technology to increase, delete, modify, and simple statistics function. At present, this simple data management method cannot achieve comprehensive data analysis, find hidden rules (for example, information intelligent arrangement and filtering) between stored data, and provide a scientific basis for policy formulation and policy adjustment support for the teaching management of colleges and universities. Only by building the application platform of college education informationization can we ensure the

effectiveness and real time of education data and can truly achieve unified standardization of format and platform data interconnection [5, 6].

Li Y believes that clustering technology can excavate analyze students' personal behavior, conducive to student management. College student group is an important part of the members of the society, which can accurately understand the behavior and habits of college students accurately and, in time, can bring great convenience to teachers and school administrators. [7]. According to the data of academic performance and consumption behavior, Zhang can make those students who have real excellent grades, but difficult families get national scholarships [8]. The data generated by college students can be used to predict students' academic performance after association rules analysis. When the behavior of students is abnormal, teachers and classmates can provide guidance and management for them to help students with difficulties [9, 10]. Students can discover the gap between themselves and others based on the clustering results and strive to learn from outstanding people.

The purpose of this research is to find a new path suitable for the current development of student behavior analysis and research in clustering technology. This paper analyzes domestic and foreign research literature related to education big data and big data technology and determines the research direction of this research after understanding the current status of education big data research at home and abroad. We research the corresponding literature resources and determine the research ideas and research framework, sort out and study the algorithms and data processing process of data mining, summarize the existing research results, and design methods and models suitable for university education data analysis.

2. Clustering Technology under Big Data

2.1. Big Data Student Learning Analysis. Big data are conducive to promoting learning changes. Studying student data, matching different ways of education, and helping different types of students will contribute to the overall and healthy development of students. Big data are conducive to promoting management changes. By using big data collection technology to reasonably manage the environment generated during campus development and using the results of the analysis and excavation of campus data for university teaching management decision-making, the scientificity of teaching management is improved, and the management of universities is improved. At the same time with the level and service efficiency, it improves the quality of teaching and management to provide powerful help for the development of the school.

Although it can provide students, teachers, and schools with intuitive graphical results, the data models for data analysis and mining at this stage are not rich enough, and the data models lack diversity. In the future, data analysis models such as theme planning, topic comparison, professional evaluation, psychological counseling, and job training can be added. If it can be developed in this way, the data model will become more and more abundant, and the

application effect of data mining and analysis in teaching will exceed imagination. Big data are conducive to promoting scientific research changes. Based on data investigation, the new paradigm of scientific research combining theory, experiment, and simulation will accelerate the transformation of social education science. At present, the technology has developed rapidly in different fields, and its application fields have been very extensive. Preprocessing the student behavior analysis data and then by studying the problems of the traditional KMEANS algorithm propose the optimization algorithm of the KMEANS algorithm and use the optimized KMEANS algorithm to analyze and apply the student information data. This function can design an effective algorithm in student behavior and has the following forms:

$$\bar{V} = \frac{1}{J} \sum_{K=1}^J X_K. \quad (1)$$

The calculated value of the algorithm is as follows:

$$\hat{y}(t) = C\hat{X}_i(t). \quad (2)$$

The data model test should use the following formula:

$$P_{ik} = \lambda I_j + \nu X_i + W_j. \quad (3)$$

2.2. Student Behavior. New Internet technologies and the widespread implementation of the clustering technology analysis of student behavior engineering have provided massive amounts of student behavior record data. It provides us with a substantial data foundation for predicting student behavior in the era of big data. Based on this, we can help students themselves, and their tutors understand the students' improper performance in their current study and life, as well as the learning pressure and learning results, they will face in the next study. It prevents students from breaking school rules and getting punishments due to bad behaviors "outlier" and escorts students' campus study life.

