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Retraction

Retracted: Investigation and Interpersonal Relationship of College Students with Intelligent Big Data

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1].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. Zheng, S. Zheng, and L. Bao, "Investigation and Interpersonal Relationship of College Students with Intelligent Big Data," *Scientific Programming*, vol. 2022, Article ID 2780841, 12 pages, 2022.

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Research Article

Investigation and Interpersonal Relationship of College Students with Intelligent Big Data

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An interpersonal relationship is a relationship that arises and develops in the process of people's extensive material and spiritual exchanges. College students, as a special group, not only have the general characteristics of modern young people's interpersonal communication but also have remarkable characteristics of their own communication. The purpose of this paper is to study how to use intelligent big data to conduct a brief survey and research on the interpersonal relationships of college students so that college students can discover their own problems and establish sound and good interpersonal relationships. This paper proposes data mining based on intelligent big data. Data mining plays an important role in information processing. Data mining includes many algorithms. This paper selects cluster analysis for the need to classify the influencing factors in interpersonal relationships. The cluster analysis algorithm can classify similar information well. The experimental results of this paper show that the most important skills given by the five companies that are considered to be necessary for talents are the interpersonal relationship, self-ability, and academic qualifications. Among them, five companies gave the highest score of 8.9 points to the interpersonal relationship and the lowest score of 8.0 points, with an average of about 8 points, while the scores of their own ability and education were below 8 points. It can be seen that entrepreneurs think that the necessary skills for talents are not academic qualifications and their own abilities but good interpersonal relationships. Therefore, it is very important to establish good interpersonal relationships.

1. Introduction

Today's college students are positive thinking and energetic. They have a wide range of interests. The interpersonal relationship of college students is an important part of social interpersonal relationships, and college students have both universality and particularity. Therefore, it is very important in theory and practice to study and discuss relevant measures to promote the harmony of interpersonal relationships among college students. Modern college students are the hope of the motherland and the future of the country. Their interpersonal skills play an important role in the progress and development of human society.

After the 1990s, the interpersonal relationship of college students has become a topic of scholarly research. With the development of the times and the rise of intelligent big data, the research on the interpersonal relationship of college students with the background of intelligent big data will deepen with the development of times. Intelligent big data not only guide the trend of social development but also have a great impact on the interpersonal relationships of college students. College students are an important part of social interpersonal relationships. The interpersonal relationship of college students is closely related to the personality health of college students, the formation of self-consciousness, the development of health psychology, and the social adaptability of college students.

The innovations of this paper are as follows: (1) this paper introduces the relevant theoretical knowledge of intelligent big data and college students' interpersonal relationships. And it proposes a cluster analysis algorithm based on intelligent big data and analyzes how the cluster

analysis algorithm plays a role in the investigation of college students' interpersonal relationships. (2) This paper compares and analyzes the cluster analysis algorithm before and after improvement. Through the experiment, we can know that the improved cluster analysis algorithm is beneficial for accurately classifying various data of college students' interpersonal relationships. This paper explores the factors that affect the interpersonal relationship of college students.

2. Related Work

Good interpersonal relationships are not only very important in society but also play an important role in developing a healthy personality. Clem et al. studied the interpersonal relationship between teachers and students. They believe that if the relationship between teachers and students is good, students' academic performance will also be improved, and students will become more interested in learning. They surveyed 52 students and found that most high-achieving students had good relationships with teachers. Although the scholar has drawn specific conclusions, their experimental data are not clear [1]. In order to reduce the amount of data collected by the internet of things and improve the processing speed of big data, Xue et al. proposed the method of compressed sensing sampling. Aiming at the high computational complexity of the compressed sensing algorithm, they uses the multiobjective optimization particle swarm optimization algorithm to improve it. It can effectively improve the reconstruction accuracy of the algorithm. The results show that the reconstruction power is higher than the traditional algorithm, so it has better reconstruction performance. The scholars believe that the improved algorithm they proposed can have a better reconstruction function, but they did not prove why the algorithm has a reconstruction function [2]. Kuang et al. found that diversity and accuracy are two distinct characteristics of large-scale heterogeneous data. It has always been a great challenge to represent and process big data efficiently with a unified scheme. They proposed a unified tensor model to represent a variety of different data. They used the tensor expansion operator to combine into a unified tensor. One of their case studies shows that approximate data for the algorithm typically guarantee 93 percent accuracy. But the scholars did not describe the case he proposed [3]. Stergiou and Psannis found that the internet of things (IoT) is a new technology that is developing rapidly in the field of telecommunications, especially in modern wireless telecommunications. In addition, based on wireless network technology, mobile cloud computing (MCC) and IoT technologies are developing rapidly. They combine the above two technologies (i.e., MCC and IoT) with big data technologies to examine their common characteristics. They found that the advantages of MCC and IoT could increase the usage of big data applications. The scholar mentioned combining the advantages of the two technologies, but they did not introduce the advantages of the two technologies [4]. Zhang et al. found that the explosion of data volume and the growing demand for data value extraction have brought people into the era of big data. Cloud computing is one of the representative technologies that utilize virtualized resources, parallel processing, and data service integration. However, the limitation of cloud computing in supporting lightweight terminal devices greatly hinders the vigorous development of cloud computing. The scholar realized that the limitations of cloud computing will affect its development but did not explain how to solve the limitations of cloud computing [5]. Xu et al. found that the increasing popularity and development of data mining technology has brought serious threats to personal information security. In recent years, privacy protection in data mining has been extensively studied. They looked at privacy issues related to data mining from a broader perspective and examined various ways to help protect sensitive information. They identified four different types of users involved in data mining applications. The scholars found that data mining will bring privacy and security problems but did not explain how to solve it, nor did they describe the four different types of users [6].

3. Cluster Algorithm Based on Intelligent Big Data

3.1. Characteristics and Significance of Harmonious Interpersonal Relationships among College Students. The formation of harmonious interpersonal relationships is beneficial to national prosperity, social stability, personal growth, and career success. The psychological development and social maturity of college students are inseparable from interpersonal relationships [7]. Interpersonal relationships are interdependent and interconnected social relationships formed by interactions among social groups [8]. Humans are social animals, and each individual has their own unique thoughts, backgrounds, attitudes, personalities, behavior patterns, and values. The paper summed up the importance of harmonious interpersonal relationships for the healthy growth of college students, as shown in Figure 1.

