

Retraction

Retracted: Construction of College Students' Mental Health Assessment and Art Therapy System Aided by the Internet of Things and Big Data

Advances in Multimedia

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This article has been retracted by Hindawi, as publisher, following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of systematic manipulation of the publication and peer-review process. We cannot, therefore, vouch for the reliability or integrity of this article.

Please note that this notice is intended solely to alert readers that the peer-review process of this article has been compromised.

Wiley and Hindawi regret 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 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] Q. Li, "Construction of College Students' Mental Health Assessment and Art Therapy System Aided by the Internet of Things and Big Data," *Advances in Multimedia*, vol. 2022, Article ID 9233823, 10 pages, 2022.

Research Article

Construction of College Students' Mental Health Assessment and Art Therapy System Aided by the Internet of Things and Big Data

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In order to improve the effect of college students' mental health assessment, this paper combines the Internet of Things and big data technology to build a college student's mental health assessment system and analyzes and verifies the clustering effectiveness indicators by using FCM, GK, and GG clustering algorithms. Moreover, this paper explores the basic concepts and processes of FCM algorithm, GK algorithm, and GG algorithm and expounds the connection between the three algorithms. In addition, this paper uses four datasets to conduct clustering experiments and compares the CS indicator with several other indicators. The experimental results demonstrate the effectiveness of the CS indicator. The simulation study shows that the student mental health assessment system based on the Internet of Things and big data technology proposed in this paper can play a certain role in student mental health and art therapy, and it also verifies that art therapy plays a certain role in student psychotherapy.

1. Introduction

The theoretical basis and orientation of art therapy is mainly Freud's psychoanalytic theory. A series of core concepts, such as symbolism, transfer, and projection, are derived from psychoanalytic theory [1]. Moreover, eliciting the client's thinking and self-analysis through intuitive mental imagery can often lead to undetected thoughts in the subconscious. At the same time, those suppressed emotions and desires are fully released, and some past experiences of misunderstandings are clarified [2]. In the process of turning ideas into concrete images, the current needs and emotions of individuals are conveyed, and through sharing and discussion, their personalities become unified. It can be said that art therapy is concerned with the individual's inner experience rather than the final product [3]. Compared with other psychotherapy methods and techniques, art therapy, as a form of relaxation and soothing, tends to make clients less defensive. This makes it easier for the subconscious content to appear in the text, and the counselor can establish a good counseling and visiting relationship with it. Moreover, various specific images appearing in the composition can also be used to unify the emotions and thoughts of the

visitors. In the process, the visitors themselves not only get a reasonable catharsis, but also sort out the connection and origin of their own past events and current problems through a specific and direct form. In addition, after the assistance of the counselors, they can obtain a rational way of thinking to deal with problems correctly, so it is a more convenient psychological counseling aid [4]. Art therapy, like art education, teaches manipulative techniques and how to use materials. In the course of art being used in therapy, the therapist provides the individual's instruction with opportunities for self-expression, self-communication, and self-growth. Compared with other forms of therapy, art therapy is more concerned with personal inner experience rather than the final product. In addition to this, in art therapy, the process, method, content, and associations of therapy become very important, because each part reflects the individual's personality development, personality characteristics, and subconsciousness [5].

A large number of studies have shown that cultural and artistic means can effectively mobilize people's psychological potential and enthusiasm in various perceptual forms and have a very positive and effective role in the prevention and treatment of people's mental health problems [6]. In many

art categories, the discovery of native art is very helpful in solving many psychological problems of modern people. For example, it can help people return to their inner world, find themselves, and restore their inherent natural connection with nature. Native art rejects rigid academic techniques and is completely the creator's spontaneous and free expression of human nature [7]. When people create original art, they do not need to emphasize any stylized skills and genres, and they are not bound by various rules and regulations. They pay more attention to the essence of the spirit and the feeling of the soul, which can soothe the trauma and relieve the pressure in the heart. The recovery of mentally handicapped, mentally ill, and other people has a powerful effect, and it also has a powerful effect on various mental health problems of ordinary urban community residents. As an audience, you will also feel the power and truth of the soul in the original works of art and can understand the psychological demands of the creator without words [8].

With the rapid development of science and technology and the drastic changes in social life, the spiritual civilization of society has been unable to keep up with the rapid development of material civilization. Living in today's society, more and more people are divorced from nature, and their psychology cannot adapt to the rapid changes of the surrounding things, so people's instinct and nature fight back, and various mental health problems have appeared [9]. Mental health problems and mental illnesses are actually the separation of the relationship between man and society and between man and nature. Original art creation comes entirely from the inner impulse, is an important means to open the human mind, and has a healing effect on mentally healthy patients. It removes the drawbacks of the limitation of words and language on people's spirit, and without any cultural thinking, it can open up a channel to the inner world based on nature [10]. For the treatment of mental health diseases, the international biopsychosocial medical model has been implemented very early, which emphasizes the comprehensive treatment of diseases through physical, psychological, social, cultural, and other aspects. However, China currently adopts a biomedical model, which relies on drugs to treat mental illnesses throughout the process. While controlling the disease, it also produces great side effects, and people's brains and spirits are gradually numb. In fact, when mental health diseases are controlled in the early stage of drug treatment, the intervention of art, culture, psychology, and other services in the later rehabilitation is particularly important [11]. Native art therapy is a rehabilitation treatment for mental health disorders that is both natural and humanitarian. In the process of treatment, first of all, the practitioners let patients recognize and accept mental health diseases, respect patients' personal will and abnormal thinking that is contrary to ordinary people, try their best to eliminate the interference of the outside world for patients, and let patients realize themselves through the free creation of original art of perfection. Native art therapy is also a kind of mutual aid and complementary therapy. Patients with mental health disorders repair themselves through native art creation, communicate with others through works, and reestablish connections with others, society, and nature [12].

