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Retraction

Retracted: Research on the Application of Improved K-Means Spatial Clustering Algorithm in Landscape Conservation of Gardens

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1].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] H. Sun and Y. Yang, "Research on the Application of Improved K-Means Spatial Clustering Algorithm in Landscape Conservation of Gardens," *Security and Communication Networks*, vol. 2022, Article ID 3148223, 11 pages, 2022.

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Research Article

Research on the Application of Improved K-Means Spatial Clustering Algorithm in Landscape Conservation of Gardens

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Garden art is the culture of generations since ancient times and is another spiritual carrier of people's internal admiration for natural landscape, culture, and art as well as their love for living in nature and landscape. This article mainly studies the data clustering algorithm and adopts a research methodology that progresses from simple to complex. It starts by establishing a spatial data clustering model and then clustering the low-dimensional data, and then processing the high-dimensional spatial data in the low-dimensional data set. The original K-means clustering algorithm is then improved, and the new algorithm is created by combining PSO with the K-means algorithm in the high-dimensional spatial data set. And the improved two algorithms are applied to the study of data related to landscape conservation sites, and the powerful superiority of the improved K-means spatial clustering algorithm in this article is verified through the comparison of the algorithms.

1. Introduction

Garden art is the culture of generations since ancient times. It is another spiritual carrier of people's internal reverence for natural landscape and cultural art; sentiment in nature and landscape life, culture, and art; and historical inheritance in the traditional culture of our Chinese nation for five thousand years. Oriental architecture culture has gradually penetrated not only the entire human landscape industry civilization development but also the most original historical lineage. It renders the unique regional characteristics, distinctive style of garden art architecture, beautiful sculpture production process, full of ancient oriental humanistic wisdom charm of mysterious ancient folk religion philosophy, complete and rich connotation of traditional folk morality and ethics. The world's historical and cultural landscape heritage of the garden art category is composed of the sculptural craftsmanship, the mysterious ancient folk religion and philosophy full of the charm of the ancient Eastern human wisdom, the complete and rich traditional folk morality and ethics, the excellent oriental poetry and songs like the universe, and the profound and colorful ancient folk language and script.

As one of the first countries in Asia to start building large-scale modern urban garden projects, recognized in the history of modern world architecture, Chinese garden projects have long been known as the "mother of gardens" in the world (Figure 1).

The two core objectives of the work on the conservation of the ecological diversity of the cultural landscape of gardens are as follows: the sustainable conservation of landscape resources and their restoration methods; and the sustainable development of landscape resources. Chinese scholars are still in the stage of theoretical exploration of the scientific conservation theory of natural resources in Chinese gardens and cultural landscapes, and no relatively systematic and mature research has been established at home and abroad. The scientific conservation of China's key cultural landscape environment still needs relevant academic methods and theories. This article focuses on the use of an improved and optimized K-means spatial clustering algorithm model to explore the contemporary Chinese

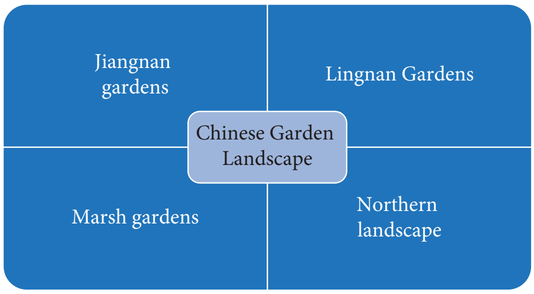

Figure 1: Four categories of Chinese gardens and landscapes.

landscape conservation methods and theoretical systems and then gradually realizes the effective and sustainable scientific protection and restoration development of China's cultural landscape and the reasonable continuation of the tourism industry development and operation mode. To achieve the integration of resources and the homeland landscape's natural scenery, one must fully exploit the traditional advantages of Chinese national culture.

1.1. Research Background. At present, various inappropriate measures of conservation management methods and excessive use of various unreasonable means have caused the conservation work to be stretched to the limit [1]. The current domestic professional laws and regulations on the protection and management of historical and cultural landscape resources are searched, and related technical research and thesis materials are few and far between. The general lag in the development of laws and regulations and the relative lack of technical means of protection and management have also led to different degrees of damage to the protection of each major cultural landscape in China [2].

The current domestic government is not very optimistic about the overall conservation status of traditional cultural landscape protection, and a thousand cities are one-sided and have lost their individuality. The huge cultural gap in the protection concept also makes the government of almost every provincial capital city in the overall protection of the cultural landscape share some similarities in thinking. Unscientific cultural planning and construction have also delayed the long-term natural evolution of urban cultural landscape laws and operating mechanisms [3]. At the same time, due to the basic judgment, concept overview, theoretical principles of protection and utilization, and the application of management practice methods of important cultural landscape resources in China, there are generally some serious cross confusion in the scope of understanding and lack of clear and complete systematic definition, and its resource protection application problem will increasingly evolve into an important realistic issue that restricts the research of ecological and cultural tourism protection and development [4].