As shown in Figure 1, the significance of harmonious interpersonal relationships for college students is as follows.

3.1.1. Help Promote the Socialization of College Students. Interpersonal communication is closely related to everyone's life, but it does not mean that everyone can build good relationships. Looking at the whole society, all people are engaged in interpersonal activities, and some people do it well, but some people are frowning all day because of interpersonal relationships. The so-called effective interpersonal relationship refers to the realization of heart-to-heart communication between people and the connection between emotions and emotions [9]. Healthy relationships ensure a person's mental health and emotional balance because a person will face all kinds of setbacks and difficulties in order to survive in society. In many cases, this is unbearable for the individual, and they need the help of relatives and friends around them to overcome the difficulties [10].

3.1.2. Contribute to Cultivating the Sound Personality of College Students. It maintains normal interpersonal relationships, it can get along well with others, and it humbly

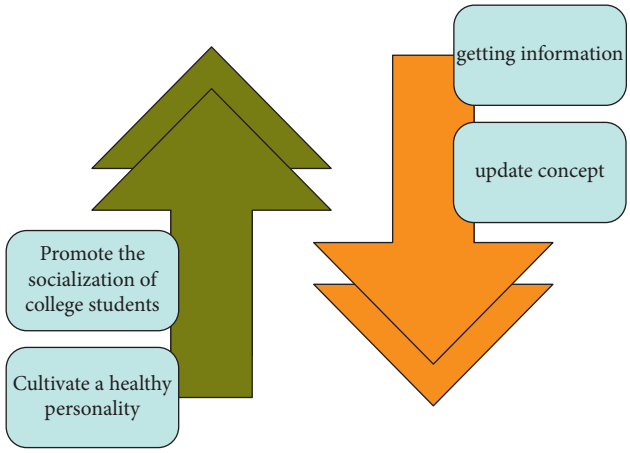

Figure 1: The significance of harmonious interpersonal relationships for college students.

accepts others' corrections. It accepts the strengths and weaknesses of others and has strong emotional control. It affects people's physical and psychological conditions. If people lack positive interpersonal communication, they cannot treat themselves and others properly [11]. People who are narrow-minded and short-sighted can easily form huge mental and psychological pressures. It is difficult to resolve psychological contradictions and may lead to morbid psychology in severe cases. The harm caused by bad interpersonal relationships is shown in Figure 2.

As shown in Figure 2, the consequences of bad interpersonal relationships are withdrawn personality, mental illness, and so on, so good interpersonal relationships may maintain psychological balance and make emotional responses consistent with external stimuli. These aspects are inseparable from interpersonal communication [12]. More than 80% of successful people have high IQ and emotional intelligence interpersonal skills. In contrast, the intelligence factor, which is generally considered to be very important, only accounts for less than 20%. Today's society emphasizes win-win cooperation and the establishment of good interpersonal relationships. On the one hand, it is closely related to the formation of good character and quality of college students.

3.1.3. Help College Students to Obtain Information and Update Their Concepts. The self-development of college students is inseparable from interpersonal relationships, and interpersonal relationships play an important role in college students. On the one hand, good interpersonal relationships can help college students vent their negative emotions, relieve academic and life pressure, and help college students form positive and optimistic character traits and physical and mental health. The formation of interpersonal relationships can help college students have a broader vision and knowledge [13]. Through interpersonal relationships, college students can understand themselves from different aspects, so as to better carry out self-improvement and self-development.

3.2. Advantages of Cluster in Investigation of Interpersonal Relationships of College Students. Cluster analysis is a more general analysis method, and it is engaged in research in various fields because there are great differences in different data types according to the industry [14, 15]. So it is necessary to understand the data structure of the initial data, which is helpful for the data processing in the data mining process. The results of cluster analysis vary according to the measure of similarity of data objects [16]; it can cluster dense data sets of arbitrary shape. It can find outliers while clustering, and it is not sensitive to outliers in the data set, as shown in Figure 3.

As shown in Figure 3, the advantages of the cluster analysis algorithm mainly include the following aspects.

3.2.1. The Algorithm Is Scalable. Currently, large amounts of data are stored in databases in all fields. In the interpersonal relationship survey of college students, because of the need to process a lot of data, the scale of the data will continue to expand. As far as the current research is concerned, many cluster analysis algorithms have higher computational speed and better clustering results for the data set [17].

3.2.2. The Algorithm Has the Function of Processing High-Order Raw Data. The more data attribute values, the higher the maintenance of the database. The meaning of data is getting richer and richer, and if the attributes required to represent the data increase, there will be many data entries in each tuple in the database [18]. Clustering algorithms have excellent processing capabilities for records with relatively few data items and can generally mine meaningful results.

3.2.3. Algorithms Can Deal with and Process Abnormal Data. In many cases, the data set has two identical records. In practical applications, in order to make data mining more meaningful, additional constraints are required. The clustering algorithm must have sufficient volume for the constraints [19]. Even if the constraints are met, it has excellent cluster analysis capabilities.

3.3. Similarity Measurement Method for Cluster. As can be seen from the definition of clustering, its intuitive description is to cluster similar data objects in a data set into one class, so that different data objects belong to different classes. Cluster analysis refers to the analytical process of grouping a collection of physical or abstract objects into classes of similar objects. This conceptual definition is very simple, but in a particular cluster analysis, the purpose of clustering is very different, and the results obtained are also different. Therefore, it is difficult to clearly judge that clustering structure is correct and reasonable [20]. Two distinct clustering structures that can be observed under different similarity measure scales are shown in Figure 4.