By appreciating and understanding the original artworks of patients, we can reexamine our own heart and nature, so that we can truly understand and help patients with mental health diseases, and form a virtuous cycle of mutual aid and mutual assistance [13].

The goals of native art therapy and college students' mental health education programs are the same, and both are aimed at promoting mental health. The original art is "truth-seeking" and "freedom." The original art creation does not need mastery of professional skills or application of creation rules. It only focuses on inner expression, which has a natural tacit understanding with the personality of contemporary college students. The teaching goal of the mental health education course cannot be limited to solving the current mental health problems of students but should enable students to master their own emotional regulation and mental disease prevention methods through the course, so as to comprehensively improve students' personal quality and help them have a positive and healthy attitude [14]. As a new natural treatment method, native art therapy particularly needs to be properly integrated into the mental health education curriculum of college students. First of all, the original art breaks through the constraints of language and words, bypasses the psychological defense of creators, allows their inner emotions and subconsciousness to be presented in the works, transforms the unconscious into consciousness, and transforms illusory consciousness into real visual works, thereby helping students discover the existing psychological problems and the root causes of the problems, so that the originally complex psychological problems can be treated and improved [15]. The native art creation integrated into the classroom is mainly the creation of native art painting. Students can paint freely. There is no level of painting skills or genres. Students only need to play freely and express their inner emotions. The creative process of native art can also relieve students' emotions and stress. Secondly, as an art form independent of traditional art, native art also has a certain artistic aesthetic training function. In appreciating original works of art and creating original art paintings, the diversified application of painting forms, the selection of materials, and the expression of emotions in the works will not only improve the students' mental health, but also improve their own aesthetic awareness and comprehensive physical and mental quality. It has been comprehensively improved [16]. Thirdly, the intervention of native art in college students' mental health education course is conducive to the improvement of college students' innovative consciousness and ability. The unrestrained original art painting creation helps students to open up the logical and rational thinking in the solidified cultural class, then inspires brainstorming, and enhances their sense of innovation [17]. Psychologically, let students jump out of a certain psychological crux, open their hearts, and look at problems with a positive attitude, and mental health problems will naturally heal themselves. Finally, the original art creation integrated into the mental health education curriculum, in the form of independent painting and group collaborative painting. The expression of individual painting, group tacit cooperation, and display and sharing of

works can cultivate students' sense of cooperation, improve communication skills and interpersonal relationships, and improve students' creative interest and enthusiasm for participating in activities. The health state gets a virtuous circle [18].

This paper combines the Internet of Things and big data technology to build a mental health assessment system for college students and explores the effect of art therapy on college students' mental health.

2. Mental Health Cluster Analysis Algorithm

2.1. FCM Clustering Algorithm. The FCM algorithm is a relatively classic fuzzy clustering algorithm. It is an improvement to the ordinary C-means algorithm. The reason is that the latter is a hard division in clustering, ignoring the ambiguity of the boundaries between objects, while FCM is a flexible division, which is more in line with practical applications. Moreover, FCM has been widely used in pattern recognition, data mining, artificial intelligence, and other fields. For the FCM algorithm, the user is required to input the number of clusters c and initialize the cluster centers in advance, so the clustering results it produces largely depend on the initialization of the cluster centers and the selection of the number of clusters c .

$X = \{x_1, x_2, x_3, \dots, x_n\}$ is a collection of n -ary data. The FCM clustering algorithm is to divide the dataset X into c subsets S_1, S_2, \dots, S_n . If the cluster centers of the c subsets are represented by $A = \{a_1, a_2, \dots, a_c\}$ and the fuzzy membership degree of the element x_j for S_i is represented by u_{ij} , then the optimization objective function of the FCM clustering algorithm is as follows:

$$J_{FCM}^m(U, A, X) = \sum_{i=1}^c \sum_{j=1}^n u_{ij}^m d_{ij}^2 = \sum_{i=1}^c \sum_{j=1}^n u_{ij}^m \|x_j - a_i\|. \quad (1)$$

u_{ij} satisfies the constraints:

$$\sum_{j=1}^n u_{ij} = 1, k, j \leq n. \quad (2)$$

Among them, $U = \{u_{ij}\}$ is the $c \times n$ matrix; $A = \{a_1, a_2, \dots, a_c\}$ is the $s \times c$ matrix; and d_{ij} is the distance between x_j and a_i . As a fuzzy index, m is usually used to control the fuzzy degree of the membership matrix U , and its value range is generally [1.5–2.5]. The larger the value of m , the higher the fuzzy degree of clustering. The FCM algorithm is an iterative convergence process, and its purpose is to minimize the objective function. Lagrange multiplication is used when optimizing the objective function (formula (1)).

$$a_i = \frac{\sum_{j=1}^n (u_{ij})^m x_j}{\sum_{j=1}^n (u_{ij})^m}, \quad (3)$$

$$u_{ij} = \frac{1}{\sum_{k=1}^c (d_{ij}/d_{kj})^{2/(m-1)}}. \quad (4)$$

The flow of the FCM clustering algorithm is shown in Figure 1, and its specific implementation steps are as follows:

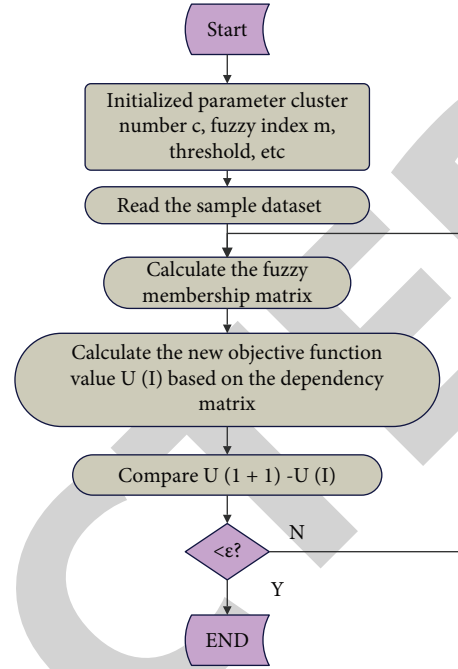


FIGURE 1: FCM algorithm flowchart.