Although there is a certain degree of commonality with the professional national laws and regulations on the protection of cultural monuments and sites in terms of focusing on the protection of cultural landscapes of the garden type, they are significantly different in several aspects such as

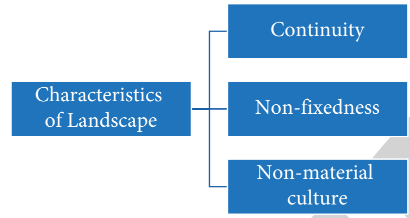

Figure 2: Main characteristics of landscape gardening.

assessment criteria, identification of heritage subjects, the scope of areas involved, management requirements, and socioeconomic roles. As a result, China's current regulations on the protection of ecological and cultural heritage are, to a certain extent, not entirely theoretically relevant and legally operable.

1.2. Concept Definition

1.2.1. Definition of Garden Landscape. Combined with the national garden culture defined in the natural heritage standard system of "nature and the joint action of mankind"-related definition, generally, believe that not all natural garden landscapes can be called national garden cultural landscape heritage, only for those who do establish in the natural mountains, rivers, lakes, and wetlands, such as the room, after a long period of human landscape environment maintenance management and appropriate decoration and beautification. The initial formation of some natural garden relics can only be officially called natural landscape garden architectural heritage (Section 1.1).

1.2.2. Characteristics of the Garden Landscape. The landscape has three main characteristics: continuity, nonfixedness, and nonmaterial culture [5] (Figure 2).

(1) Continuity. The formation and development of a cultural landscape, which is both a natural phenomenon and a type of common artwork created by human society, must undergo a lengthy, complex, and diverse integrated cultural process. As a result, garden class cultural landscapes, which have many parts and basic components, are more vivid and full and also exhibit more typical characteristics, allowing them to accurately reflect the cultural activities of a particular geographical era and long-term history [6]. It is based on this historical era of the garden cultural accumulation and landscape natural long-term interaction relationship, so that the garden class cultural landscape widely become a historical classic and the most easily appreciated by generations of future generation collection of the direct internal reasons.

(2) Nonfixedness. The natural landscape, cultural activity relics, and artificial garden landscape are the three main components of the garden-like cultural landscape. The natural landscape and the garden landscape serve as the two main material carriers for this composition. These natural landscapes have a more obvious relative nonfixed nature [7].

First, the natural landscape is also a living landscape, climate change, geological plate movement, plant growth and reproduction and evolutionary succession activities will change a natural landscape A natural landscape will change due to a variety of factors, including climatic change, geological plate movement, plant growth and reproduction, and evolutionary succession. Second, all the green plant landscapes, garden constructions, paths, and other artificial natural landscape environments in the garden landscape environment will change or disappear accordingly with the passage of time. Finally, the material cultural landscape is always in some kind of dynamic change cycle, extinction, reconstruction, alteration, and local new construction activities are a major objective reason affecting the overall formation and development of the cultural landscape of the garden category [8]. Therefore, the content of the main material carrier in the cultural landscape of the garden is not completely fixed change. This nonfixed nature is also expressed in the dynamic change of the cultural landscape space, on the one hand, and, on the other hand, in the "historical landscape" and "existing landscape" of time dislocation and space overlap.

(3) Nonmaterial Culture. The nonmaterial cultural content in the cultural landscape of the garden refers to the cultural activities and historical events attached to the material cultural landscape. These nonmaterial cultural contents are the soul of the garden-like cultural landscape and are very important. Intangible cultural content means the important content that distinguishes the garden-type cultural landscape from other categories of cultural heritage [9].

2. Literature Review

Relevant journal articles on garden conservation include: "The Conservation and Repair of Ancient Chinese Gardens," "The History and Review of the Conservation and Repair of Yu Garden in Shanghai," "A Preliminary Study on the Conservation and Utilization of Ming and Qing Historical Gardens in Nanjing," "The Characteristics of the Giant Stone Garden of Chongqing Jukui Academy and its Conservation and Utilization," "Research on the Conservation and Development Measures of Classical Gardens in Suzhou," "An Exploration of the Definition of the Scope of the Conservation and Control of the Historical and Cultural Reserve of Qing Dynasty Royal Gardens in the Western Suburbs of Beijing," "Classical Gardens Protection and Restoration Should Be Based on the Theory of Garden Tradition," "On the Authenticity of Protecting Historical Garden Heritage," "Royal Garden Cultural Space and Cultural Heritage Protection," etc [10]. In terms of regional cultural gardens, these articles have undertaken some research on their protection, usage, regeneration, and renewal; however, there are fewer studies on the theoretical principles and methods for protection and regeneration [11].

Relevant master's theses on garden conservation are shown in the following.

In 2004, Zhang Yu's article "A Preliminary Study on the Conservation of Dunheyuan" recognized and analyzed the history of the Summer Palace; the original purpose of gardening, historical value, artistic value, cultural accumulation, and technical connotation; and proposed conservation strategies and methods for the current state of conservation of the Summer Palace; The conservation methods were refined through two levels of internal conservation and external control [12].

