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Retraction

Retracted: Characteristics Analysis of Applied Mathematics in Colleges and Universities Based on Big Data Mining Algorithm Model

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1].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] Y. Wang, F. Tian, and Y. Bai, "Characteristics Analysis of Applied Mathematics in Colleges and Universities Based on Big Data Mining Algorithm Model," *Security and Communication Networks*, vol. 2022, Article ID 7978031, 13 pages, 2022.

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Research Article

Characteristics Analysis of Applied Mathematics in Colleges and Universities Based on Big Data Mining Algorithm Model

Yuqin Wang[1], **Feng Tian**[2], **and Yong Bai**[3]

[1]*College of General Education, Chongqing Vocational and Technical University of Mechatronics, Bishan, Chongqing 402760, China*
[2]*College of Mechanical Engineering, Chongqing Vocational and Technical University of Mechatronics, Bishan, Chongqing 402760, China*
[3]*Information Engineering Institute, Chongqing Vocational and Technical University of Mechatronics, Bishan, Chongqing 402760, China*

Correspondence should be addressed to Yuqin Wang; 202001277@yangtzeu.edu.cn

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To analyze the mathematical nature of applied mathematics in colleges and universities, a method based on a model of big data mining algorithms is proposed. Firstly, the modeling is carried out through the deployment of nodes, which can accurately collect the characteristics of data information in the case of massive big data; secondly, the acquisition algorithm of multi-feature fusion is systematically optimized, which can avoid data interference and collect features quickly and accurately; thirdly, by transforming the multidimensional application-oriented university applied mathematics discipline model into an unlimited experience loss minimization problem with penalty factors, the improved support vector machine algorithm is used to construct and solve the objective kernel function. It is proved that the intelligent collection method based on big data mining algorithm model for the characteristics of applied mathematics in colleges and universities is effective. The sympathetic set corresponding to the flowing data is [115~135]; the data similarity in big data environment is 1; in order to ensure that the intelligent collection method of applied mathematics discipline characteristics in colleges and universities based on big data analysis can collect data characteristics more accurately, which are 110/76.65/78/110, respectively.

1. Introduction

With the revolution of science and technology, artificial intelligence, Internet plus, and other emerging technology industries have occupied all levels of social production and life, and digital economy has changed the way of production and life of mankind. Facing the torrent of big data and the emergence of many diversified data, big data has brought opportunities and influence to personal life, enterprise management, education, and teaching, and even the development of the country and society. China's big data era has come. In the next few years, talents who can meet the development needs of big data industry will get more and better development space. However, a grim reality is before us. How to develop big data talent is an urgent issue.

Therefore, the undergraduate talent training of mathematics and applied mathematics should seize the opportunity of the times, comply with the trend of the times, clarify the guidelines and specific objectives of the party and the state, and accelerate the teaching, experiment, and talent training, and big data technology will contribute to the development of scientific research, social services, and big data industry talent, and will be the driving force behind the development of the big data industry.

Big data mining algorithm is the frontier field of current informatization. Its great power of technological change and the magic charm in business practice have attracted the favor of many experts and scholars in the field [1]. The research shows that the collection, analysis, management, and application of big data combined with high and new technologies such as data mining are not only the key to improve the development and utilization of data but also a feasible way to improve the intelligence and dynamics of human data processing, as shown in Figure 1.

2. Literature Review

With the advent of the digital age and the rising frequency of Internet use, data feature collection and extraction in massive data can effectively promote the rapid identification and efficient utilization of data. Data in the Internet are effectively transmitted in the form of data compression, and small data are also effectively transmitted in the form of multiple compressed into large data packets. Therefore, effective analysis and use of big data are the keys to use data in the future [2]. In a large data environment, the traditional method is a two-line polynomial method that breaks down large data into efficient data properties. This method can accurately extract the data features, but due to the increase of the amount of data, the traditional methods cannot be applied to the modern data environment. In the age of big data, applied mathematics has become a basic skill and a necessary tool for survival in the digital economy era and has created tremendous productivity in managing the real world through the virtual world. High technology is the application of mathematics. Exploring the accurate teaching and training of applied mathematics under the background of big data has become an important research topic.

Gao et al. believed that the construction project of applied mathematics discipline is discussed from the aspects of organizational structure, existing problems, and project management mechanism, and some suggestions are given [3]. Lu and Zhou started with the fragmentation characteristics of applied mathematics discipline construction projects in colleges and universities, and this paper analyzes all aspects of the fragmentation of applied mathematics discipline construction projects and gives three crack paths from the reform of management system, innovation of construction ideas, and specific paths [4]. Yang et al. studied the management mode of applied mathematics discipline construction project in colleges and universities with system engineering methodology, and put forward project management suggestions from four dimensions [5]. Zhang and Wang studied the objective integrated management elements and modes of mathematics discipline construction projects [6]. Ying and Zhao comprehensively discussed the project management of discipline construction, performance evaluation, target setting, and evaluation system [7]. Dbicka-Kumela et al. improved the construction project management of key disciplines by introducing the third-party supervision system and put forward corresponding suggestions [8]. Chen et al. studied the postevaluation method of applied mathematics discipline construction project by using fuzzy analytic hierarchy process, and gave the corresponding three-level evaluation index system [9]. Hui Ping and Song believed that in the data age, the most precious information in mathematics is massive educational data, which is the core cornerstone of the development of smart education. Data mining technology and learning analysis technology are the links between big data and smart education [10]. Cao et al. believed that technology's participation in the field of intelligent learning is mainly reflected in its boosting effect on learning activities, learning experience, and personalized learning [11]. Zuo and Chen believed that the intelligent learning environment should be able to detect the learning situation and distinguish the characteristics of mathematics [12]. Zhang et al. believed that the core of intelligent learning is information analysis and learning support, and information analysis plays a supporting role in determining the goal of intelligent learning [13]. Dongpo and Hongxia said in the age of the information economy, and the ability to use data plays an important role in the scientific decision-making process of enterprise development [14].

Based on the current research, this paper puts forward an analysis and processing method with the help of big data mining algorithm model, establishes the effect prediction model of applied mathematics discipline construction project management, discusses the discipline construction method based on big data mining analysis model, establishes the model, and makes prediction and analysis through the collection, sorting, and analysis of data related to mathematics discipline characteristics.

3. Characteristics of Applied Mathematics in Colleges and Universities Based on Big Data Mining Algorithm Model

3.1. Big Data Mining Algorithm

3.1.1. Concept and Characteristics of Data Mining. (1). Big Data Concept. Big data refers to a diversified, time-effective, collected, and huge data collection, which cannot be analyzed and sorted by conventional tools. Since the 21st century, the rapid development of information resources has supported the advancement of information technology and marked the arrival of the big information age [15]. The investigation and research show that the fields involved in big data include astronomy, biology, computer, electronic technology, automation, information resource management, and other aspects. It can sort out and classify according to the users' usual browsing content and concerned information, and accurately provide customers with satisfactory services. Through the analysis and sorting of big data, traditional enterprises facing Internet pressure can ensure that their products keep pace with the times.