- (1) The algorithm performs initialization operation and presets the number of clusters c , the fuzzy index m , the threshold ϵ , the number of iterations $l=0$, the maximum number of iterations L , and the fuzzy partition matrix U .
- (2) The algorithm uses (3) to update the cluster center A .
- (3) The algorithm updates the division matrix U ; namely, $u_{ij}^{(l+1)} = 1 / \sum_{k=1}^c (d_{ij}/d_{kj})^{2/(m-1)}$.
- (4) If $\|U^{(l+1)} - U^{(l)}\| \leq \epsilon$ or $l=L$, the algorithm terminates; otherwise, if $l=l+1$, the algorithm goes to (2).

2.2. GK Clustering Algorithm. The fuzzy C-means algorithm (FCM) does not fully consider the structure of the dataset, which is obvious for datasets with spherical structure. Gustafson and Kessel improved this algorithm. They introduced an induction matrix into the algorithm. The improved algorithm can better adapt to the structure of the dataset. This is the GK clustering algorithm, which is a fuzzy clustering algorithm based on an objective function. It uses the adaptive distance method of clustering covariance matrix in the process of data clustering, which can effectively cluster the dataset with super ellipsoid structure. In addition, it proposes a new method by extending the standard FCM by using an adaptive distance norm. This method uses different weighting matrices A_j for different data distributions, which can more realistically reflect the classification of different datasets. Although GK clustering algorithm has been widely used, it still has certain shortcomings. The reason is that it has a strong dependence on the setting of the initial value. Once the initial value is not set properly, the result will fall into the local optimal solution.

In addition, this algorithm has poor self-regulation ability. The reason is that it depends on the preset number of

clusters, and such a subjectively determined number of clusters may not conform to the structural characteristics of the dataset itself.

$X = \{x_1, x_2, \dots, x_n\}$ is a set of n -element data, in which each data object x_k has d characteristic indicators, so its characteristic index matrix is as follows:

$$X = \begin{pmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{pmatrix} = \begin{pmatrix} x_{11}x_{12} \cdots x_{1d} \\ x_{21}x_{22} \cdots x_{2d} \\ \vdots \\ x_{n1}x_{n2} \cdots x_{nd} \end{pmatrix}. \quad (5)$$

If the dataset X is divided into c classes ($2 \leq c \leq n$), the center vectors of the obtained c clusters are as follows:

$$M = \begin{pmatrix} m_1 \\ m_2 \\ \vdots \\ m_c \end{pmatrix} = \begin{pmatrix} m_{11}m_{12} \cdots m_{1d} \\ m_{21}m_{22} \cdots m_{2d} \\ \vdots \\ m_{c1}m_{c2} \cdots m_{cd} \end{pmatrix}. \quad (6)$$

$\mu_{jk} \in [0, 1]$ is the degree to which the k -th data object belongs to the j -th class, and satisfies $\sum_{j=1}^c \mu_{jk} = 1$, $k = 1, 2, \dots, n$, $j = 1, 2, \dots, c$; then, the fuzzy partition matrix is as follows:

$$U = \begin{pmatrix} \mu_{11}\mu_{12} \cdots \mu_{1n} \\ \mu_{21}\mu_{22} \cdots \mu_{2n} \\ \vdots \\ \mu_{c1}\mu_{c2} \cdots \mu_{cn} \end{pmatrix}. \quad (7)$$

The clustering criterion of GK algorithm is to minimize the following objectives:

$$J_f(U, M) = \sum_{j=1}^c \sum_{k=1}^n \mu_{jk}^b \|x_k - m_j\|_A^2. \quad (8)$$

Among them, $b > 1$ is the weighted index, which reflects the overlap between the pattern classes. The larger the b is, the more the overlap is. The similarity measure function is expressed as follows:

$$D_{jk}^2 = \|x_k - m_j\|_A^2 = (x_k - m_j)^T A_j (x_k - m_j). \quad (9)$$

D_{jk}^2 determines the shape of the cluster, which represents the distance between the k -th data object and the j -th cluster center. Among them, A_j is a positive definite matrix determined by the cluster covariance matrix F_j , and this covariance can approximately reflect the actual shape of each cluster. When A_j is an identity matrix, the metric function is represented by Euclidean distance.