In 2005, Jin Hainan's article "A Trial on the Conservation and Renewal of Historic Gardens in the Shizhahai Area" analyzed the landscape characteristics of historic gardens in the Shizhahai area; made conservation suggestions for the existing problems in the conservation of historic gardens in the Shizhahai area; and made targeted conservation suggestions in terms of water quality, gardens, new buildings, environment, and night scenery. The recommendations were made for the preservation and utilization of the Wangfu Garden from the internal and external environment and the coordination area [13].

In 2006, Li Zaihui's article "Tianjin Concession Gardens and Conservation" studied the formation, development, and style of Tianjin concession gardens and proposed three levels of the legal system, implementation, and archival records to protect concession gardens measures for the year [14].

In 2007, the thesis of Bian Ji's "Research on the conservation planning of historical gardens" made a full explanation of the concept, characteristics, and value system of historical gardens and proposed methods to conserve historical gardens from maintenance and protection, restoration and reconstruction, prudent utilization, and public participation through the content of relevant domestic and foreign studies [15]. Cheng Li's article "Conservation and Utilization of Beijing Altar Gardens: The Case of Zhongshan Park" introduces the history and current situation of Beijing Tiantan gardens and identifies the main problems and contradictions of Zhongshan Park based on its history and field survey and proposes conservation measures to improve laws and regulations, foreign registration system, fund management, camp management, and public participation for Zhongshan Park. Team, experts and scholars, public participation, cultural resources and other aspects of conservation [16].

In 2012, Wu Tao's thesis on "Preservation and Heritage of Yangzhou Historical Gardens Based on Regional Culture" mainly analyzed the problems of conservation and restoration of Yangzhou historical gardens by addressing the current situation of their conservation and proposed an overall strategy and framework for the conservation and restoration of Yangzhou gardens in a targeted manner in terms of specific means and methods of conservation and restoration to establish the operational process of conservation and restoration. It also proposes four aspects of the conservation system in terms of establishing the operational process of conservation and restoration, conservation and restoration of space, developing evaluation standards and technical specifications for conservation and restoration, and determining the basic means and ways of conservation and restoration [17].

3. Brief Description of the Method

3.1. The Basic Idea of Clustering Algorithm. Among the classification studies in the past, people mainly rely on the experience generated by accumulation and learning to master the expertise to solve some problems related to clustering; the frequency of using mathematical methods is very low. However, as the complexity of the actual problem increases, it becomes more difficult to solve realistic and complex problems by relying only on past experience and expertise, so cluster analysis emerges.

In general, there may be different degrees of similarity among the samples or indicator variables we study [18]. Then, according to the value of some observed indicators of the sample, we find some statistics that can measure the similarity between samples or indicators, and based on this, the samples or indicators with greater similarity are clustered into one category each. After the clustering is completed, the indicators that are closely related to each other will have a greater degree of similarity and will be clustered into one class; the indicators that are distant from each other will have a smaller degree of similarity and will be clustered into another class, so that after all the samples are measured, the indicators will be divided into different classes according to the degree of similarity.

In economic, social, and demographic development research activities, there are new problems in research and construction of new classifications involving a large number of disciplines [19]. For example, in the practice of urban and rural economic survey and research, in order to accurately study the average income growth and actual consumption level of urban and rural residents in the living standards of urban and rural residents in different economic regions, it is often necessary to scientifically divide them into several different social types to analyze and study; however, due to the oldest former traditional taxonomic research, one of the main theoretical bases for the basis of classification is mainly life. However, because one of the main theoretical bases of the oldest traditional taxonomic research is the accumulation of experience and some professional theoretical knowledge, and because this foundation is rarely used to treat the classification phenomenon inductively, this inevitably results in some subjective thinking and deliberateness when doing the classification problem, and it is unable to accurately and quantitatively fully reveal some essential differences between law and logical connection of the intrinsic law of each objective form of things, especially in a complex classification problem that involves more complex factors [20]. The problem of qualitative classification often leads to a decrease in the overall accuracy of its classification study.

It is possible to cluster both by clustering the sample variables and also by clustering each of the other sample variables that directly affect the sample results at the same time. The clustering of variables affecting the sample function is generally referred to as variable Q-type cluster analysis, while the clustering of variables affecting the sample variables is referred to as function variable R-type cluster analysis [21].

3.2. K-Means Clustering Algorithm. Traditional clustering methods have various forms and different algorithms, and their main classifications are shown in Figure 3.

K-means algorithm belongs to one of the common algorithms in the division method, and its theory also belongs to a basic category of iterative optimization algorithm (optimization clustering), which generally requires the algorithm to satisfy a certain equalization function, as a basic criterion of the basic iterative optimization process, and iterate continuously to get each optimal cluster clusters [22]. Although it is said that the K-means algorithm is relatively easy and fast to implement, in fact, there are some limitations in the process of cluster calculation, iteration, and optimization: (1) the algorithm is sensitive to the initial cluster centroid; (2) it is easy to fall into the local optimal solution [23].