(2). Data Mining Concepts. Data mining is the core of big data. It is not only the inevitable product of the development of the times, but also an independent emerging subject. Through data research, it is found that data mining is closely related to business planning. For potentially important information, data mining collects and arranges complex, cumbersome, and large amounts of data, which can promote the development and innovation of business [16]. At present, data mining has been applied in many fields such as education, scientific research, electronic and mechanical automation, marketing, and Internet, and has created huge

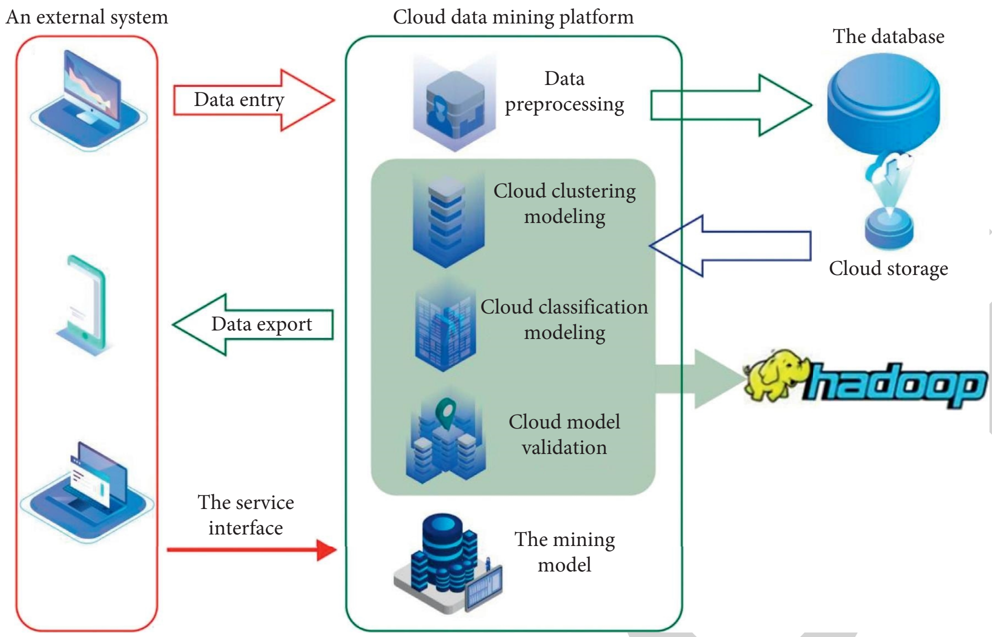

FIGURE 1: Cloud data mining platform.

economic benefits in many fields and promoted the rapid development of the industry.

(3). Characteristics and Methods of Data Mining. Data mining is a tool for studying valuable information from a vast body of information, and it is called information retrieval. Data mining is the process of automatically searching for hidden information of a specific relationship within a large amount of data. It collects and organizes valuable data mainly through statistics, online analysis, data retrieval, machine training, and expert systems. Data mining is considered an important step in the process of acquiring knowledge in the field of artificial intelligence. [17]. Computer technology analyzes data, finds laws from large amounts of data, and integrates new sources of information from relevant data. Data extraction includes association analysis, cluster analysis, specific group analysis, and evolution analysis. However, not all information retrieval and sorting processes are data mining. For example, database management system or Internet search engines are tasks in the field of information retrieval. This data processing includes cumbersome algorithms and precise logic. Data mining seems to be involved in a wide range of fields, but its practical application has not been fully popularized. The main development trends of data mining are further study the methods of information collection, standardize the commercial application of data mining, and establish a new system to adapt to social development.

3.1.2. Big Data Analysis Framework. The data mining algorithm designed in this paper includes clustering analysis algorithm and BP neural network model algorithm, which are organically combined to realize the analysis of various big data [18]. The data extraction algorithms developed in this article can analyze the information and knowledge processes that are valuable, used, and analyzed that are hidden in many incomplete, impure, and randomly aggregated data. How to effectively use this information and extract useful information resources from these data has become an urgent key step in the process of knowledge discovery. The architecture diagram of data processing is shown in Figure 2.

In the database, big data information not only includes the data transmitted by various sensors such as vibration sensor, temperature sensor, humidity sensor, and magnetic field sensor but also includes text, audio, video, graphics, images, and other data used in various occasions. When analyzing these data, users can select data samples for these data and extract sample features from these data samples [19]. Then, the extracted sample features are stored in the database. In this design, the data storage layer can store the result data obtained by the data acquisition layer in the form of structured database. The data mining layer analyzes different structures of data. The data mining layer provides various data mining algorithms, effectively analyzes different data types, outputs users' expected values, mines the required information for users, and effectively completes various data mining tasks.

3.1.3. Types of Data Mining Algorithms. Data mining includes many kinds, such as association algorithm, decision tree, neural network model, regression analysis, genetic algorithm, and other algorithms. Different data analysis types can realize different data output and meet the different needs of users [20]. This paper combines K-means clustering algorithm and BP neural network algorithm model to realize the analysis of big data. As shown in Figure 3, firstly, the classification of different data is realized through the cluster analysis algorithm model. Cluster analysis is a statistical analysis technology that divides a group of research objects into relatively qualitative clusters. Through cluster analysis,

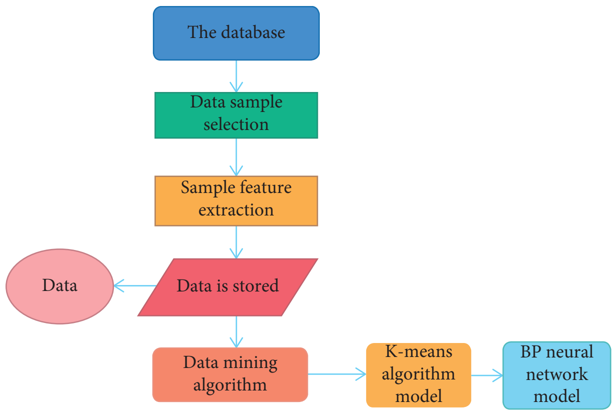

Figure 2: Big data analysis architecture design.

the data with the same attributes are divided together, which is helpful for users to realize data analysis. Then, the data after cluster analysis are input into the BP network algorithm model for further training and learning [21].

(1). Cluster Analysis Algorithm. In the design of this paper, firstly, K-means algorithm is used to preliminarily classify and calculate the data. K-means algorithm is also known as k-means clustering algorithm and fast clustering method. In this method, K-means algorithm can classify various data into a predetermined number of classes K based on the minimization error function; that is, the selected sample data are divided into k parts. The algorithm can process batch data [22]. The main steps of big data analysis are as follows:

(1) K center points are randomly selected from different sample data to select the center point of the initial cluster; before extracting data, it is preferred to preprocess the data to obtain relatively pure data, and then proceed to the next step based on the processed data. Then, among the data mentioned above, such as sensor data, power grid data, text, audio, video, graphics, and images, K sample data to be analyzed are randomly extracted. These extracted sample data can be used as the center of the initial value big data set, also known as the center of the sample cluster [23].