$$F_j = \frac{\sum_{k=1}^n \mu_{jk}^b (x_k - m_j)(x_k - m_j)^T}{\sum_{k=1}^n \mu_{jk}^b}, \quad (10)$$

$$A_j = \det(\rho_j F_j)^{\frac{1}{n}} F_j^{-1}, \rho_j > 0. \quad (11)$$

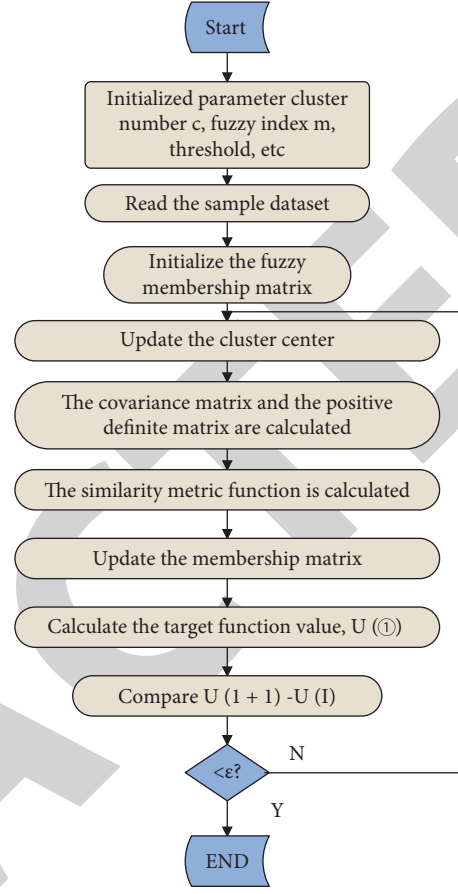


FIGURE 2: Flowchart of GK algorithm.

Among them, ρ_j is a constant for each cluster. Without any prior knowledge, in order to make the capacity of each cluster roughly the same, we usually take $\rho_j = 1$. It can be expressed as a constrained optimization problem:

$$\min \sum_{j=1}^c \sum_{k=1}^n \mu_{jk}^b \|x_k - m_j\|_A^2 F_j, \quad (12)$$

$$\text{s.t. } \sum_{j=1}^c \mu_{jk}^b = 1, k = 1, 2, \dots, nF_j. \quad (13)$$

By solving it with the Lagrange multiplier method, we get the following:

$$\mu_{jk}^b = \frac{1}{\sum_{l=1}^c (D_{jk} D_{lk})^{2/(b-1)} F_j}. \quad (14)$$

When $D_{jk}^2 = 0$, $\mu_{jk} = 1$, $\mu_{lk} = 0$ ($l \neq j$)

$$m_j = \frac{\sum_{k=1}^n \mu_{jk}^b x_k}{\sum_{k=1}^n \mu_{jk}^b}, j = 1, 2, \dots, cF_j. \quad (15)$$

The flow of the GK clustering algorithm is shown in Figure 2, and its specific implementation steps are as follows:

- (1) The algorithm performs initialization operations, that is, presets the number of clusters c , the weighting index b , the number of iterations I , the iteration termination condition ε , and the initialization fuzzy partition matrix U .
- (2) The algorithm updates the cluster center m_j according to (15).
- (3) The algorithm calculates the fuzzy covariance matrix F_j and the positive definite matrix A_j according to (10) and (11), respectively.
- (4) The algorithm calculates the similarity metric function D_{jk}^2 according to (9).
- (5) The algorithm updates the fuzzy partition matrix U according to (14).

If $U(I+1) - U(I) < \varepsilon$, the algorithm terminates; otherwise, if $I = I+1$, the algorithm goes to the second step and repeats the above steps.

2.3. GG Clustering Algorithm. The Gath–Geva (GG) algorithm is an improved algorithm of the Gustafson–Kessel (GK) algorithm. Since the fuzzy C-means clustering algorithm can only reflect the standard distance specification of the hyperspherical data structure, the FCM algorithm, which is an improved algorithm of the fuzzy C-means clustering algorithm, is only suitable for clustering data with the same shape and direction. In order to reflect the degree of separation in any direction or in any subspace, the GK clustering algorithm introduces an adaptive distance norm D_{jk}^2 and a covariance matrix F_j . However, although the GK clustering algorithm solves the hyperspherical data problem in the FCM algorithm, its efficiency is much lower than that of the FCM algorithm and does not completely break away from the clustering algorithm's dependence on the shape of clusters similar to spheres. Therefore, it is necessary to change the distance measure. The shape of the clusters is determined by the matrix A_j in the distance function. In order to for the algorithm to be no longer affected by the structure of the sample data set during clustering and to be able to detect and adapt to data of different shapes, sizes, and densities, the GG clustering algorithm introduces a distance measure based on fuzzy maximum likelihood estimation. This effectively improves the accuracy of clustering.

If it is assumed that a known set of sample datasets is $X = \{x_1, x_2, \dots, x_n\} \subset R^p$, the total number of sample data is n , and the sample data x_i are all p -dimensional, fuzzy clustering is to divide the sample set X into c classes $(c_1, \dots, c_j, \dots, c_c)$ according to the fuzzy membership matrix $U = [u_{ij}]$. Among them, $u_{ij} \in [0, 1]$ is the membership degree of the sample x_i in the dataset to the j -th class, and the sum of the membership degrees of the sample x_i to all classes is equal to 1. Then, the objective function is defined according to the criterion of the minimum sum of square distances from the sample points inside the cluster to the cluster center:

$$J = \sum_{j=1}^c \sum_{i=1}^n (u_{ij})^m |x_i - c_j|^2 / 2. \quad (16)$$

The GG clustering algorithm introduces a distance measure, which is based on fuzzy maximum likelihood estimation and is defined as follows:

$$D(x_i, c_j) = \frac{(\det(A_i))^{1/2}}{p_i} \exp\left(\frac{(x_i - c_j^{(t)})^T A_i^{-1} (x_i - c_j^{(t)})}{2}\right),$$

$$1 \leq i \leq N, 1 \leq j \leq c. \quad (17)$$

Among them, A_i is the covariance matrix of the i th cluster, and p_i is the prior probability that the i th cluster is selected.