In order to solve the problems of K-means algorithm clustering, scholars have proposed different improvement methods, with the common purpose of avoiding clustering sensitive to the initial centroid; the most traditional method is to arbitrarily choose the initial point value, then calculate it several times, and finally select the best result inside the calculated result. Other algorithms use multiple sampling methods to generate different clustering centers, and then cluster the newly generated clustering centers to select the better clustering result, with the initial center selected by that clustering result as the optimal initial center. The literature uses the density method to calculate the density between data objects among sample data points to generate the sample initial points meritively. The literature calculates the density of the local area where each data sample point is located, and then selects the points in the k high-density areas that are farthest from each other as the initial center points [24]. The literature uses the method of estimating class feature centers to improve the algorithm, and the estimated class feature centers are used to initialize the K-means algorithm [25]. The literature proposes a method to select the initial cluster centers based on the data sample distribution, constructs k compact data sets using the greedy idea, and selects the mean value of the sample data in each set as the initial cluster centroid.

Traditional K-Means algorithm is used to further solve the current problem of selecting initial centroids when constructing clustered data; so this article tries to start from two aspects of how to solve the following problems, respectively: (1) In the problem of selecting the initial centroids, the main approach is to use greedy thinking to construct the number of clusters according to the distribution of samples. (2) Customizing a class function with interclass and intraclass correlation for equalization. An organic combination of these two is used for algorithm improvement [26].

3.3. K-Means Algorithm Modeling. Let the sample $X = \{x_i | i = 1, 2, \ldots, n\}$ data $C_j\,(j = 1\ ,\ 2\ ,\ \ldots\ ,\ k)$ set, for the k classes that denote $C_j\,(j = 1, 2, \ldots, k)$ clustering, denote the clustering centers of each $c_j = (1/n_j)\sum_{x \in C_j} x$ class, where n_j denotes the number of samples of each data set, and

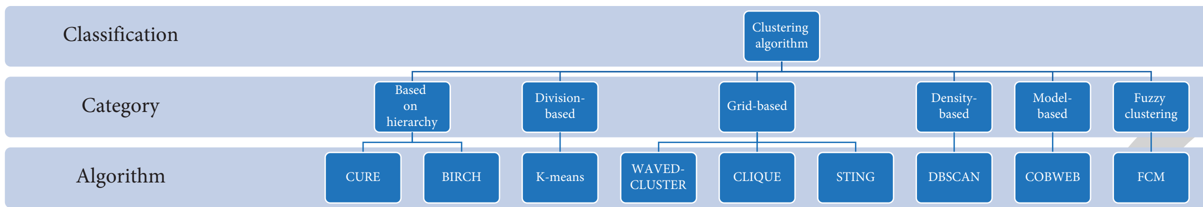

FIGURE 3: Classification of clustering methods.

the distance between two data objects uses Euclidean distance.

The K-means algorithm is mainly to find the objective function after several calculations to classify the given different data into different categories of the minimum value, which in turn maximizes the compactness and independence of the generated clusters.

$$J(c,k) = \sqrt{W(c) \times W(c) + b(c) \times b(c)}. \tag{1}$$

where

$$\begin{aligned} W(c) &= \sum_{i=1}^{k} W(C_i) = \sum_{i=1}^{k} \sum_{x_i \in C_i} d(x, C_i)^2, \\ b(c) &= \sum_{1 \le j \le i \le k} d(c_j, c_i)^2. \end{aligned} \tag{2}$$

Here, $W(c)$ denotes the difference of data points within a class, which can be defined by a variety of distance functions, the simplest being the calculation of the sum of squares of the distances from each point within a class to the center of the class to which it belongs; $b(c)$ denotes the difference of data sets between the classes, which is defined as the distance between the centers of different clusters.

Algorithm 1is described as follows (Figure 4).

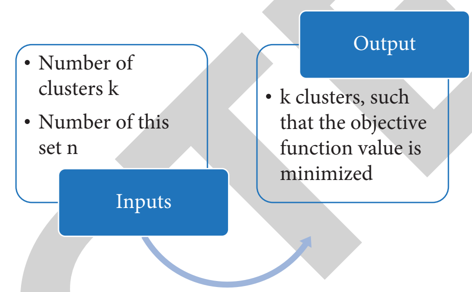

FIGURE 4: K-means algorithm modeling.

3.4. Initial Centroid Selection Algorithm for Data Samples. The K-means algorithm is characterized by its sensitivity to initial values. Therefore, the selection of different initial points may lead to different clustering results. Since the clustering results depend on the initial centroids to a certain extent, different choices of initial centroids can make the clustering results very unstable. If the initial clustering center starts with a bad choice, it may lead to the final result being difficult to meet the expectation. To address the possible defects of the K-means algorithm that is too sensitive to the initial points, this article uses a data sample distribution algorithm, which can make improvements by selecting the initial clustering centers according to the data distribution dynamics [29].