As shown in Figure 4, cluster analysis is the grouping of data objects based on the information found in the data that describes the objects and their relationships. The goal is to find out the similarity between objects within a group. This

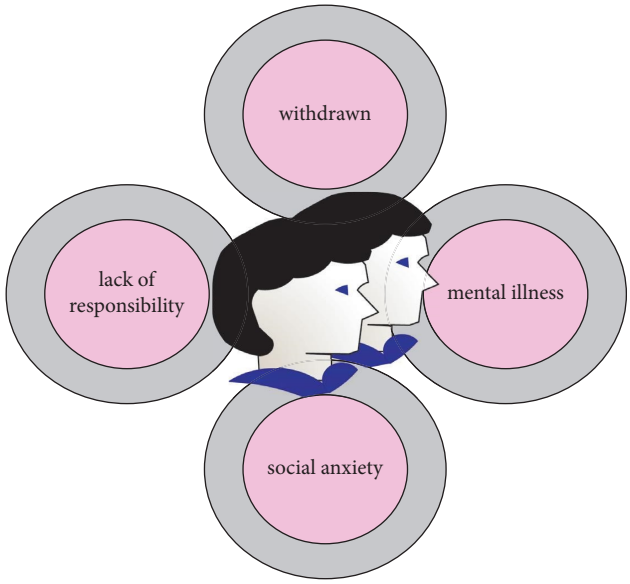

Figure 2: Consequences of bad relationships.

paper divides the similarity of cluster analysis into three aspects. These measurement methods are mainly manifested in two important stages of cluster analysis, namely the algorithm design stage and the result evaluation stage, and the three similarity degrees all represent the relationship between data units. But the granularity level of the data unit is different [21], as shown in Figure 5.

As shown in Figure 5, after the data is saved, it will exist in various forms. Next, when performing cluster analysis, certain methods are required in order to represent the structure of the data. This facilitates the processing of relevant data [22]. The following two expressions are usually used.

3.3.1. Data Matrix. If there are a total of s records in the data set, each record has n attributes. Then, it is represented using matrix $n \times s$, as in the following formula:

$$\begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1s} \\ a_{21} & a_{22} & \cdots & a_{2s} \\ a_{31} & a_{32} & \cdots & a_{3s} \\ a_{n1} & a_{n2} & \cdots & a_{\mathrm{ns}} \end{bmatrix}. \tag{1}$$

In order to make the clustering effect better, people need to standardize the data, as follows:

$$s_q = \frac{1}{n}\left(\left|a_{1q} - m_q\right| + \left|a_{2q} - m_q\right| + \cdots + \left|a_{\mathrm{nq}} - m_q\right|\right), \tag{2}$$

where $(a_{1q}, a_{2q}, \ldots, a_{\mathrm{nq}})$ is the n measure of q.
The normalized measure is calculated as follows:

$$z_{kq} = \frac{a_{kq} - m_q}{s_q}. \tag{3}$$

The choice of distance function or similarity function is usually determined by experience and relevant background knowledge in practical clustering applications. The commonly used measurement method is the Euclidean distance. Euclidean distance generally refers to the Euclidean metric. In mathematics, the Euclidean distance or Euclidean metric is the "ordinary" (i.e., straight line) distance between two points in Euclidean space, as follows:

$$d(i, j) = \sqrt{\left|a_{i1} - a_{j1}\right|^2 + \left|a_{i2} - a_{j2}\right|^2 + \cdots + \left|a_{in} - a_{jn}\right|^2}, \tag{4}$$

where both a_i and a_j data sets have n attributes. In addition, according to different clustering objectives, the Manhattan distance can also be used. Manhattan distance is a geometric term used in geometric metric spaces to indicate the sum of the absolute wheel distances of two points in a standard coordinate system, as in the following formula:

$$d_{\mathrm{man}}(i, j) = \left|a_{i1} - a_{j1}\right| + \left|a_{i2} - a_{j2}\right| + \cdots \left|a_{in} - a_{jn}\right|. \tag{5}$$

The Mahalanobis distance is calculated as follows:

$$d(i, j) = \sqrt{\left(a_i - a_j\right)^T \Sigma^{-1} \left(a_i - a_j\right)}. \tag{6}$$

Minkowski distance is a further generalization of Euclidean distance. The Minkowski distance is calculated as follows:

$$d(i, j) = \sqrt[p]{\left|a_{i1} - a_{j1}\right|^p + \left|a_{i2} - a_{j2}\right|^p + \cdots + \left|a_{in} - a_{jn}\right|^p}, \tag{7}$$

where if $P = 1$, one can find that this expression is the same as that of Manhattan distance. When $P = 2$, one can find that this expression is the same as that of Euclidean distance [23]. The cosine of the included angle is used to express their similarity coefficient as in the following formula:

$$\mathrm{sim}(i, j) = \frac{\sum_{k=1}^{k} \left(a_{ik}, a_{jk}\right)}{\sqrt{\sum_{k=1}^{k} a_{ik}^2}}. \tag{8}$$

A metric related to the Jaccard coefficient is the Jaccard distance, which is used to describe the dissimilarity. Jaccard coefficients are often used to express the similarity between sets. The following formula is to use the Jaccard coefficient to express the similarity of two sets T_i and T_j, as follows:

$$\mathrm{sim}\left(T_i, T_j\right) = \frac{\left|T_i \cap T_j\right|}{\left|T_i \cup T_j\right|}. \tag{9}$$

In the case of different needs and different problems, people may have different representations for the types of attributes, and they will be stored in different forms. It is relatively simple and easy to measure the similarity coefficient based on distance, and it is often chosen by everyone [24]. When the value of the similarity coefficient is consistent with the degree of similarity, it is called the blindness coefficient. When it is inconsistent with the degree of similarity, it is called the dissimilarity coefficient. The commonly used similarity coefficients include distance coefficient, correlation coefficient, and joint coefficient.