$$A_i = \frac{\sum_{k=1}^n (u_{ik})^m (x_i - c_j^{(t)})(x_i - c_j^{(t)})^T}{\sum_{k=1}^n (u_{ij})^m}, \quad (18)$$

$$p_i = \frac{1}{n} \sum_{k=1}^n u_{ik}. \quad (19)$$

The cluster centers are as follows:

$$c_j^{(t)} = \sum_{i=1}^N (u_{ij}^{t+})^{mm} x_i / \sum_{i=1}^N (u_{ij}^{t-})^{m1}, 1 \leq j \leq c. \quad (20)$$

The membership update function of sample x_i is as follows:

$$u_{ij}^{(t)} = \frac{1}{\sum_{k=1}^c (D(x_i, c_j) / D(x_i, c_k))^{2/(m-1)}}, 1 \leq i \leq N, 1 \leq j \leq c. \quad (21)$$

The fuzzy Gath–Geva algorithm flow is shown in Figure 3, and its specific implementation steps are as follows:

- (1) The algorithm initializes the sample dataset X that needs to be clustered; that is, the number of clusters c , the number of iterations t ($t = 1, 2, 3, \dots$), the conditional threshold $\varepsilon > 0$, and the random initialization fuzzy partition matrix U are given in advance.
- (2) The algorithm updates the cluster center according to (20).
- (3) The algorithm calculates the distance measure according to (17), and the distance measure is obtained by the clustering covariance matrix (18) and the prior probability (19).
- (4) The algorithm updates the classification matrix according to (21) and changes the membership degrees of the samples in different classes.
- (5) If $U(t+1) - U(t) < \varepsilon$, the algorithm terminates; otherwise, if $t = t+1$, the algorithm goes to the second step and repeats the above steps.

3. Mental Health Assessment and Art Therapy System for College Students Aided by the Internet of Things and Big Data

The main feature of smart campus construction is to use smart terminals, sensitive equipment, and information

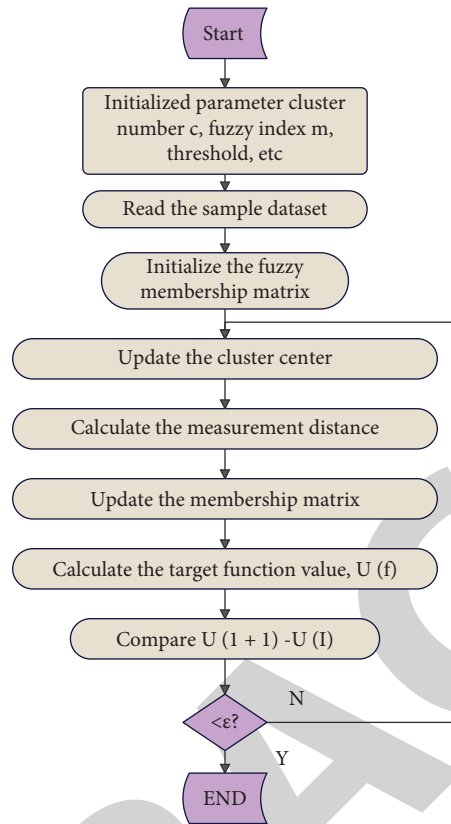


FIGURE 3: Flowchart of the GG algorithm.

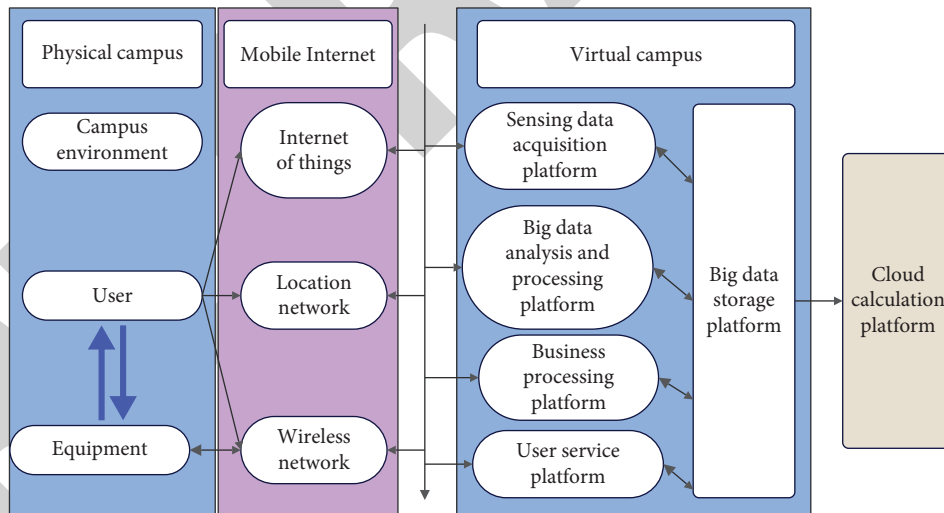


FIGURE 4: Schematic diagram of smart campus space integration.

systems to understand the running laws of objects through data analysis and investigation, and obtain a large amount of activity process and status data. In contrast to digital campus structures, smart campuses should focus on using data to build physical and virtual campuses for universities. The fusion map of smart campus space is shown in Figure 4.

The overall design of the smart campus mental health management system includes 6 modules: login module, student module, administrator module, import module, export module, and statistics module. The most difficult thing

for administrators in practical work is the function module of administrators; the difficulty lies in the overall management and maintenance of the system and the analysis and feedback of students' problems. The functional diagram of the mental health management system is shown in Figure 5.