Suppose the full set of samples for clustering is S, the full set S contains n sample data, the total number of clusters is k, and there are m factors affecting each sample data, then each data x can be expressed as $x = (x_1, x_2, x_3, x_4, \ldots, x_m)$. The distance between data x and data y uses the Euclidean distance.

$$\text{dist}[x, y] = \sqrt{(x_1 - y_1)^2 + (x_2 - y_2)^2 + \cdots + (x_m - y_m)^2}. \tag{3}$$

$\lim it$ is defined as the threshold value, which is the maximum spatial distance allowed to join a certain set. It is expressed as

$$\text{lim}it = \frac{((\max(\text{dist}[I, J]) - \min(\text{dist}[I, J]))}{k}. \tag{4}$$

The distance between data x and data set V is

$$\text{dist}[\text{x}, \text{V}] = \min(\text{dist}[\text{x}, \text{v}], \text{v} \in V). \tag{5}$$

The farthest distance between data x and data set V is

$$\text{Dist}[x, V] = \max(\text{dist}[x, v], v \in V). \tag{6}$$

In the K-means algorithm, data samples that are distributed in dense local areas are considered to have clusters at this point, so the average of these dense area data sets is often chosen as the initial clustering center [30]. To find the data set that is consistent with the data in terms of spatial distribution and can represent k clusters, Figure 5 is given (Algorithm 2).

3.5. Improved K-Means Algorithm for Initial Centroids and Evaluation Functions. On the same data set, based on different input parameters, using the same clustering algorithm may end up with different clustering results, and for these different results generated, applying the already defined validity function to make a judgment, the optimal division can be finally obtained. According to such steps, this article first uses the initial centroid selection algorithm of data samples to precisely find out the initial clustering centroids and then applies a new evaluation function—equalization evaluation function—which can effectively find out the optimal clustering.

3.5.1. Equalization Evaluation Function. When clustering, the design of the evaluation function includes two main

Input: The number of clusters k and the number of sample sets n
Output: k clusters, so that the objective function value is minimized
(1) Choose any k clusters from the n sample sets as the initial cluster centers, i.e., the mean value of this class [27].
(2) Calculate the distance between the cluster center and each data in the sample set, and put the one with the smallest distance into the class where the cluster center point is located.
(3) After new data points are added to each class, the mean value of the class is recalculated.
(4) Loop step (2) and step (3) until the objective function J does not change, then the algorithm ends [28].

Algorithm 1: K-clustering algorithm.

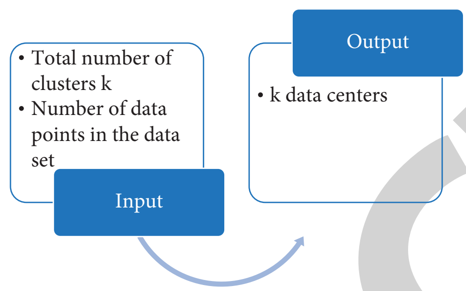

Figure 5: Initial centroid selection algorithm for data samples.

Input: Total number of clusters k and number of data points in the data set
Output: k data centers
(1) Calculate the distance matrix according to $D = (d_{ij})$ the formula, where $d_{ij} = \text{dist}[i\ ,\ j]\,(1 \leq i \leq n\ ,\ 1 \leq j \leq n)$
(2) Find the maximum and minimum values of the distance from the distance matrix D, and calculate the lim it threshold value.
(3) In the distance matrix D, find the two data a, b with the smallest distance, add the data a, b to the set, and $C_i\,(i = 1, 2, 3, \ldots, k)$, $C_i = \{a, b\}$ at the same time remove the data a, b from the set S, and update the matrix D.
(4) Find the closest sample $C_i t$ in S. If $\text{Dist}\,[t, C_i]$ is less lim it than the threshold, add tC_t to the set, while removing t from the set S, update the matrix D, and repeat step (4) using Eq. Otherwise, stop.
(5) If $i < k$, $i = i + 1$, repeat steps (3) and (4) until the k sets are completed.
(6) Take the $C_i\,(1 \leq i \leq k)$ average value of the data in the set noted as data center j, so that k data center points are selected.

Algorithm 2: K-mean space clustering algorithm.

factors: the similarity between data in each class is large, and the similarity between classes should be as small as possible. To achieve these two points, it is necessary to know the intraclass distance $W(c)$ and the interclass distance $b(c)$ of the clustering class C. The intraclass distance represents the distance between data points in the same class, and the interclass distance represents the distance between classes in different classes. The overall effect of clustering can be expressed and measured by the combination of intraclass and interclass distances. Based on this idea, the equalization evaluation function is obtained.

The equalization evaluation function is defined here as the quadratic root of the sum of the squares of the intraclass and interclass distances. The criterion function for clustering is the equalization evaluation function, and the equalization evaluation function is composed of overall intraclass distance and interclass distance functions, specifying that the algorithmic clustering effect is optimal when the value of the equalization function is the smallest.

$$\text{Min}\{\text{J}\,(\text{c}, \text{k})\}. \quad (7)$$

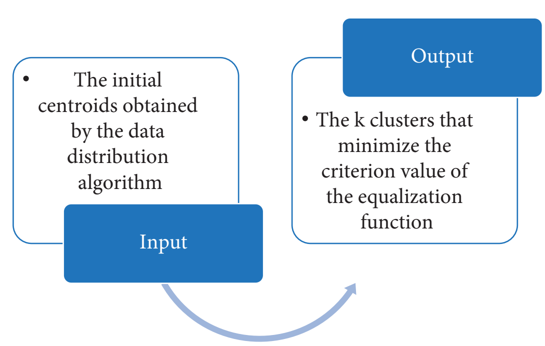

Figure 6: Improved K-means algorithm.