3.4. Hierarchical Cluster Algorithm. The similarity measure in hierarchical clustering mainly involves the similarity

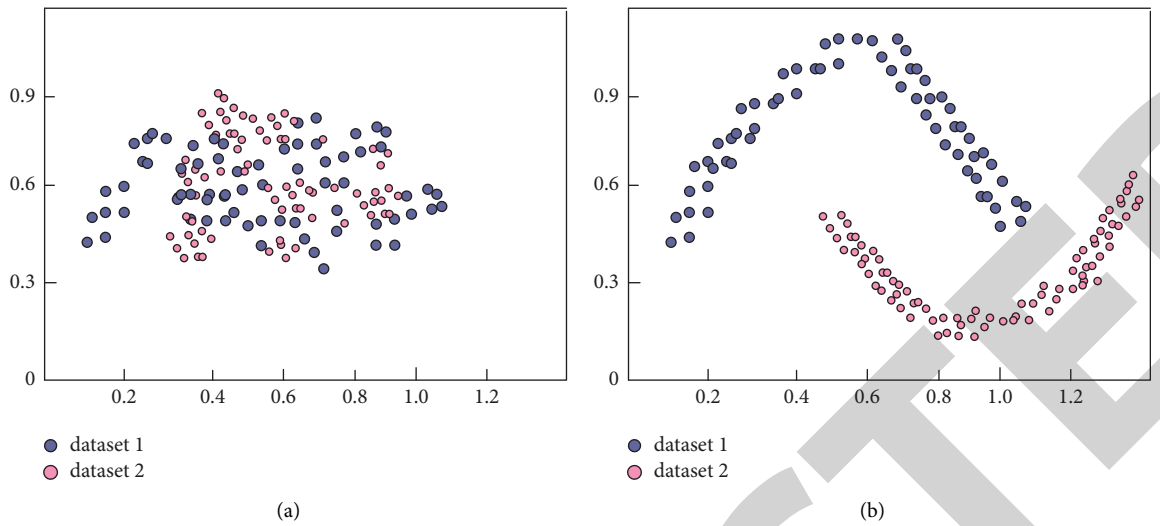

Figure 3: Effect of cluster analysis: (a) data set before clustering and (b) clustered data set.

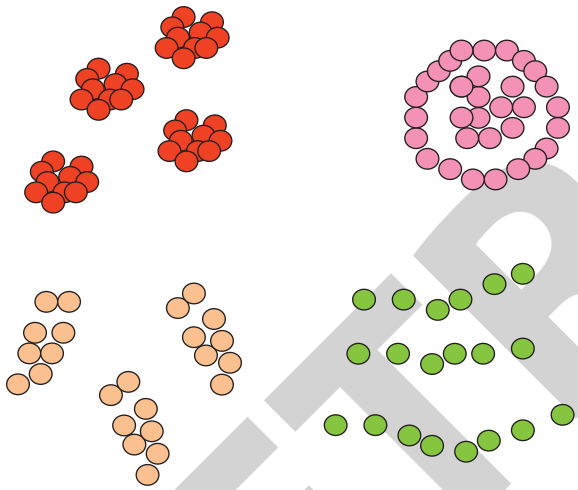

Figure 4: Two distinct clustering structures observable at different similarity measure scales.

relationship between class objects. $D_{nn}(C, C\prime)$ is the two subclasses in the clustering structure, and $d(i, j)$ represents the distance between any two data elements. There are four commonly used distance definitions:

A single join, also known as the nearest neighbor distance, can be expressed as follows:

$$D_{nn}(C, C') = \min d(i, j). \tag{10}$$

In the evaluation stage of the clustering results, in order to test the performance of the clustering algorithm, it is often necessary to compare the results generated by the algorithm with the "real" clustering results (generally obtained by human annotation), as follows:

$$a(C_1, C_2) = \sum_{u_i \in C_1} \max \left| u_i \cap v_j \right|. \tag{11}$$

It measures the degree of matching between C_1 and C_2 and takes the maximum value if and only when $C_1 = C_2$.

Cross-entropy is an important concept in Shannon's information theory, which is mainly used to measure the difference in information between two probability distributions. The performance of language models is usually measured in terms of cross-entropy and complexity. "Cross" entropy can measure the relationship between two data sets through nonparametric estimation, which is more sufficient to describe the data distribution than general second-order statistics. If C_1 and C_2, respectively, represent two subclasses in the cluster structure, the Renyi entropy distance between C_1 and C_2 is defined as follows:

$$D_R = -\log\left(\frac{1}{MN}\sum_{i=1}^{N}\sum_{j=1}^{M} G\left(a_i - b_j\right), \sigma^2\right), \tag{12}$$

where G represents the Gaussian kernel function and σ^2 is the variance of the Gaussian function.

In general hierarchical clustering, each individual data element is initially treated as a subclass. It then merges the two subclasses with the smallest distance step by step and finally forms a tree-like hierarchy. Each layer represents a granularity-level clustering structure [25]. Hierarchical clustering is a kind of clustering algorithm that creates a hierarchical nested clustering tree by calculating the similarity between data points of different categories.

3.5. Ant Colony Clustering Algorithm and Improvement. In the process of ants foraging, the behavior of a single ant is relatively simple, but the whole ant colony can reflect some intelligent behaviors. This is because the ants in the ant colony can transmit information through a certain information mechanism. Ant colony algorithm is a bionic optimization algorithm, which has many advantages. However, the ant colony algorithm also has some shortcomings, which will affect the solution to these problems. The study found

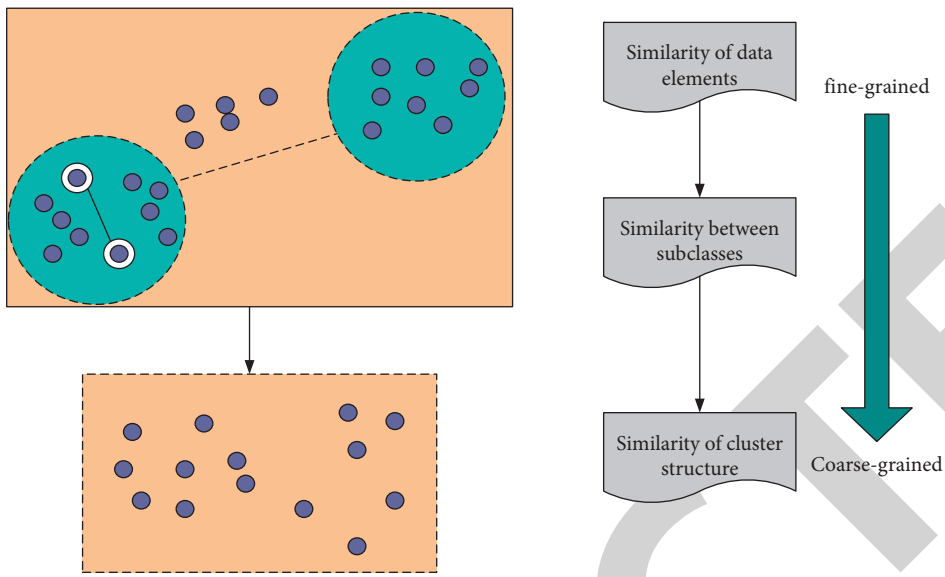

Figure 5: Data units of different granularity levels corresponding to three similarity measures.