4. Experimental Results and Analysis

4.1. Test Data. To verify the effectiveness of the indicators in this paper, three groups of experiments are designed. FCM,

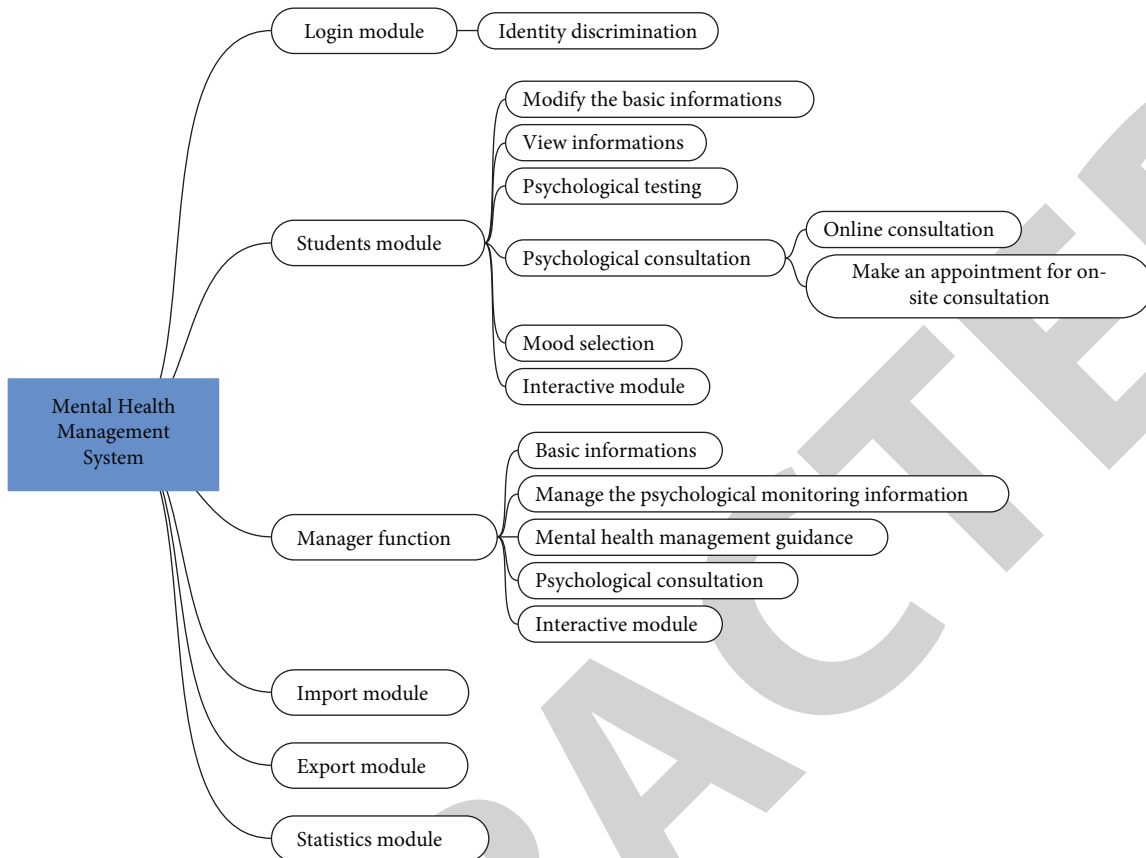


FIGURE 5: Functional diagram of smart campus mental health management system.

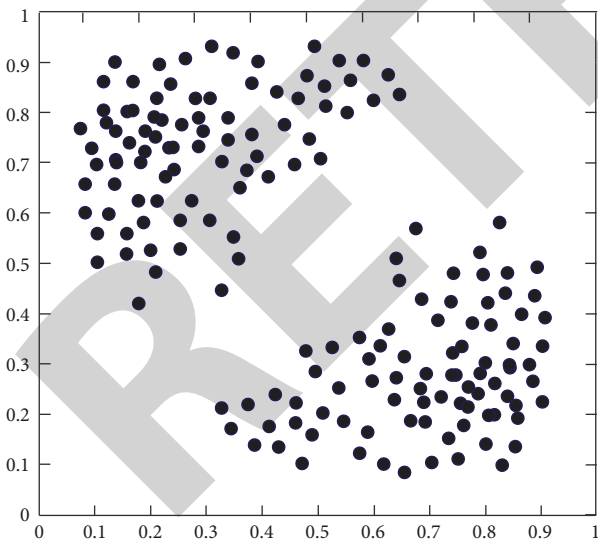


FIGURE 6: Dataset 1.

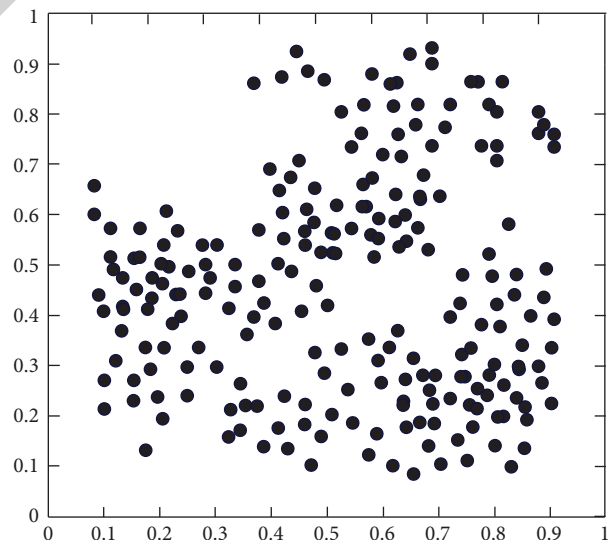


FIGURE 7: Dataset 2.