(2) Each different data point is configured to the center point closest to the data point, the sample cluster points are divided, and the points of multiple different sample data clusters are divided into the sample cluster represented by the center closer to it; that is, the center points closer to the center point of the initial cluster are divided into one class. In this step, the distance formula (1) is introduced to obtain

$$\mathrm{d}(x,y)^2 = \sum_{i=1}^{n} (x_i - y_i)^2 = \|x - y\|_2^2. \tag{1}$$

In formula (1), XY represents heterogeneous samples, respectively; N represents the dimension of the data sample; and DXY is the Euclidean distance. Based on the center point of the cluster sample of

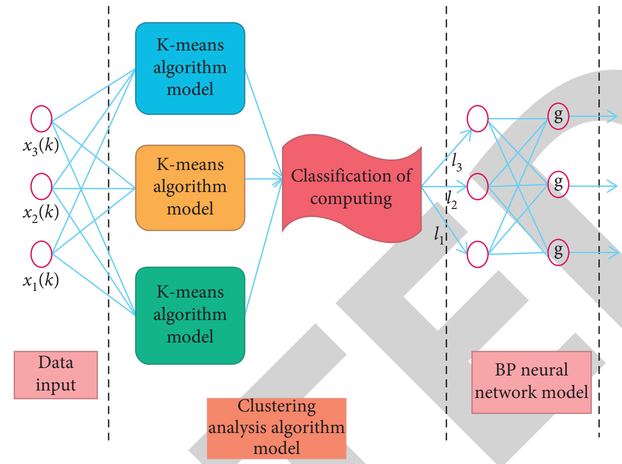

Figure 3: Data mining algorithm flow.

each data selected, the distance between each database sample data and these center sample parameters is calculated by formula (1), and the corresponding big data are redivided according to the minimum distance.

(3) Calculate the distance between each feature and these central features by the mean of the sample data object for each cluster, divide the corresponding objects by the minimum distance, and recalculate the mean of the interval distance from each point to the center. Take the point of this class and assign each data to the nearest center point. The center point of each sample data point in the sample cluster is used to represent the center point of the sample cluster. According to different parameter data, the distance between each sample data center point and these cluster information data centers can be calculated again according to the center points of different cluster information sample data, and the corresponding fault information sample data can be divided again according to the above minimum distance. Form the minimum data calculated each time into matrix D, as shown in the following formula:

$$D = \begin{pmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \cdots & \cdots & & \\ x_{k1} & x_{k2} & \cdots & x_{kn} \end{pmatrix}. \tag{2}$$

where x is the set of minimum values.

(5) Judge whether to perform iterative calculation until all big data values are no longer allocated or the maximum number of iterations has been reached. If the number of iterations is equal to the set threshold, iterative calculation is not required. If the number of iterations is different from the set threshold, adjust the parameters and return to step 2). Repeat steps 2) and 3) to continue the calculation. In big data processing, the cluster with the smallest big data

error criterion function can be obtained by using k-means algorithm. K-means clustering algorithm is widely used and can deal with larger data sets than hierarchical clustering. Cluster K sample data points in the space as the center, and finally classify the information big data closest to different samples [24]. Through continuous iterative calculation, the values of each cluster center are gradually updated until the result of the best cluster is output, as shown in Figure 4.

(2). BP Neural Network Algorithm Model. After k-means algorithm is adopted to output the results, BP network algorithm is adopted to continue the mechanical learning and training of model algorithm, which can map and process the complex nonlinear relationship in data samples in time [25]. Because the BP network algorithm model has high learning efficiency, fast diagnosis speed, and high accuracy, it can quickly diagnose the fault type of communication data in the clustered data, making the information of processing communication fault more accurate, as shown in Figure 5.

BP neural network model includes input layer, implication layer, and output layer. In the input layer, it usually includes data such as sensor data, power grid data, text, audio, video, graphics, and images by constantly adjusting the weights and thresholds in the neural network to gradually approach the desired results and finally minimize the output error. Adjust the BP neural network model according to the following formula: the formula of the adjustment of the output layer weight system is as follows:

$$\Delta\omega_{KI} = \eta O_k^p\left(1 - O_k^p\right)\left(t_k^p - O_k^p\right)O_i^p 9. \tag{3}$$

The formula of the adjustment of weight coefficient of hidden layer is as follows:

$$\Delta\omega_{ij} = \eta O_i^p\left(1 - O_i^p\right)\sum_{i=1}^{L}\Delta\omega_{ki}O_j^p. \tag{4}$$

The formula of the quadratic accurate function model for input mode pairs in different big data samples is as follows:

$$J_p = \frac{1}{2}\sum_{k=1}^{L}\left(t_k^p - O_k^p\right)^2, \tag{5}$$

where y_i is the output database sample data information; y_i' is big data of standardized database samples; $y_{\max}, y_{\min}$ are the maximum and minimum values of the sample big data of the output database; where $0 < Q < 3$; $0 < B < 2$, then determine the number of hidden layer nodes between 6 and 10, the value from input layer to hidden layer is between 0.2 and 0.5, and the value from hidden layer to output layer can be between 0.2 and 0.3. According to the above formula, the BP neural network model can be established.

3.2. Characteristics of Applied Mathematics in Big Data Mining. Mathematics is the basis and tool of all scientific and technological development. It serves to guide and improve data mining. This can increase the efficiency of extracting valuable information from large amounts of data.

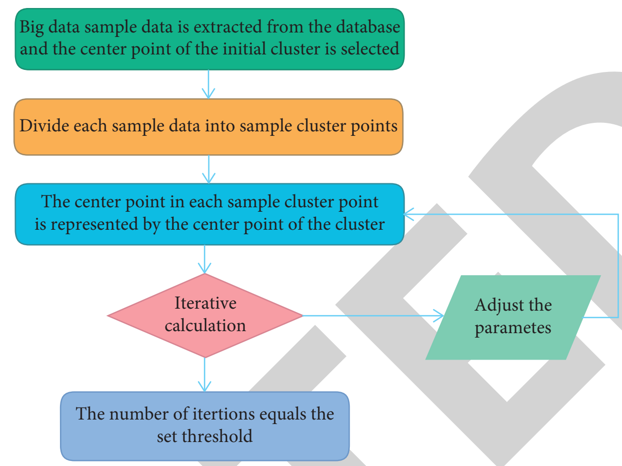

Figure 4: Flow chart of clustering analysis algorithm.

The use of mathematical knowledge in the analysis and classification of data mining will enhance the level of data analysis and stimulate the development of data mining. In the process of data mining, it is inextricably linked to the support of basic mathematical knowledge. Mathematics is closely related to big data mining. Through the application of objective function fuzzy clustering method, interval algorithm, and gray correlation analysis in data mining, this paper deeply explores the relationship between mathematics and data mining.

3.2.1. Objective Function Fuzzy Clustering Method. In big data mining, objective function fuzzy clustering method is widely used in data analysis and image processing. At present, objective function fuzzy clustering method has become the mainstream method of big data mining. This method clusters and integrates all elements through fuzzy relations through the relationship and similarity between objective things, and re-establishes the database for analysis and research. In the application of objective function fuzzy clustering method, data mining technicians use fuzzy relations to formulate certain standards for the required data, use scientific calculation methods to integrate, enrich and improve the matrix structure of data, finally collect the required clusters through direct and fuzzy clustering methods, and sort out these clusters in combination with networking method and maximum tree clustering method.