With the implementation of the student behavior analysis and the continuous development and progress of information technology, most universities can ensure the effectiveness of education data and realize the unified standardization of format and platform data interconnection. In the Internet era, the construction of digital campuses is a shortcut to the construction of student behavior analysis projects in colleges and universities. The "Internet + education" model has enabled campus network integration platforms to emerge one after another in major campus environments. Big data technology that is popular all over the world will become student behavior. New options are for analysis and development. The traditional single teaching management model of major universities is being replaced by new technologies, new methods, and new teaching management concepts. It integrates large-scale campus data resources accumulated over many years to improve campus digital intelligence and, more efficiently, teaching management platform. The specific results are shown in Figure 1. After the campus data resources are

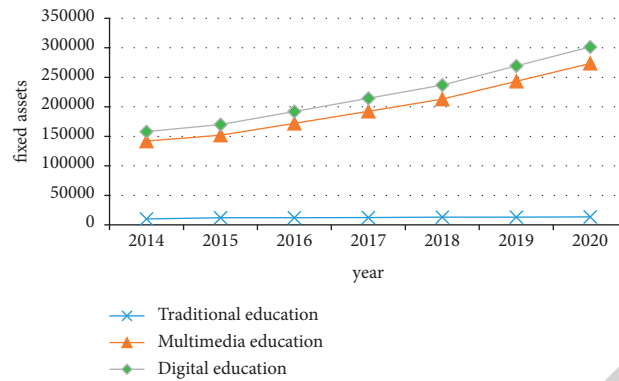


FIGURE 1: Error optimization performance of the modified model.

digitized, the conventional teaching values are calculated by simulation. Similarly, the intelligent teaching management value range can be obtained. It can be seen that conventional education remains the same on average and data education resources increase.

3. Student Behavior Analysis under Big Data

3.1. Student Behavior Based on Clustering Technology. With the progress of society, technology is life and learning through its data analysis, mining, and prediction capabilities. All walks of life in the Internet age are generating. As the informatization construction of colleges and universities continues to improve, major teaching management systems and platforms are also constantly updated and improved, which has led to the explosive growth of college database data. The educational big data application environment has initially taken shape in major universities. However, many colleges and universities do not make reasonable use of campus data, which makes this precious resource sleep all year round. In this context, rational use of campus big data, clustering technology for data mining, and analysis of campus education big data has become very meaningful research at the moment.

Major colleges and universities across the country have begun to transform from traditional campus management methods to modern digital development. The construction of information technology is closely related to universities. Only by building the application platform of college education informatization can we ensure the effectiveness and real time of education data and truly achieve unified standardization of format and platform data interconnection to use new management methods. At present, informatization construction is an important development stage of digital campus construction which refers to the use of information technology to management to facilitate standardized management of teachers and students and rational use of network platforms to uniformly integrate student, faculty, and other related behavioral data to replace the traditional low-efficiency management model.

The virtual teaching environment is one of the results of the construction of a smart campus. Its advantages realize data openness and sharing, while also realizing efficient

management of data. It not only greatly improves the management efficiency of teaching resources but also improves campus business management capabilities. A comprehensive informatization goal for the construction of educational informatization is set. The specific results are shown in Figure 2. It can be seen from the figure that the proportion of conventional education is decreasing year by year, while the quality of information-based campus management is increasing year by year.

3.2. Educational Development of Student Behavior. Analyze and apply research on university student behavior data under the background of big data. The number of student behaviors is one of the educational data, and the teaching, management, and evaluation of education have undergone earth-shaking changes. The degree of attention to educate big data has increased with the popularization of Internet information technology. According to research statistics, as of December 31, 2019, 18% of the overall global application market has been occupied by the education field, and it has increased exponentially. The field of education is one of the important application areas for the development of big data. Scholars predict, based on the development trend of big data in recent years, the arrival of big data will bring real changes to the education sector.

With the development of society, in response to the call for the construction of the student behavior analysis project in colleges and universities, the construction of the software and hardware teaching environment in most colleges and universities is close to the big data application environment. The campus all-in-one card system, the library book lending system, and various MOOC learning platforms provide for the construction of college student behavior analysis projects. With strong support, this is also a strong of universities. The specific results of big data application by students are shown in Table 1.