GK, and GG clustering algorithms are used to verify the effectiveness of the index CS. Three sets of experiments use the same four datasets. The fuzzy index m is generally selected between 1.5 and 2.5, and this algorithm sets $m = 2$.

In order to verify the validity of the indicators, the experimental dataset contains 4 sets of data. The data in this paper are all from the psychological data of college students

and are obtained through survey collection. Figures 6 and 7 are schematic diagrams of dataset 1 and dataset 2.

4.2. Experimental Results and Analysis of FCM Clustering Algorithm. In order to verify the effectiveness of this indicator, it is compared with four commonly used indicators,

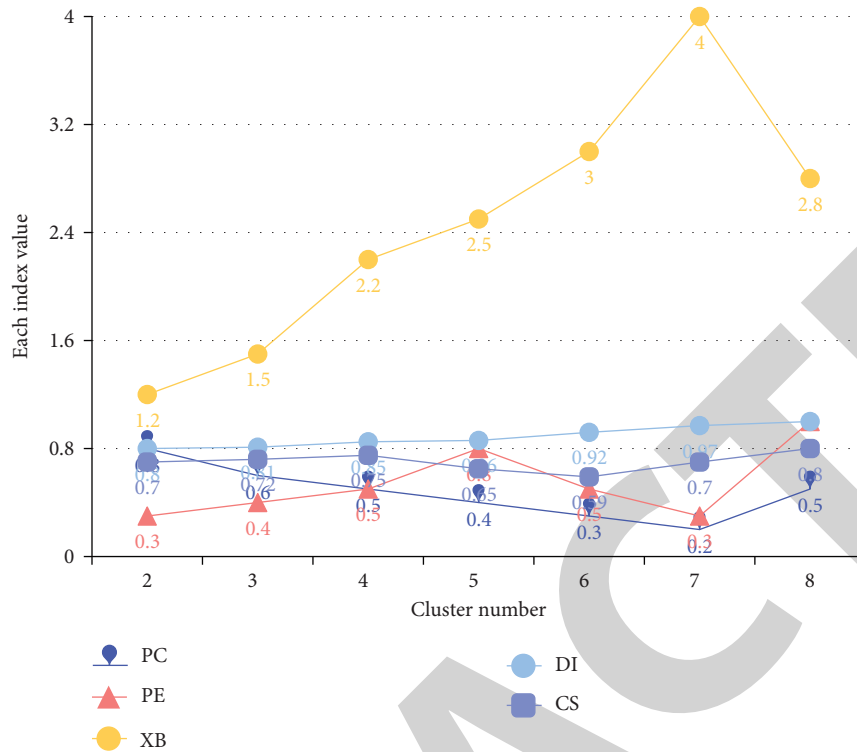


FIGURE 8: Experimental results of dataset 4.

which are partition coefficient (PC), partition entropy (PE), classical effectiveness index (XB), and relative index (DI). The results are shown in Figure 8. At the same time, the FCM clustering algorithm was used to perform cluster analysis on the four groups of datasets in the experiment. The results show that the value of each indicator varies with the number of clusters. Among them, when the PC value is the maximum, the PE value is the minimum, the XB value is the minimum, and the DI value is the maximum; the corresponding optimal number of clusters is obtained. In addition, when the CS index is the smallest, the optimal number of clusters is obtained.

4.3. Experimental Results and Analysis of GK Clustering Algorithm. Compared with the FCM clustering algorithm, the GK clustering algorithm introduces a covariance matrix. Therefore, this paper uses the GK clustering algorithm to verify the index and to test the validity of the index CS. The verification method is still to comprehensively compare it with four commonly used indicators. The experiment uses GK clustering algorithm to process 4 sets of data. As shown in Figure 9, when the PC value is the maximum, the PE value is the minimum, the XB value is the minimum, and the DI value is the maximum; the number of clusters reaches the best.

The experimental results show that for dataset 1 with a clear structure, each indicator can still accurately obtain the optimal number of clusters. However, the clustering results of dataset 2 show that the PC indicator shows a decreasing result in any algorithm analysis due to the defects of its own

algorithm. The PE and DI indexes did not obtain the best number of clusters, while the XB and CS indexes obtained the best number of clusters. For dataset 3 with an increased dimension, except for the CS indicator, the indicators cannot give good results. In dataset 4, the XB index, the DI index, and the CS index give the best number of clusters. This shows that the CS index is still effective for different clustering algorithms.

4.4. Experiment Results and Analysis of GG Clustering Algorithm. The GG clustering algorithm improves the GK clustering algorithm by introducing fuzzy maximum likelihood estimation, which makes the algorithm more suitable for datasets with complex data structures. In order to further verify the effectiveness of the index CS, it is still comprehensively compared with four commonly used indexes. The experiment uses GG clustering algorithm to process 4 datasets. As shown in Figure 10, when the PC value is the maximum, the PE value is the minimum, the XB value is the minimum, and the DI value is the maximum; the number of clusters reaches the best.

The experimental results show that the partition coefficients PC and PE only achieve the best number of clusters on dataset 1 with clear data classification. The XB metric gets the correct number of clusters on dataset 1, dataset 2, and dataset 4. The DI metric gets the correct number of clusters on dataset 1. At the same time, the CS index can still maintain good effectiveness. Even if the GG clustering algorithm is used, the optimal number of clusters can still be obtained in the four datasets.