3.2.2. Interval Algorithm. Interval algorithm is a clustering method that uses mathematical means to analyze and sort out the relationship between data, and obtains important information by locking the interval value of data. Interval algorithm can integrate, mine, and process incomplete system information in the process of big data mining. Big data mining technicians use interval algorithm to convert the data encountered in the process of data mining into comparable data, and use scientific methods to sort out and analyze the data in a fixed range. Through practical research, researchers found that interval algorithm mainly includes matrix and interval clustering method, interval and interval

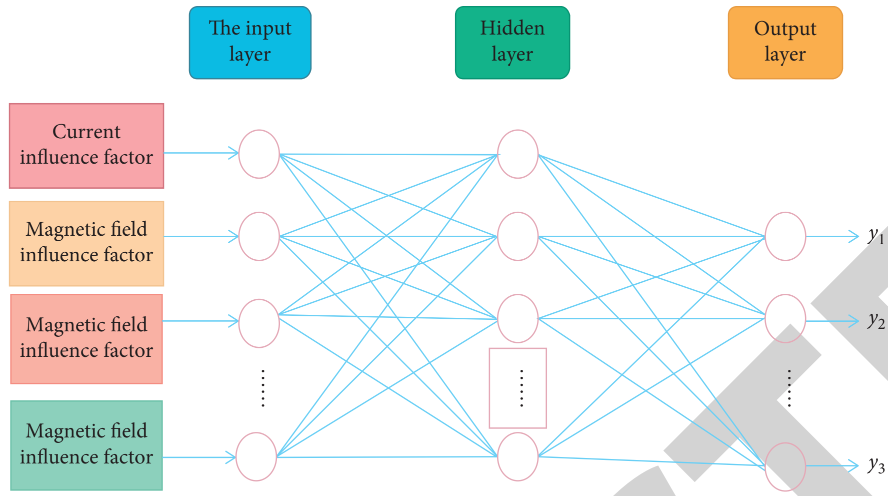

Figure 5: BP neural network model algorithm model.

clustering method, number, and interval clustering method. Among them, the number and interval clustering method is used most frequently. It can reasonably assist the staff to extract the incomplete system information quickly, efficiently, and accurately according to the scientific algorithm. In a clear range of values, use the most advanced statistical means and methods for scientific proof. A series of analysis and integration can also be carried out in each interval to analyze and judge the interval range of important information through practical accumulation.

3.2.3. Gray Correlation Analysis. Gray correlation analysis is a data processing method that uses the basic theoretical knowledge of gray system and measures the relationship of valuable data between large databases according to the correlation between system factors, that is, "gray correlation." This method is suitable for dynamically developing data information. In the gray correlation system, its expression is $s = (x, R)$, X is the set of influencing factors between data, and R is the set involving the mapping between factors. Big data mining technicians most often use the gray correlation analysis method to analyze the geometry between a series of messy geometric curves by scientific means and analyze the data. The more similar the shapes between geometric figures, the higher the degree of correlation between them. In data mining, the gray correlation analysis method can analyze and sort out the incomplete data and samples with less data, and get valuable information.

4. Design Scheme and Experimental Analysis of Discipline Characteristics of Applied Mathematics in Colleges and Universities Based on Big Data Mining Algorithm Model

4.1. Design Scheme of Intelligent Acquisition Method for Discipline Characteristics of Applied Mathematics

4.1.1. Establish Node Deployment Model. The intelligent acquisition method of applied mathematics subject characteristics analysis proposed uses the node deployment model to collect the system data characteristics according to the distribution of data nodes and attribute relationship. The data acquisition flow chart is shown in Figure 6.

The established node deployment model first needs to classify and reselect data, to ensure that the established node deployment model can collect data more accurately. The data classification process is as shown in the following formula:

$$\mathrm{Sim}(I, I_1) = \frac{\sum_{K\in U}(P_{ik} - P)(P - P_J)}{\sqrt{\sum_{K\in U}(P_{ik} - P)^2}\bullet\sqrt{\sum_{K\in U}(P_{ik} - P_J)^2}}, \quad (6)$$

where $\mathrm{Sim}(I, I_1)$ represents the data similarity in the big data environment, and the data classification is completed according to the similarity; P_{ik} represents the sympathetic set corresponding to the flow data; P and P_J, respectively, represent the preference of massive raw big data.

After the system is classified according to the similarity of the original big data calculated above, the orderly modeling can be carried out. The modeling process is completed according to the deployment of data nodes. The process is shown in the following formula:

$$p = p_1 + \frac{\sum_{k\in u}\mathrm{Sim}(i, k)(p_{ku} - p)}{\sum_{k\in u}\mathrm{Sim}(i, k)}, \quad (7)$$

where p represents the established node deployment model and p_1 represents the node deployment of a kind of data. Coefficient matching is carried out according to different data. Generally, it is between [1.75–5.50] data sets; represents the characteristic representation of the original big data; and represents the attribute feature representation of big data. The features extracted from different data are stored in the set matrix column in the form of matrix. The generated matrix column is shown in Table 1.

Modeling through node deployment can accurately collect the characteristics of data information in the case of massive big data.

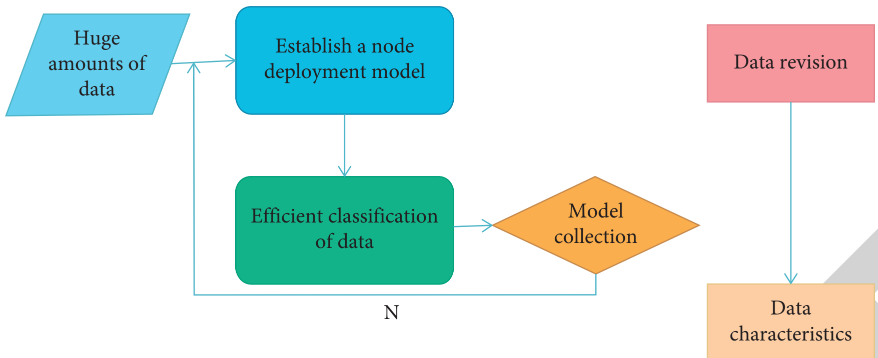

FIGURE 6: Data acquisition process.

4.1.2. Optimize the Acquisition Algorithm of Multi-Feature Fusion. Applied mathematics uses the intelligent acquisition method based on the big data analysis proposed in this paper, but uses a node placement model, but is not sufficient to collect effective data properties in the case of large data analysis. It also needs to systematically optimize the acquisition algorithm of multi-feature fusion, so as to avoid data interference and collect features quickly and accurately. First of all, the identification process of data features needs to be optimized. Formula (8) is as follows:

TABLE 1: Characteristic storage matrix column.

	I_1	I_2	$\cdots$	I_N
I_1	N_{11}	N_{12}	$\cdots$	N_{1M}
I_2	N_{21}	N_{22}		N_{2M}
$\cdots$	$\cdots$	$\cdots$		$\cdots$
I_N	N_{M1}	N_{M2}	$\cdots$	N_{MM}

$$\operatorname{Sim}(U,U_1)=\frac{\sum_{i=1}^{n}(R_i-T)^2\times\left(R_i-T-P_{JU}\right)\times\left(R_i-T^2\times\left(R_i-T-P_{JU}\right)\right)}{\sqrt{\sum_{i=1}^{n}\left(R_i-T^2\times\left(R_i-T-P_{JU}\right)\right)_i^2+\left(R_i-T^2\times\left(R_i-T-P_{JU}\right)^2\right)^2}}, \tag{8}$$

where $\operatorname{Sim}(U,U_1)$ represents the feature attributes and feature expression set contained in big data; R_i represents the feature quantity of a certain kind of data after data classification; T represents the characteristic content; a P_{JU} represents the exclusive and unique attributes of big data. After the identification of data features, noncharacteristic attributes need to be screened out to facilitate the accuracy and speed of the acquisition process. Formula (9) is as follows:

$$P_U=\underset{R}{\longrightarrow}+\frac{\sum_{i=1}^{n}\left(\operatorname{Sim}(U,U_1)\right)_i(R-r)_i}{\sum_{i=1}^{n}\left[\operatorname{Sim}(U,U_1)\right]_i^2}, \tag{9}$$

where P_U means to limit the screening conditions, and those meeting the conditions will be screened out; R represents the filtering conditions used in the screening process, which can prevent useful attributes from being screened out and improve the process of data feature collection; and r represents the existing screening conditions. After filtering, data features can be collected, and the process is shown in the following formula:

$$\begin{aligned}R_U&=\lambda\left(\bigcap_{i=1}^{n}r_i+\frac{\sum_{i=1}^{n}\operatorname{Sim}(U,U_1)\times(R,R_X)_i e^{i\theta}}{\sum_{i=1}^{n}\operatorname{Sim}(u,u_1)_i^2}\right),\\&+(1-\lambda)\left(R_J+\frac{\sum_{i=1}^{n}\left(\operatorname{Sim}(I,I_Y)_i-\overline{X}\right)^2\operatorname{Sim}(u,u_1)_i^2}{\sum_{i=1}^{n}\left(\operatorname{Sim}(I,I_Y)_2-\overline{X}\right)^2}\right).\end{aligned} \tag{10}$$