that the combination of the ant colony algorithm and cluster analysis could better solve the above problems. This has become a research trend in recent years. The ant colony clustering algorithm is shown in Figure 6.

As shown in Figure 6, although the ant colony algorithm solves the problem of clustering, the number of clusters no longer needs to be manually given, but the maximum number of iterations still needs to be given in advance before clustering. If the grasp of the scale of the problem is not accurate enough, the prediction of the number of iterations will be biased. If the diversity is excessive and the system is too active, it will lead to excessive random motion and fall into a chaotic state. If the diversity is not enough and the positive feedback is too strong, it will lead to rigidity. When the environment changes, the ant colony cannot adjust accordingly. Assuming that the number of iterations is too large, the algorithm has converged before reaching the maximum number of iterations. It has already obtained the clustering result, which will cause the algorithm to do unnecessary iterations and waste the execution time. Therefore, this paper improves the ant colony clustering algorithm.

In the realization process of the clustering algorithm based on the principle of ant foraging, people first need to determine the number of target clusters. It then selects a cluster center for each cluster, and the choice of the initial cluster center is likely to affect the final clustering effect. $\tau_{ij}(0) = 0$; the dissimilarity between objects is represented by Euclidean distance; and the distance and dissimilarity are positively correlated. Then the calculation expression of the pheromone concentration $\tau_{ij}(t)$ on the path at time t is as follows:

$$\tau_{\mathrm{ij}}(t) = \begin{cases} 1, d_{\mathrm{ij}} \le r \\ 0, d_{\mathrm{ij}} > r \end{cases}, \tag{13}$$

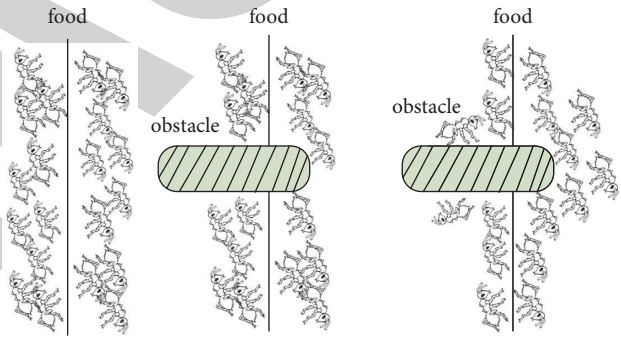

Figure 6: Ant colony clustering algorithm.

where d_{ij} represents the weighted Euclidean distance from object i to object j. The probability of object a_i moving towards object a_j is as follows:

$$p_{ij}(t) = \frac{\tau_{ij}(t)\eta_{ij}^{\beta}(t)}{\sum_{s \in S} \tau_{sj}^{\alpha}(t)\eta_{sj}^{\beta}(t)}, \tag{14}$$

where α and β are control parameters.

Iteration is the activity of repeating a feedback process, usually with the aim of approaching a desired goal or result. Each repetition of the process is called an "iteration," and the result of each iteration is used as the initial value for the next iteration. After an iteration, the data objects in each cluster are different from those before the iteration. At this time, people need to update the cluster center of each class, as shown in the following formula:

$$\bar{C}_j = \frac{1}{w} \sum_{i=1}^{w} a_i. \tag{15}$$

The dissimilarity of data objects in the same class is calculated as follows:

$$d_{ij} = d(a_i, a_j) = \sqrt{\sum_{i=1}^{m} P_i (a_{i1} - a_{j1})^2}. \quad (16)$$

Finally, the result of clustering is judged. If the sum of the dissimilarities of all classes is less than the parameter e of the end of the clustering, the clustering ends. Otherwise, it is necessary to recluster until the cluster termination condition is met.

In a two-dimensional grid, the ants move continuously and perform pick-up and drop-down behaviors. When an ant encounters a data object O_i at position r at a certain moment, one needs to calculate its local density by the following expression:

$$f(o_i) = \begin{cases} \frac{1}{s^2} \sum_{o_i} \left[1 - \frac{d(o_i, o_j)}{2} \right], \text{else} \\ 0, f > 0 \end{cases}, \quad (17)$$

where $f(o_i)$ represents the similarity density between the object and other surrounding objects.

When an ant moves in a two-dimensional grid, the probabilities of picking up and putting down are as follows:

$$P_p = \left(\frac{k_1}{k_1 + f(O_i)} \right)^2, \quad (18)$$

$$P_p = \left(\frac{k_1}{k_1 + f(O_i)} \right)^2. \quad (19)$$

If the similarity between the data in a certain neighborhood of the ant's moving path and the data carried by the ant is higher than the specified threshold, the data will be placed in this position. Then the ants continue to move randomly, repeatedly picking up and putting down, until the number of repetitions is greater than the maximum number of iterations, the algorithm ends, and the clustering result is obtained.

3.6. Application of Cluster Investigation of Interpersonal Relationships among College Students. The original data obtained may be stored in different ways, resulting in inconsistent data forms. Data merging refers to combining data from different databases or different formats to resolve ambiguity in meaning. If the data source is different, there will be many mismatches in the data structure, data unit, data naming rules, and so on. Data merging refers to merging data, which transforms, refines, and summarizes data from the original data. To obtain raw data, data mining is necessary.