4. KMEANS Algorithm Based on Clustering Technology

4.1. Student Behavior Engineering. The focus of the student behavior analysis environment is not only talent training, but a comprehensive upgrade to the training of faculty, staff,

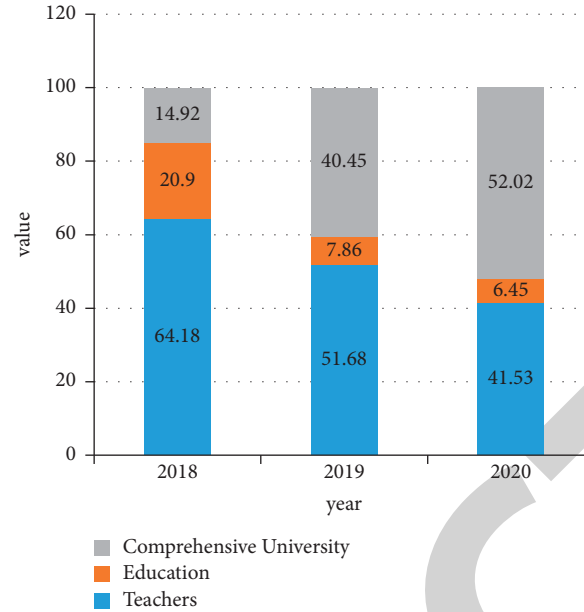


FIGURE 2: The proportion of physical education in various universities.

TABLE 1: Big data application student behavior statistics.

Use frequency	Often (%)	General (%)	Rarely used (%)
One cartoon	92	6	2
Library system	83	11	6
MOOC learning platform	53	17	30

and students throughout the school. The ultimate goal is to realize intelligent campus services. The student behavior analysis project is further deepening of data mining and interconnection and is one of the inevitable products of the development of emerging technologies such as big data. Its function is to improve the comprehensive strength of campus information management. It is the correct development direction to build the application platform of college education informatization. Maybe by building the application platform of college education informatization, we can ensure the effectiveness and real time of education data and can truly achieve unified standardization of format and platform data interconnection. Due to the rapid expansion of the information construction of the major teaching management platforms on campus, the data inventory will increase exponentially. The specific results are shown in Figure 3. The figure shows that student behavior analysis under clustering technology emphasizes the unity of instrumentality and humanity. If teachers can effectively apply big data technology in education and guide students to actively play their main role, it will promote the diversified development of teaching methods.

4.2. KMEANS Algorithm Model Analysis. The KMEANS algorithm can only achieve local optimization but not global optimization. It has a great dependence on the initial cluster

center point. Through repeated execution of the algorithm, the initial clustering points randomly generated by the system and the calculation links of each object are realized, and the evaluate (C function) is used to evaluate the respective results C, and the object with the smallest evaluate (C) value is calculated as the final result of how to determine the value of the initial K. First, we determine a K value interval, perform KMEANS algorithm clustering on all values in the K interval, and use the specified evaluation function to evaluate the clustering results to obtain an optimal cluster As a result, this K is the best initial K value. The larger the K value, the more clustering center points. Obviously, the sum of the squares of the distance between each object and its initial clustering center point will become smaller. The results are shown in Table 2.

These shortcomings of the KMEANS algorithm directly affect the final stability of the KMEANS clustering results. After analysis and research, clustering is performed, and the final clustering result is obtained. The optimized KMEANS algorithm is applied to the student behavior analysis system, and the effect is very obvious. This article proposes a method for optimizing KMEANS, which is applied to the student behavior analysis system, which can analyze the collected data more systematically. First, the processing counselor can select the clustering coefficient K according to his own will. to flexibly set the range of clustering value K, and you can give the initial range of clustering coefficient K (a, b); the clustering process executes the traditional KMEANS clustering algorithm ba times, and the ba KMEANS algorithm is currently the most commonly used clustering algorithm based on partition; the two most significant defects in the KMEANS algorithm are closely related to its initial value, the K value, which needs to be set in advance, and the selection of the K value in the actual process is very difficult. In most cases, we cannot choose k directly. The specific results are shown in Figure 4, which is KMEANS compared with the