In the formula, $e^{i\theta}$ represents the holding weight of data features in the case of big data analysis and λ represents the balance factor correlation coefficient during acquisition. $\overline{X}$ represents the data feature acquisition factor. Through the above formula, the collection of data features can be completed, but there are certain conditions in the process of collection. The limited formula (11) is as follows:

$$\lambda=\begin{cases}\dfrac{\sum_{i=1}^{n}\phi_i^2}{\lim(M\times N)}, & M+N\geq 0,\\[2ex] \dfrac{\partial^2\Omega}{\partial u^2}\bullet M, & M+N\leq 0,\\[2ex] 0.5.\end{cases} \tag{11}$$

where $M+N$ represents the collection amount of attribute characteristics and performance characteristics in the collection process, ϕ_i^2 represents the value subattribute of big data, and $\partial^2\Omega/\partial u^2$ represents the response formula that cannot enter the acquisition process.

4.2. Implementation of University Applied Mathematics Subject Model Based on Big Data Mining. The university applied mathematics subject model based on the improved

SVM algorithm has strong adaptability. By transforming the university applied mathematics subject model for multidimensional application into an unlimited experience loss minimization problem with penalty factors, the improved support vector machine algorithm is used to construct and solve the objective kernel function. By introducing the cold and hot data separation factor and the introduction of the stochastic gradient descent factor, both space and time efficiency are achieved, and the kernel function is adaptively adjusted for different data sets. It solves the inherent disadvantages of traditional support vector machine algorithms such as poor interpretability, lack of adaptability of kernel functions, imbalance between generalization ability and learning ability, and memory consumption that changes significantly over time. Theoretically, it is applicable to the problem of high-dimensional coupled applied mathematics disciplines in colleges and universities under the constraints of any complex factors, especially for the applied mathematics disciplines in colleges and universities with single user population, no coupling of internal constraints, and large amount of collective data of interest points.

4.2.1. Improvement of SVM Algorithm. In essence, support vector machine algorithm belongs to an efficient, limited, and generalized classifier with supervised and scalable taxonomic elements, which can overcome linear and nonlinear obstacles. In order to realize the effect of nonlinear multicore data mining and clustering, improve the memory consumption ratio, balance the generalization ability and learning ability, improve the interpretability of data set, and strengthen the adaptability of kernel function. The cold and hot data separation factor and random gradient descent factor are introduced to improve the SVM algorithm. The discipline model of applied mathematics in colleges and universities for multidimensional application is transformed into an unlimited experience loss minimization problem with penalty factors. The objective function (12) of the minimization problem is defined as follows:

$$l(\omega, (x, y)) = \max\{0, 1 - y < \omega, x \gg \omega\}. \tag{12}$$

The objective function is solved by random gradient descent. In each iteration cycle, the training samples are randomly selected and the corresponding objective function gradient is reflected. The gradient step length is selected on the opposite side of the iteration direction to ensure that the running time of the algorithm meets $O(n/\lambda_c)$, where n is the sum of dimensions in the constraint space of ω hand x. In order to solve the dual problem corresponding to the nonlinear kernel, perform the following mapping transformation formula:

$$\sum \alpha_i y_i x_i \longrightarrow \omega\,(i \neq 0 \text{ and is an integer}). \tag{13}$$

After the mapping of formula (13), the unrestricted experience loss minimization problem with penalty factor under multidimensional constraints given in formula (12) is transformed into an extreme value solution problem under single constraints. Furthermore, smooth loss functions are used instead of hinge loss to further transform the problem into a smooth and unconstrained optimization problem under the hyperplane. The specific solution process is as follows:

Randomly select a training sample i_t in the hyperplane constrained space, where i represents the internal attribute of the sample and t represents the external activity of the sample (number of iterations). If it is brought into formula (12), there is formula (14)as follows:

$$f(\omega, i_t) = \frac{\lambda}{2}\|\omega\|^2 + l\big(\omega, \big(x_{i,} y_i\big)\big). \tag{14}$$

If the subgradients of formula (14) are solved, formula (15)is as follows:

$$\nabla_t = \lambda\omega_t - I\left[y_i\{\omega_t, x_i\} < 1\right] y_i x_i. \tag{15}$$

In formula (15), $I[y_i\{\omega_t, x_i\} < 1]$ is the indicator function, and the value range is two values. If it is true, it is 1, and otherwise, it is 0. Based on formula (15), we input the user interest point data set S and regularization factor λ. If the external activity of the sample (number of iterations) is T, then the iteration of one cycle can be expressed as the following formula:

$$\omega_{t+1} \leq \omega_t - \beta_t \nabla_t. \tag{16}$$

In formula (16), is the adaptive step size factor, which is negatively correlated with the number of iterations. Bring formula (15) into formula (16) to obtain the following formula:

$$\omega_{t+1} \leq \omega_t - \beta_t \lambda \omega_t - I\left[y_i\{\omega_t, x_i\} < 1\right] y_i x_i. \tag{17}$$

Further simplify formula (17) and deduce backward to obtain the following formula:

$$\omega_{t+1} \leq \left(1 - \frac{1}{t}\right)\omega_t + \beta_t I\left[y_i\{\omega_t, x_i\} < 1\right] y_i x_i. \tag{18}$$

Based on formula (18), if the indication function is true, there is formula (19)as follows:

$$\omega_{t+1} \leq \left(1 - \frac{1}{t}\right)\omega_t + \beta_t y_i x_i. \tag{19}$$

Based on formula (18), if the indicated function is not true, there is formula (20)as follows:

$$\omega_{t+1} \leq \left(1 - \frac{1}{t}\right)\omega_t. \tag{20}$$

Equation (18) shows that the cold and hot data can be separated by setting the comprehensive bias term. Furthermore, by introducing the online learning mechanism, the predictor with low generalization error can be obtained, which balances the generalization ability and learning ability.

4.2.2. Simulation Verification of Optimization Model. In order to verify the actual working effect of the applied mathematics subject model in colleges and universities after introducing the separation factor of cold and hot data and

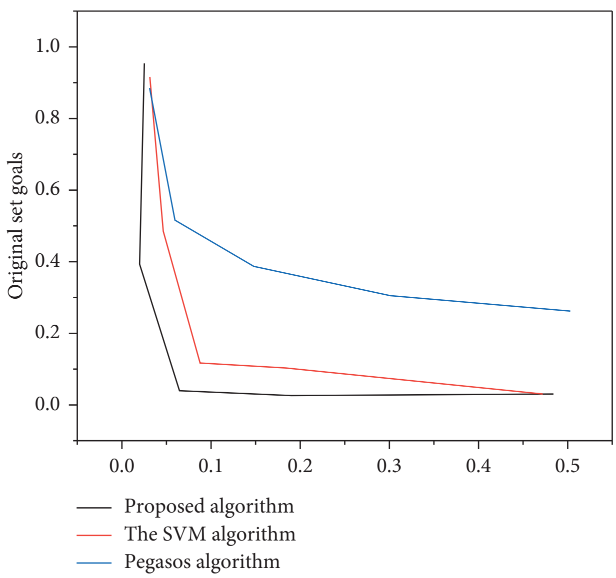

Figure 7: Model performance based on linear kernel data set.