In the investigation of college students' interpersonal relationships, interpersonal relationships can reflect the personality of college students. Not only that, but student achievement is also an important measure of student learning. Scientific analysis of students' interpersonal relationships can help students know how to adjust their interpersonal relationships by grasping their own strengths and weaknesses and mastering methods that are more suitable for them. If the relationship is poor, it needs to be improved. Scientific analysis and evaluation of students' interpersonal relationships can help teachers understand the interpersonal relationships of all students.

Applying cluster analysis to the investigation of college students' interpersonal relationships, we hope to dig out useful information. The result of clustering is to divide the influencing factors of college students' interpersonal relationships into several groups (i.e., clusters). Then, in the same cluster of cluster, whether the influencing factors of students' college students' interpersonal relationships will be similar needs to be confirmed through experiments combined with relevant investigations. Then, based on the experimental results, it makes the best of its strengths and avoids its weaknesses.

4. Experiment and Interpersonal Relationships among College Students Based on Cluster

4.1. Experiment and Cluster Algorithm before and after Improvement. The experimental data used in this experiment is the IRIS data set in the UCI machine learning database. This paper uses MATLAB for simulation experiments. After having the experimental condition data, simulation experiments were carried out on the k-means algorithm, the standard ant colony clustering algorithm, and the improved ant colony clustering algorithm. The results are shown in Tables 1 and 2.

As shown in Tables 1 and 2, from the error rate, it can be seen that the error rate of the k-means algorithm is relatively high. The improved ant colony clustering algorithm has a lower error rate. For the improvement of the ant colony clustering algorithm, people only carry out the verification of small data sets; if conditions permit, people need to verify the effect of cluster analysis on huge data sets.

This paper analyzes the execution time and work efficiency of the two algorithms, as shown in Figure 7.

As shown in Figure 7, comparing the execution efficiency of the two algorithms, it is found that the improved ant colony clustering algorithm takes less time and has higher execution efficiency. From these two aspects, the improved ant colony clustering algorithm has shown advantages and can continue to be studied. The goal of clustering is to dig out the internal structure of the data in the interpersonal relationships of college students. It provides meaningful information for further data analysis.

4.2. Student Interpersonal Relationship Survey Based on Cluster. The interpersonal communication of college students has the characteristics of self-interest and autonomy. With the reform and development of society, people's values are changing quietly, and the current interpersonal utilitarianism of college students is

Table 1: Clustering results of standard ant colony clustering algorithm.

Cluster category	Records	Incorrect record count	Error rate (%)
Category 1	40	8	16.7
Category 2	50	11	18.0
Category 3	54	10	15.6
Category 4	59	12	16.9
Category 5	60	9	13.0

Table 2: Clustering results of improved ant colony clustering algorithm.

Cluster category	Records	Incorrect record count	Error rate (%)
Category 1	45	3	6.2
Category 2	55	4	6.7
Category 3	60	3	4.7
Category 4	65	2	2.9
Category 5	70	5	6.6

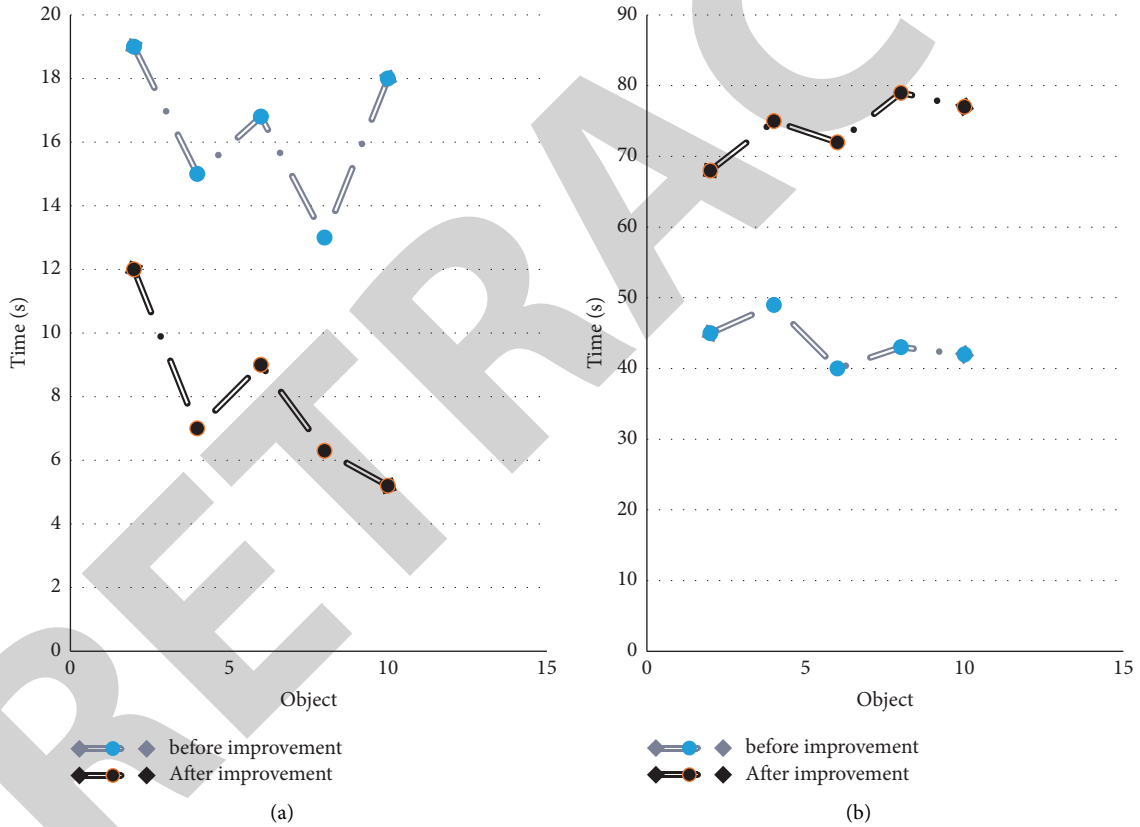

Figure 7: Comparison of execution time and work efficiency of the two algorithms: (a)the execution time of the two algorithms and (b) the work efficiency of the two algorithms.

gradually surpassing emotional communication. This article investigates whether college students at a university consider interpersonal relationships important. It uses cluster analysis to mine useful information and classify it, as shown in Figure 8.