3.5.2. Improved K-Means Algorithm. According to the related literature, it is known that the result of k generally does not exceed $\sqrt{n}$. In this article, we improve the K-means algorithm, which does not need to give the value of k in advance, $k1 \sim \sqrt{n}$ can be taken from (n is rounded), and the K-means algorithm is executed cyclically, and the smallest one is selected among the equalization function values, and

Input: Initial centroids obtained by the data distribution algorithm
Output: k clusters that minimize the criterion value of the equalization function
(1) Set the value of k so that it is $1, 2, \ldots, \sqrt{n}$ equal to.
(2) Call the k objects determined by the initial centroid obtained by the data sample algorithm as the initial clustering centers.
(3) Calculate the mean value in the obtained classes and place each sample object in the nearest class.
(4) Update the mean value of each class.
(5) Calculate the evaluation function according $J(c, k)$ to the formula, until it converges; otherwise, repeat step (3) and step (4).
(6) Select the minimum value of the equalization function according $J(c, k)$ to the formula, and write down the corresponding k value that is the optimal number of clusters, at which point the algorithm ends.

Algorithm 3: Improved K-means space clustering algorithm.

the k value at this time is recorded, and this k value is the optimal number of clustering results. In this article, we start to select the initial centroid based on the data distribution method as shown in Figure 6 (Algorithm 3).

3.6. Spatial Data Clustering. Spatial data clustering (spatial clustering) is one of the important components of spatial data mining. As a research direction in cluster analysis, it refers to the grouping of each data object according to the similarity between items so that the data in each cluster reach a certain degree of similarity, while there are certain disparities between data in different classes, and further, the main distribution patterns of spatial data and related typical patterns can be found. Spatial data clustering has been widely used in urban planning, environmental monitoring, earthquake forecasting, military, market analysis, and many other fields, penetrating into many aspects of social life.

The PSO-based K-means data clustering algorithm, as the name implies, combines this PSO algorithm with the K-means algorithm, so that it can well achieve the result of correct classification of data by avoiding the defect that k needs to be specified in the K-means algorithm. However, in high-dimensional spatial data, the evaluation criterion function of the K-means clustering algorithm is limited, and if no improvement is made, then the results obtained are bound to be unsatisfactory.

In this article, the evaluation criterion function of K-means is improved so that it is related to both intraclass and interclass distances, thus adding weights to the intraclass and interclass distances that affect the evaluation criterion function to make it more effective in clustering; the tests in this article show that the improved algorithm has relatively high convergence and a high correct rate, which strengthens the effectiveness of the clustering effect.

In this article, the improved K-mean space clustering algorithm is called the clustering algorithm $K_{m,n}$PSO, and its main process is shown in Figure 7.

4. Empirical Analysis

When there are many factors affecting the sample data, that is, when the dimensionality of the data is high, a "dimensional disaster" occurs, which refers to a situation where the computational complexity of the clustering algorithm increases exponentially as the number of dimensions increases. Moreover, the higher the dimensionality, the more difficult it is to define the distance function in the clustering algorithm.

As it is more difficult to handle when clustering high-dimensional data, in high-dimensional data space, dimensional groups can be grouped by different types of dimensions, and we call this method of handling data as dimensional grouping method. In the relational spatial database, attributes are divided into various types, for example, they can be divided into spatial attributes and nonspatial attributes, and among spatial attributes, they can also be divided into geometric and nongeometric attributes and many other cases. According to this method, the number of dimensions is greatly reduced, and the original high-dimensional spatial data set is split into multiple groups of low-dimensional data sets, and improved algorithms can be applied to the low-dimensional data sets, and the clustering results obtained at this time are more accurate. The basis of dimensional grouping can be set according to the characteristics of the actual database.

In this article, we selected the indicators and data related to landscape conservation from 2000 to 2021 and obtained the initial data set with 21 dimensions, which we divided into three clustering influence factor groups, $A1$, $A2$, and $A3$, according to the dimensional grouping method, and the number of clustering influence factors in each group is 7 dimensions, and each clustering influence factor group is divided into three classes of $K_{m,n}$PSO each using the algorithm in the previous chapter of this article, and then using the index conversion method. The conversion is then performed.

First, for a high-dimensional data set, all samples are clustered on the first spatial influence factor group obtained by the clustering method, and some clusters are obtained; then the results obtained by clustering on the first spatial influence factor group are clustered on the second clustering influence factor group by clustering $K_{m,n}$PSO method, and some other clusters are obtained, and this time the results obtained in the second clustering influence factor group are clustered on the third clustering. The final clustering results are obtained by applying the same method to the third cluster of influencing factors until all clusters of influencing factors have been processed.