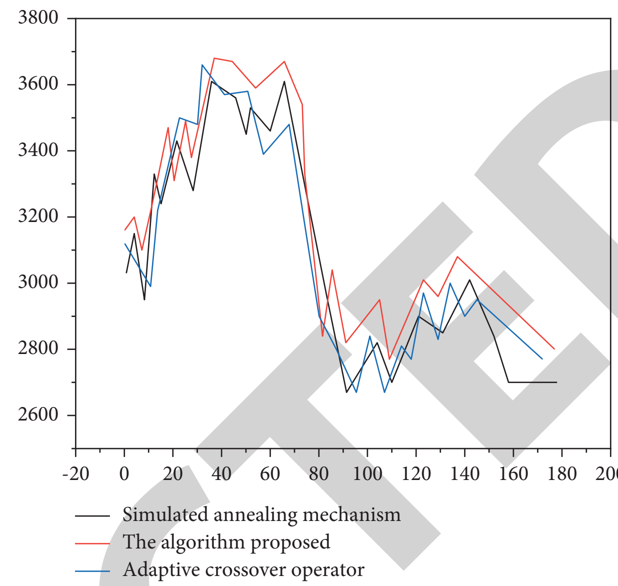

Figure 9: Decision analysis effect of standard fuzzy neural network algorithm.

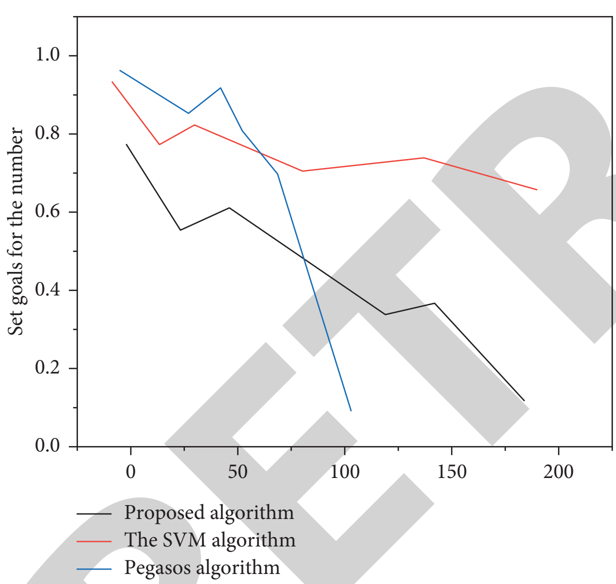

Figure 8: Model performance based on nonlinear kernel data set.

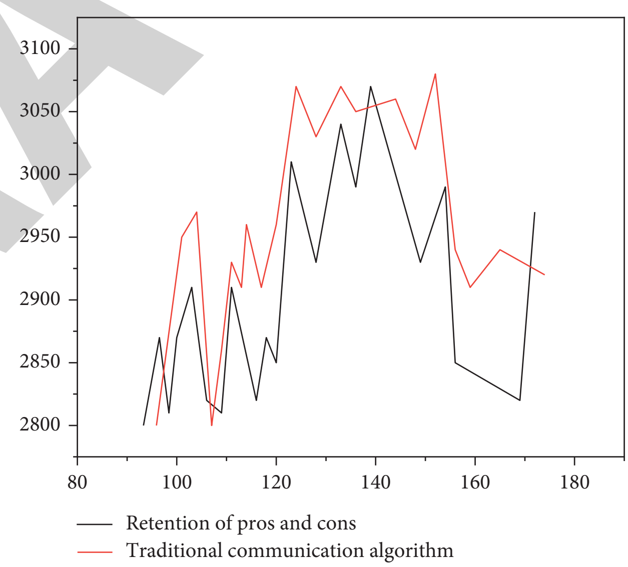

Figure 10: Decision analysis effect of improved fuzzy neural network algorithm.

the random gradient descent factor and integrating into the mechanism of decision analysis system, the actual efficiency of using fuzzy neural network for decision evaluation and adaptive training of fuzzy rules is analyzed. In order to be general and objective, the linear kernel data sets (ASTRO pH, CCAT, and cov1) and nonlinear kernel data sets (Reuters, adult, and USPS) are selected, set the initial objective function, and set the training times of fuzzy neural network as 1000, the training goal as 0.01, and the learning rate LR as 0.1. The algorithm is simulated and verified from multiple dimensions, such as the comparative analysis of the convergence curve of the original objective function, the comparative analysis of the convergence curve of the objective function after log regression constraint, and the comparative analysis of the classification error rate of the objective function. Based on the python 3.5.2 kernel, the graphical simulation is carried out in the PyCharm 3.5 environment. The significant difference mark is used to give the comparison curve in the simulation diagram. The final simulation results are shown in Figures 7–10, and the simulation experimental results are shown in Table 2. In order to make the test data set provided by sklearn library more appropriate to the university applied mathematics subject model, regression mapping is performed on the behavioral data set and the invisible point of interest data set, which improves the purity of the data set, reduces the data set redundancy, and improves the simulation efficiency.

Table 2: Summary of simulation experiment results.

Comparison algorithm	Linear kernel data set (Astro-ph)	Nonlinear kernel data set (Reuters)	Sample prediction accuracy (%)	Classification error probability (%)
Pegasos algorithm	Astro-ph	Reuters	66.32	50.65
This paper presents an algorithm	Dimension: 98445	Dimension: 98445	80.21	87.32
SVM-perf algorithm	Number of positive samples: 7021	Number of positive samples: 8553	75.92	56.95
LaSVM algorithm	Number of negative samples: 25627	Number of negative samples: 23562	51.97	74.15

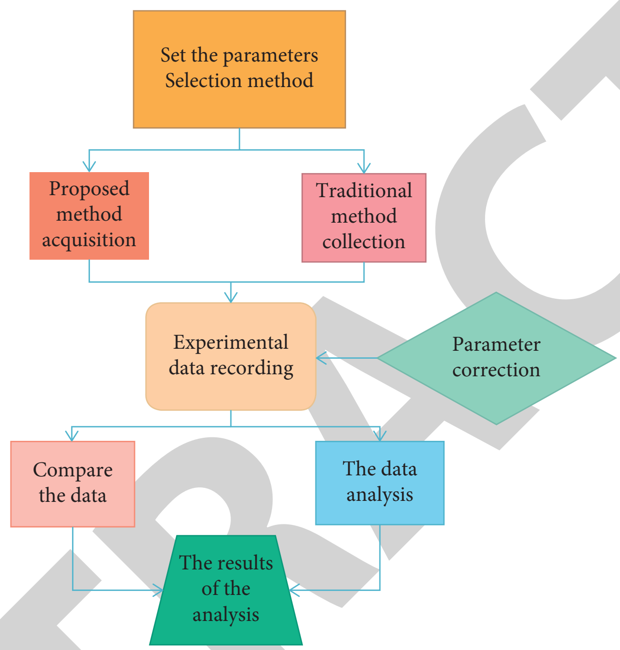

Figure 11: Experimental flow.