As shown in Figure 8, the highest percentage of them considered "important" was 23%. Surprisingly, a small number of students think it is not important at all to build good relationships in college. This status quo should arouse the great attention of ideological and political educators in colleges and universities. It is necessary to carry out correct education and guidance for college students.

This paper analyzes the importance of interpersonal relationships in five companies, as shown in Table 3.

As shown in Table 3, 5 companies believe that interpersonal relationships are the most important skills required

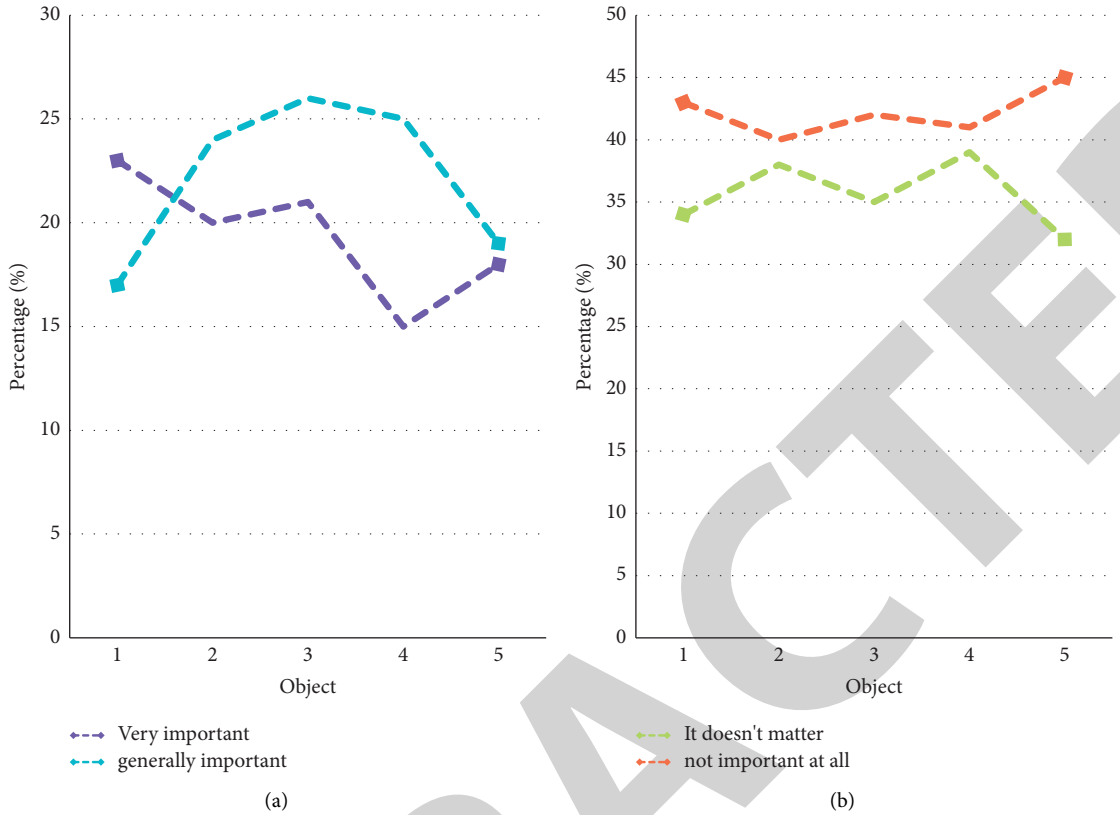

Figure 8: How important college students consider relationships to be.

Table 3: Teaching quality evaluation data before the implementation of the new system of teaching.

Research object	Interpersonal relationship	Self-capability	Education
1	8.5	7.6	7.3
2	8.4	7.3	7.0
3	8.9	7.5	7.2
4	8.2	7.8	7.1
5	8.0	7.7	6.9

Table 4: Questionnaire on interpersonal relationships of 80 students.

Grade	Number of people	Percentage (%)	Effective percentage (%)
A	13	16.25	16.25
B	21	26.25	26.25
C	30	37.5	37.5
D	16	20	20

for talents, and now schools of all levels and types have their own survey methods for interpersonal relationships among students. It achieves an objective analysis of students' interpersonal relationships through certain investigation methods.

It divides the quality of interpersonal relationships into grades *A*, *B*, *C*, and *D*, which correspond in turn from good to bad. It also divides each grade into a certain interval and then divides the interpersonal relationship of students into grades according to the interval. This blurs the numerical distinctions between students' interpersonal relationships. This paper investigates the quality of interpersonal relationships among 80 students, as shown in Table 4.

As shown in Table 4, it can be seen from the clustering results that there are 13 people with good interpersonal relationships, accounting for 16.25%. There are 21 people with normal interpersonal relationships, accounting for 26.25%, and 30 people with poor interpersonal relationships, accounting for 37.5%, ranking first. There are 16 people with poor interpersonal relationships, accounting for 20%. It can be seen from this that most of the students' interpersonal relationships are not very good, so they should strengthen their own interpersonal relationships and better adapt to society.

As an open learning exchange platform, the source of students also has a variety of different backgrounds, growth locations, and different concepts. Because the interpersonal relationships of college students are special in many aspects, the most obvious feature of interpersonal relationships among college students is that distance determines proximity. This paper investigates the influencing factors of college students' interpersonal relationships, as shown in Figure 9.