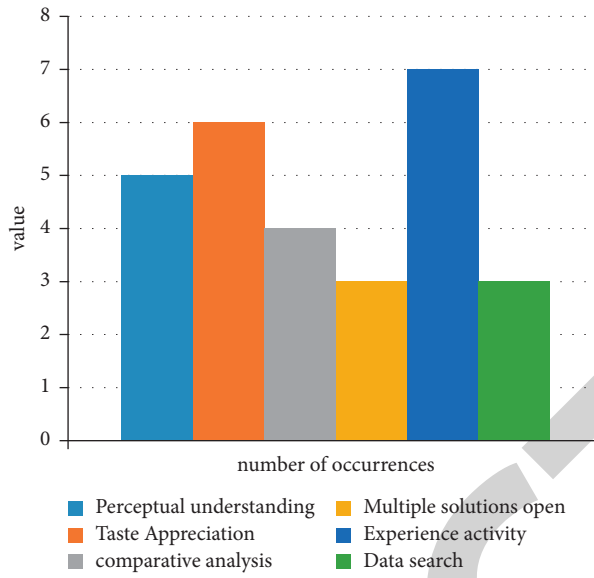


FIGURE 3: Statistics of practice items.

TABLE 2: Statistical table of sample library.

Parameters	Value	Parameters	Value
Input flow	200, 300, 500	Departure interval	10
Vehicle speed	Measured speed	Error threshold	1
Front and rear flow	Measured speed	Experiment step	100–200
Share	0.5, 1, 2	Noise matrix variance	[10, 9, 20]

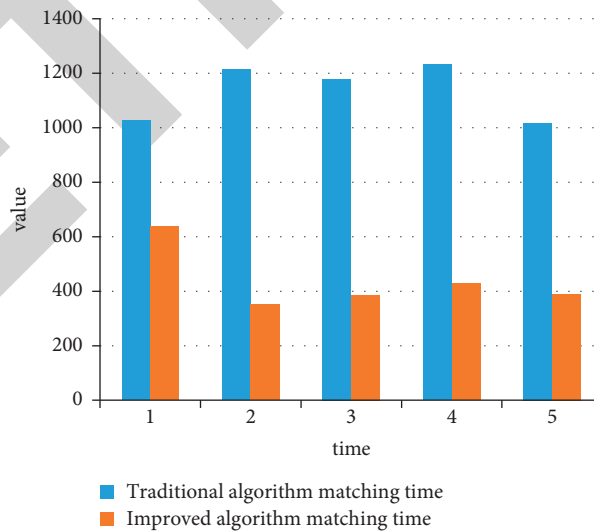


FIGURE 4: Comparison of case matching time.

original algorithm. The average prediction accuracy of the original algorithm is 84.35%, and the average prediction accuracy of the KMEANS algorithm is 89.47%.

5. Conclusions

This paper still has many deficiencies in the application of student behavior analysis and research models based on clustering techniques. With the gradual construction of school informatization, various application systems have been started, and the scope of data integration is gradually expanded. Data values in the shared library have not been fully utilized. A large number of business data storage within each department can only be used by various departments, not for comprehensive and effective classification, integration, and analysis, and cannot provide decision support for management. Therefore, campus data are a valuable asset of campus data analysis and mining in the university information construction. There are still many in-depth implications for the application of student behavior analysis and research models. There are still many steps uninvolved in student behavior analysis due to spatial and individual capabilities.

Data Availability

The data underlying the results presented in the study are available within the article.

Disclosure

The authors confirm that the content of this manuscript has not been published or submitted for publication elsewhere.

Conflicts of Interest

There are no potential conflicts of interest in this study.

Authors' Contributions

All authors have read and approved the manuscript.

Acknowledgments

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