Table 3: Experimental parameters.

Number of experiments	Number of data features to be collected	Random feature collection	Acquisition correction parameters
1	10	5	10^{-4}
2	20	10	10^{-4}
3	30	15	10^{-4}
4	40	20	10^{-4}
5	50	25	10^{-4}

From Figures 7–10 and Table 2, it can be seen from both qualitative and quantitative aspects. Firstly, the convergence speed and fine granularity of the objective function of the improved SVM algorithm, the convergence efficiency of the objective function after log regression constraints, and the classification error rate of the objective function have been greatly improved; secondly, after introducing the separation factor of cold and hot data and the random gradient descent factor and integrating into the mechanism of decision analysis system, the actual work effect of applied mathematics discipline model in colleges and universities has been greatly improved. The actual efficiency of using fuzzy neural network for decision evaluation and self-adaptive training of fuzzy rules is good. The cooperative adaptation of linear kernel and nonlinear kernel and the consideration of space and time efficiency are preliminarily realized; finally, the kernel function is adjusted adaptively according to different data sets, which greatly reduces the memory consumption, improves the iteration efficiency of data sets, and solves the inherent disadvantages of traditional support vector machine algorithms, such as poor interpretability, lack of self-adaptability of kernel functions, imbalance between generalization ability and learning ability, and significant changes in memory consumption with time. Theoretically, it is applicable to the problem of high-dimensional coupled applied mathematics disciplines in colleges and universities under the constraints of any complex factors, especially for the applied mathematics disciplines in colleges and

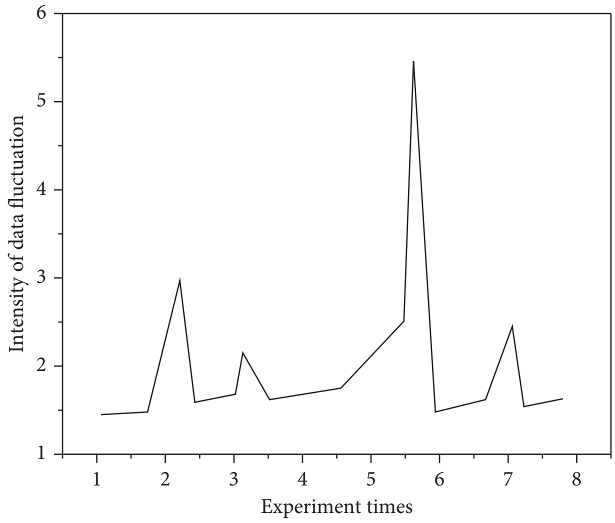

Figure 12: Data fluctuation intensity.

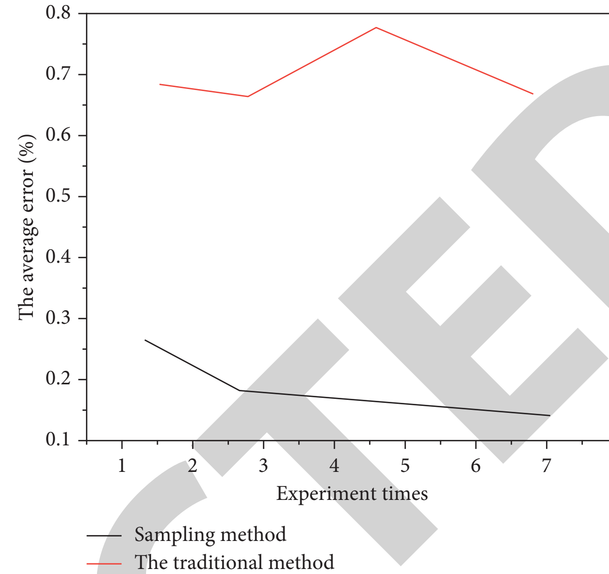

Figure 14: Comparison of experimental results.

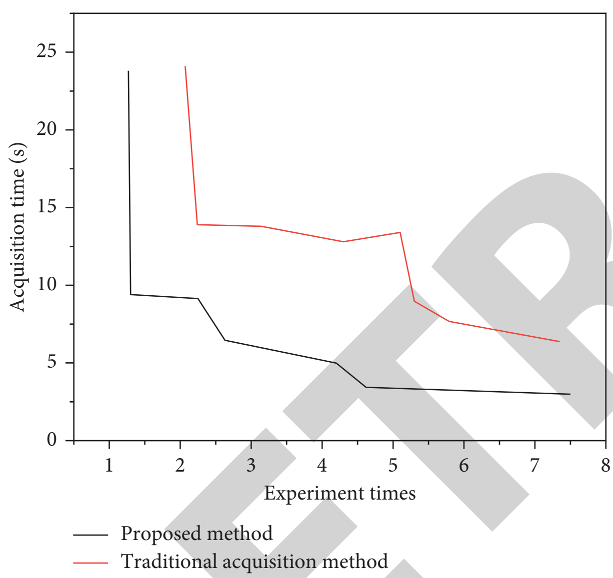

Figure 13: Comparison of experimental results.

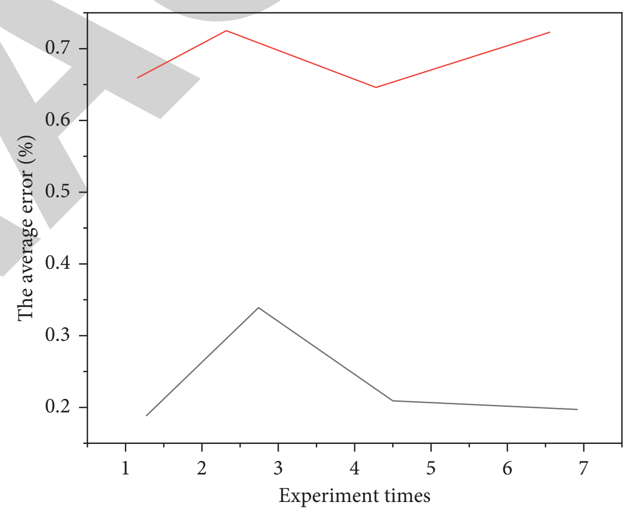

Figure 15: Comparison of experimental results.

universities with single user population, no coupling of internal constraints and large amount of collective data of interest points.

4.3. Experimental Analysis. In order to test the effectiveness of the method of intelligently mastering the characteristics of applied mathematics in colleges and universities based on big data analysis, a comparative simulation experiment is designed. Conduct in-depth feature collection of applied mathematics in colleges and universities under the environment of simulated big data. Using the intelligent acquisition method of applied mathematics discipline characteristics in colleges and universities based on big data analysis proposed in this paper. In order to ensure the effectiveness of the test, the traditional data feature acquisition method is used to carry out the test at the same time. The test process is shown in Figure 11.

In order to ensure the effectiveness of the intelligent collection method, which has developed the characteristics of applied mathematics courses in colleges and universities based on big data analysis, the parameters are set, and the sympathetic set of p_{ku} corresponding flow data is [115~135]; set the data similarity in big data environment to 1; in order to ensure that the intelligent collection method of applied mathematics discipline characteristics can collect data characteristics more accurately, $R_i, \phi_i^2, e^{i\theta}, p$ are set to 110/76.65/78/110, respectively.