For example, there are three clustering influence factor groups, also called dimension groups, $A1$, $A2$, and $A3$, respectively. First, two classes (1, 3, 5, 6, 10) and (0, 2, 4, 8, 9)

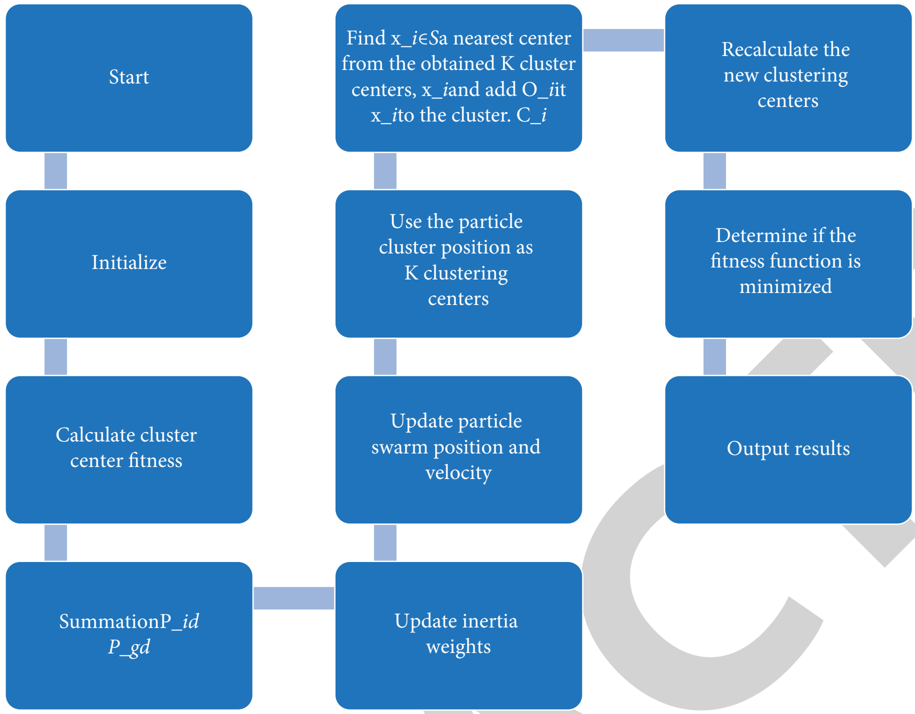

Figure 7: $K_{m,n}$PSO flow of clustering algorithm.

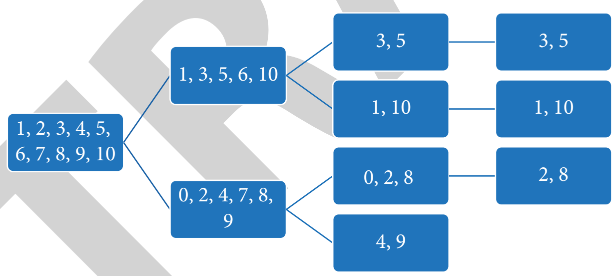

Figure 8: Clustering results.

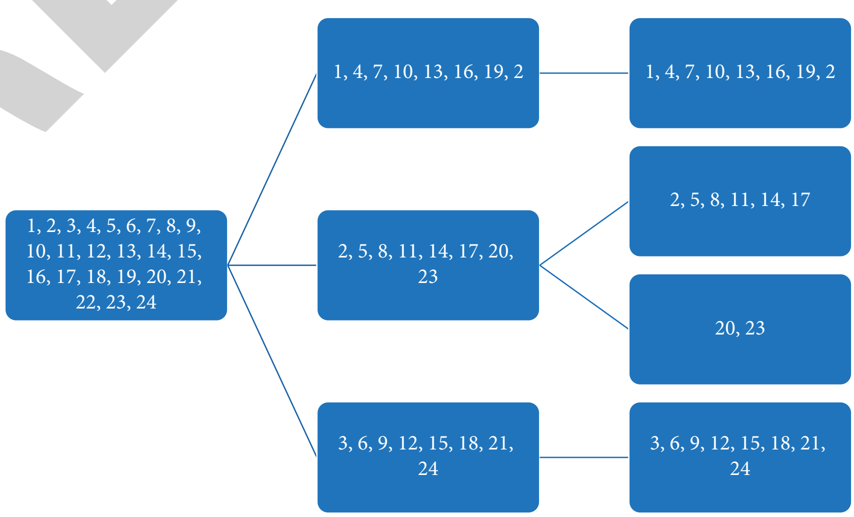

Figure 9: Clustering results.

are $K_{m,n}$PSO obtained by clustering on the whole sample data set using the clustering method on the $A1$ dimension group, and then the same method is applied on the $A2$ dimension to first cluster (1, 3, 5, 6, 10) clustering to get two classes (3, 5) and (1, 10), and similarly clustering (0, 2, 4, 8, 9) in $A2$ dimension to get two more classes (0, 2, 8) and (4, 9), followed by clustering (3, 5), (1, 10), (0, 2, 8), and (4, 9) in $A3$ dimension again to get the final clustering results (3, 5), (1, 10), and (2, 8). The clustering process is shown in Figure 8.