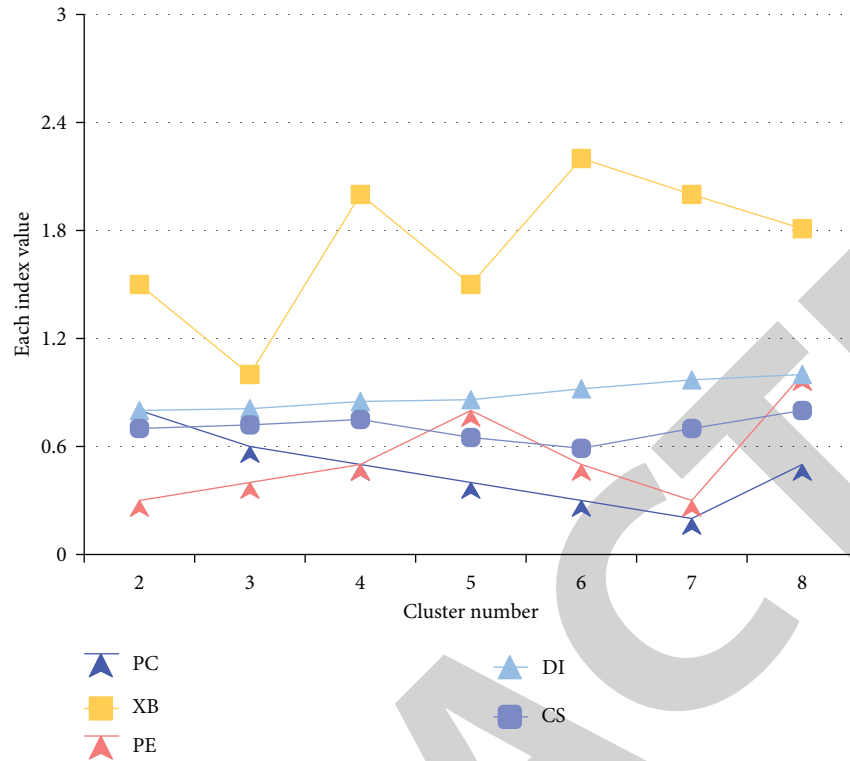


FIGURE 9: Experimental results on dataset 4.

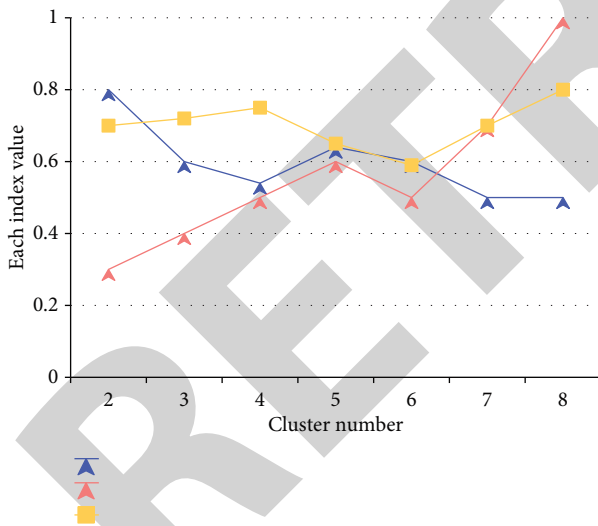


FIGURE 10: Experimental results of dataset 4.

From the above analysis, it can be seen that the CS index is most suitable for application in the student mental health assessment system based on the Internet of Things and big data technology. Therefore, the CS index is selected as the evaluation index of the system in this paper. On this basis, the effectiveness of the student mental health assessment system based on the Internet of Things and big data technology is verified, and the results are shown in Table 1.

Through the above research, we can see that the student mental health assessment system based on the Internet of Things and big data technology proposed in this paper can

TABLE 1: Effect evaluation of student mental health assessment system based on Internet of Things and big data technology.

Num	Effect statistics	Num	Effect statistics	Num	Effect statistics
1	79.12	17	87.68	33	81.55
2	84.11	18	84.88	34	85.02
3	84.53	19	87.71	35	79.07
4	79.53	20	82.13	36	82.84
5	84.35	21	85.93	37	85.57
6	83.25	22	81.92	38	80.26
7	83.03	23	82.73	39	84.81
8	82.97	24	79.53	40	81.08
9	85.96	25	84.73	41	86.05
10	86.70	26	82.82	42	85.13
11	87.19	27	85.36	43	81.75
12	84.98	28	83.78	44	79.10
13	84.94	29	80.85	45	80.68
14	80.70	30	82.00	46	85.30
15	85.97	31	81.90	47	85.08
16	80.10	32	86.48	48	84.67

play a certain role in student mental health and art therapy, and it also verifies that art therapy plays a certain role in student psychotherapy.

5. Conclusion

The rapid development of social economy has pushed the spiritual life of Chinese society to the highest point, and the mental health of college students has also received unprecedented attention. Therefore, it is imperative to promote

the reform of college students' mental health education curriculum, and applying art therapy to curriculum construction is an important method to improve students' psychological construction level. In the course of mental health teaching, the teaching of psychological knowledge is very difficult, but it is very difficult to apply theoretical knowledge to practice. At the same time, the application of art therapy to college students' mental health education courses needs to adhere to the premise of popularized teaching methods. In addition, in the actual teaching process, we should pay attention to the actual problems of the students and analyze the students themselves from the actual problems to achieve a balanced state of emotions. This paper combines the Internet of Things and big data technology to build a mental health assessment system for college students. The simulation study shows that the student mental health assessment system based on the Internet of Things and big data technology proposed in this paper can play a certain role in student mental health and art therapy.

Data Availability

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

Conflicts of Interest

The author declares no conflicts of interest.

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