The set test parameters are shown in Table 3, and the set data fluctuation is shown in Figure 12.

The experiment is carried out according to the parameters set by the above simulation, and the results are as follows.

4.4. Result Analysis. During the test, the test results of the traditional mining system and the mining system developed in this document were recorded. Analyzing the results in Figure 13, we know that the intelligent collection method based on the big data analysis proposed in this paper can collect the specific characteristics of the information in a short period of time.

By analyzing the results in Figures 14 and 15, the massive data feature intelligent acquisition method based on big data analysis proposed in this paper can maintain a low average error under the condition of obvious data fluctuation, and the trend is downward.

5. Conclusion

In conclusion, the intelligent acquisition method with mathematical characteristics of university application based on the big data analysis proposed in this paper ensures the accuracy of the data acquisition process in a large data environment by creating a node placement model, and can quickly and accurately collect the features of massive data in the big data analysis environment. The acquisition algorithm of multi-feature fusion is optimized to improve the sensitivity to data features and ensure the speed of feature acquisition. To ensure the effectiveness of the intelligent collection method of applied mathematics discipline characteristics, the sympathetic set corresponding to flowing data is [115~135]; set the data similarity in big data environment to 1, in order to ensure that the intelligent collection method of applied mathematics discipline characteristics can collect data characteristics more accurately, which are 110/76.65/78/110, respectively.

Data Availability

The labeled data set used to support the findings of this study is available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

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References

[1] L. Ji, D. Dai, R. Sun, W. Sun, and T. Yu, “Research on the characteristics of college students’ physical fitness database in mathematical statistics,” *Journal of Physics: Conference Series*, vol. 1952, no. 4, Article ID 042047, 2021.

[2] yangzhao, “Research on the application of university teaching management evaluation system based on apriori algorithm,” *Journal of Physics: Conference Series*, vol. 1883, no. 1, Article ID 012033, 2021.

[3] X. Gao, S. Liu, and F. Xu, “Research on the university fall enrollment strategies based on apriori algorithm,” *Journal of Physics: Conference Series*, vol. 1651, no. 1, Article ID 012093, 2020.

[4] L. Lu and J. Zhou, “Research on mining of applied mathematics educational resources based on edge computing and data stream classification,” *Mobile Information Systems*, vol. 2021, no. 7, pp. 1–8, 2021.

[5] Y. Yang, M. Ma, X. Zhu, and W. Ge, “Research on spatial characteristics of metropolis development using nighttime light data: ntl based spatial characteristics of beijing,” *PLoS ONE*, vol. 15, no. 11, Article ID e0242663, 2020.

[6] P. Zhang and C. Wang, “Research on the characteristics of English text based on computer and its translation,” *Journal of Physics: Conference Series*, vol. 1992, no. 3, Article ID 032006, 2021.

[7] F. Ying and J. Zhao, “Research on the cultivation of engineering cost professionals based on the obe concept of big data analysis,” *Journal of Physics: Conference Series*, vol. 1744, no. 4, Article ID 042080, 2021.

[8] M. Dbicka-Kumela, B. Romanowska-Dixon, I. Karska-Basta, J. Kowal, and A. Markiewicz, “The evaluation of the malignant characteristics of conjunctival lesions based on the dermatoscopic algorithm,” *Anticancer Research*, vol. 41, no. 2, pp. 895–903, 2021.

[9] H. Chen, Y. Wang, and H. Zhang, “Research on the negative resistance characteristics of silicon-based trench mos barrier Schottky diodes,” *Journal of Physics: Conference Series*, vol. 1670, no. 1, Article ID 012005, 2020.

[10] L. Hui-Ping, L. Song, Phase retrieval with phaselift algorithm,” *Applied Mathematics:A Journal of Chinese Universities*, vol. 35, no. 4, pp. 104–127, 2020.

[11] T. H. Cao, T. Thao, N. T. Trung, T. Le, and T. Trung, “A bibliometric review of research on stem education in asean: science mapping the literature in scopus database, 2000 to 2019,” *Eurasia Journal of Mathematics, Science and Technology Education*, vol. 16, no. 10, Article ID em1889, 2020.

[12] Y. Zuo and C. Chen, “Research on the characteristics of gis-based industrial agglomeration in shenyang,” in *Proceedings of the E3S Web of Conferences*, vol. 253, no. 2, Article ID 02067, Hunan, China, November 2021.

[13] Z. Zhang, S. Li, E. Wang, X. Liu, and Y. Zhang, “Research on the damage evolution characteristics of coal based on cluster analysis of temporal-spatial dimension of acoustic emission events,” *Yanshilixue Yu Gongcheng Xuebao/Chinese Journal of Rock Mechanics and Engineering*, vol. 39, no. S2, pp. 3338–3347, 2020.

[14] W. Dongpo and Z. Hongxia, “Research on flow characteristics of throttle valve based on fluent,” *Journal of Physics: Conference Series*, vol. 1676, no. 1, Article ID 012021, 2020.

[15] Y. Liu, “Characteristics of organization and management of private colleges and universities based on the big data analysis,” *Journal of Physics: Conference Series*, vol. 1744, no. 4, Article ID 042090, 2021.

[16] S. Sun, J. Cui, and T. Du, “Research on the influence of vibrations on the dynamic characteristics of ac contactors based on energy analysis,” *Energies*, vol. 13, no. 3, p. 559, 2020.

[17] W. Huang, “Research on the revolution of multidimensional learning space in the big data environment,” *Complexity*, vol. 2021, no. 4, Article ID 6583491, 12 pages, 2021.

[18] Q. Yuan and J. Li, “Research on the characteristics of environmental air pollution and its countermeasures in tianjin,”

E3S Web of Conferences, vol. 204, no. 10, Article ID 01008, 2020.
[19] W. Zou, C. Wang, and Y. Luo, "Characteristics and trends of medical-physical integration research-econometric analysis based on cnki data (1998-2020)," *Journal of Physics: Conference Series*, vol. 1852, no. 4, Article ID 042095, 2021.
[20] J.-W. Lim and H.-J. Lee, "Research trends on the characteristics of each section of torpedoes and applied technologies," *The Transactions of the Korean Institute of Electrical Engineers P*, vol. 69P, no. 2, pp. 111–122, 2020.
[21] J. Sim, J. Hong, I. Cho, and J. Lee, "Analysis of vertical stiffness characteristics based on spoke shape of non-pneumatic tire," *Applied Sciences*, vol. 11, no. 5, p. 2369, 2021.
[22] A. Suherman, A. Wiyono, Y. Yayat, R. M. H. K. Negara, and E. T. Berman, "Enhancing student learning achievement using competency-based modules on basic competencies examining the characteristics of refrigerants and lubricating oils," *IOP Conference Series: Materials Science and Engineering*, vol. 830, no. 4, Article ID 042100, 2020.
[23] I. G. Ivanova and R. A. Egoshina, "Prosodic characteristics of emotionally-colored phrases in typologically unrelated languages: based on the mari and French languages," *Finno-Ugric World*, vol. 13, no. 1, pp. 16–28, 2021.
[24] W. Astrini, E. B. Kurniawan, and M. Abdillah, "The characteristics of mosque architecture based on public preferences in malang city," *Tataloka*, vol. 22, no. 1, pp. 137–145, 2020.
[25] J. B. Park and S. Park, "An exploratory study on the mechanism and characteristics of professors' participation in community-based university-industry cooperation in local region," *Innovation Studies*, vol. 15, no. 1, pp. 63–94, 2020.