The given landscape conservation data are then divided into two dimensional groups, namely $A1$ and $A2$. There are 24 groups of data to be grouped, and the 24 groups are numbered as 1, 2, . . ., 24; first, the whole sample data set is clustered on the $A1$ dimensional group using the clustering method to obtain three classes of $K_{m,n}$PSO (1, 4, 7, 10, 13, 16, 19, 22), (2, 5, 8, 11, 14, 17 20, 23), and (3, 6, 9, 12, 15, 18, 21, 24), and then apply the same method to cluster (1, 4, 7, 10, 13, 16, 19, 22) first in $A2$ dimension to obtain one class (1, 4, 7, 10, 13, 16, 19, 22) and cluster (2, 5, 8, 11, 14, 17, 20, 23) in $A2$ dimension to obtain two classes (2, 5, 8, 11, 14, 17) and (20, 23), and one class (3, 6, 9, 12, 15, 18, 21, 24) was obtained by clustering on (3, 6, 9, 12, 15, 18, 21, 24) in $A2$ dimension. The clustering process is shown in Figure 9.

According to the dimensional grouping and dimensionality reduction method, the national landscape conservation data are clustered with a total distance of four classes, but our correct clustering should be three classes, and the 20th and 23rd data should be clustered as the second class, so the correct rate of clustering by this method is 91.7%. The dimensional grouping and dimensionality reduction method does simplify the complexity of clustering and solve the problem of "dimensional distress," but at the same time, it has a limited scope of use and can only be applied to relational databases; moreover, the accuracy of clustering obtained after dimensionality reduction by this method is not high, and we can also improve this method from these two aspects in the process of future research.

5. Conclusions and Recommendations

In this article, we mainly study the data clustering algorithm and adopt the research method from simple to complex; first, we establish the spatial data clustering model to cluster the low-dimensional data, then process the high-dimensional spatial data, improve the original K-means clustering algorithm in the low-dimensional data set, and combine the PSO with K-means algorithm in the high-dimensional spatial data set to get the new algorithm. And the improved two algorithms are applied to the corresponding data sets, and the powerful superiority of the improved K-means spatial clustering algorithm in this article is verified through the comparison of the algorithms.

For landscape conservation, the following proposed measures are put forward according to the research results.

5.1. Reconstructing the Protection System. It is necessary to develop a protection system for the protection of cultural landscape heritage of gardens according to the Convention for the Protection of the World Cultural and Natural Heritage and other national regulations to protect its "authenticity" and "integrity."

5.2. Extracting the Value Elements. Historical development of literature on the past and present life of the garden landscape for in-depth investigation and research, the site of its historical and humanistic summary, will provide richer historical resources for the cultural landscape. The collection of books related to humanities background can be a background understanding of how the landscape was formed and know what kind of humanities background has forged the landscape.

5.3. Protecting the Internal Environment. Garden landscape is largely derived from a good natural ecological environment, whether it is the internal natural vegetation or the surrounding peripheral environment, the Feng Shui grass movement will constitute a great impact on the environment. The same good natural ecological environment is the root of the landscape; mountains, water, flowers, and trees are the bones, blood, and hair of the landscape; one cannot be missing, and the natural ecological environment is constituted by the dynamic springs and pools and the flowers and trees in the four seasons. In addition, ancient trees and trees file are important elements of the landscape, are also a precious natural heritage of the landscape, and should be established for the protection of these ancient trees and trees file. Second, as a classical garden, the atmosphere of its viewing and the creation of mood is particularly important. The number of visitors per moment should be limited, should not accept a large number of tourists, should allow visitors to have a good viewing experience and spiritual perception, should be under the premise of controlling the number of tourists in the scenic area, and then should be limited through management measures to view the flow. In the premise of landscape protection while ensuring the visitor experience, can be controlled by receiving free tickets and advance reservation and can stay in the peak time limit and other ways to control the flow of people at all times to ensure the environmental experience. In addition to ensure the effect of water features, tap water can be introduced for concealed treatment. Finally, if the main garden building is relatively well protected, there is a risk of being damaged due to unreasonable use, and the impact of natural weathering requires good periodic inspection and maintenance. Compared to the main building, the garden structures and some of the miniatures are damaged by both natural and man-made influences and need to be updated and protected in a timely manner.

5.4. Controlling the External Environment. This includes the control of the external environment, the continuity of public opinion propaganda, and the control of external traffic. The control of external environment includes reasonable delineation of the external environment control area, adjustment of the nature of some surrounding sites, and reasonable organization of traffic environment. Public opinion propaganda can be carried out through on-site display, thematic museum, network propaganda, publication propaganda, media propaganda, etc. External traffic control is carried out through external diversion, selective expansion, signal guidance, etc., to control and balance the flow of people in each attraction.

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 no conflicts of interest.

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