As shown in Figure 9, the influencing factors of college students' interpersonal relationships are as follows: subjective individual factors, social value orientation factors, employment competition pressure factors, and new media technology development factors. At present, teenagers are the largest group of people who use new media for interpersonal

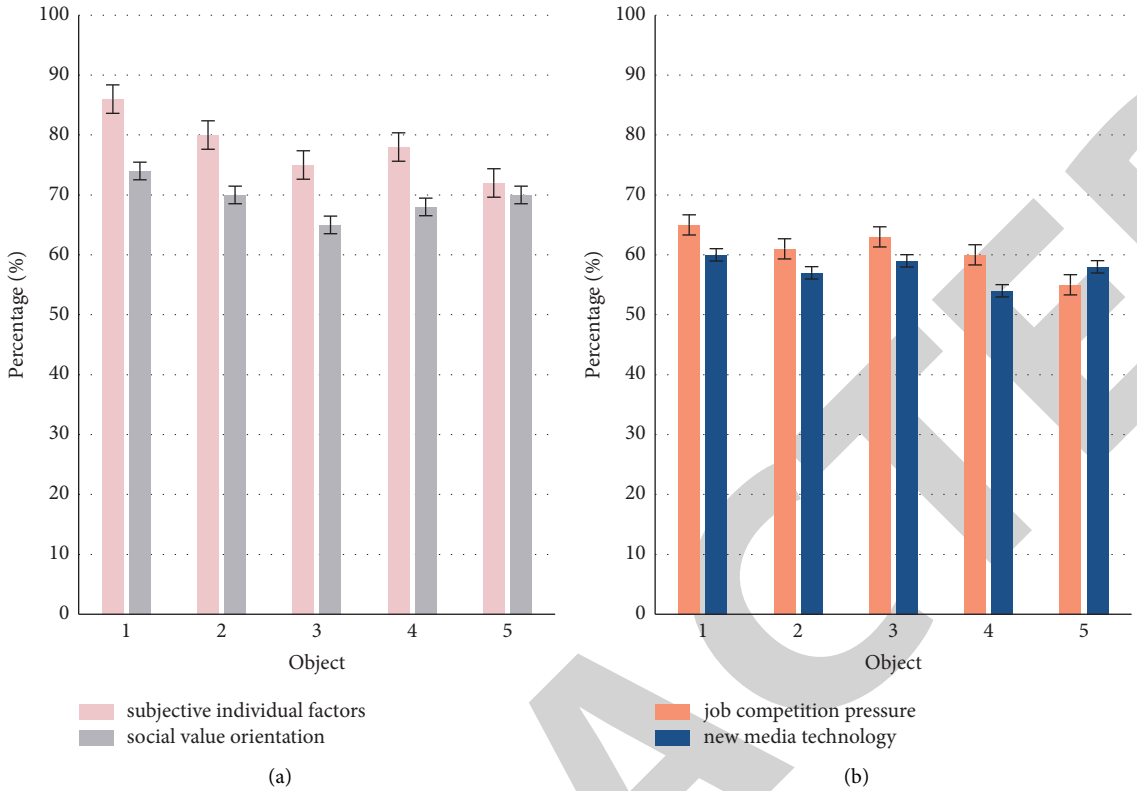

Figure 9: Factors influencing college students' interpersonal relationships.

communication, and college students are the main force of this group. College is an important period for everyone's life development, and colleagues are also the most vulnerable and confusing period in everyone's life. College students have spent more than 10 years of youth in school; their psychology is not yet mature; their social experience is almost zero; and their adaptability is very poor after entering society.

4.3. Countermeasures to Promote Harmonious Interpersonal Relationships among College Students Today

4.3.1. The Education of Harmonious Interpersonal Relationship Runs through the Daily Management of Students. As the direct implementer of student management, counselors should always run through the education of harmonious interpersonal relationships in the daily life and study of college students, so as to combine daily management with ideological education. It regulates and manages the daily behavior of college students and takes effective measures to praise the harmonious behavior of college students. It punishes the disharmonious behavior of college students, actively promotes the formation of harmonious quality of college students, and makes college students feel the beautiful atmosphere of a harmonious campus and harmonious dormitory.

4.3.2. Strengthen the Construction of Campus Spiritual Culture. Campus spiritual culture is the core and soul of campus culture, which pervades every corner of the school atmosphere. It is reflected in the whole interpersonal communication and cultural atmosphere, which highlights the style and characteristics of the school. To strengthen the construction of campus spiritual culture, the focus is to strengthen the construction of school spirit. A good school spirit can stimulate the internal motivation of the school and can resist bad psychological tendencies and behaviors. Teachers should develop a rigorous academic attitude, possess unique personality charm, and be an example of harmonious interpersonal relationships. Only in this way can it help adjust the teacher-student relationship and the various contradictions encountered in teaching. It contributes to the construction of a harmonious campus.

4.3.3. Attach Importance to the Ideological Education of College Students and Strengthen the Training of Communication Skills. The first thing to do is to understand oneself better. In particular, it is necessary to carefully understand their own character and put forward practical specific goals. On this basis, one should control their own actions and communication processes. It is very important to establish a harmonious interpersonal relationship by objectively and correctly understanding one's own physiological state, psychological characteristics, relationship with others, and the purpose of communication.

5. Conclusion

The self-education of college students' interpersonal communication is a self-enlightening activity for college students

to achieve their own growth goals. In order to cultivate students' self-education ability, it is necessary to take effective methods. To improve the relationship with classmates, it is necessary to consider the problem from the perspective of others and be good at making appropriate self-sacrifice. However, the traditional survey of college students' interpersonal relationships is too complicated and cannot accurately mine useful information and make use of it. Therefore, based on intelligent big data, this paper proposes clustering analysis in the data mining algorithm. It investigates the interpersonal relationship of college students. This article is very clear about the concept of big data and college students' interpersonal relationships. In the method part, this paper expounds on the cluster analysis algorithm. Cluster analysis algorithms not only can find similar data in interpersonal relationships but also can remove redundant data. It enables college students to have a more detailed understanding of their own interpersonal relationships, so as to establish better interpersonal relationships and better enter society. The experimental part not only conducts experiments on cluster analysis before and after improvement but also investigates whether many college students think that interpersonal relationships are important. The results show that most students think that interpersonal relationships are not very important, which is also the main reason for modern college students to be withdrawn and indifferent. In response to this problem, this paper puts forward some measures to establish a good interpersonal relationship at the end. This article hopes to help college students with poor interpersonal relationships improve their interpersonal relationships and have a better campus life.

Data Availability

No data were used to support this study.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

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