Research on Intelligent Landscape Design Based on Distributed Integrated Model

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ABSTRACT

Traditional landscape design methods rely entirely on the experience of designers and are difficult to adapt to the needs of modern society. This article proposes a landscape design method based on a distributed integrated model. Based on landscape design scheme data, the intelligent landscape design function is achieved by constructing a distributed geographic model, extracting features through data analysis and key point analysis, and using virtual environments in computer-aided design to display and restore the actual effects of landscape design. The results indicate that the landscape design method based on distributed integration mode is more in line with the needs of modern society and has significant advantages over traditional landscape design in terms of public interest and evaluation coefficient. The intelligent landscape design method based on distributed integrated models has important significance in modern urbanization construction, which can effectively improve the accuracy and speed of landscape design and create better living spaces for people.

KEYWORDS

Characteristic Points, Distributed, Landscape, Landscape Design, Modern Economy

INTRODUCTION

Landscape design plays a vital role in modern urban construction as it enhances the natural environment, purifies the air, and provides a comfortable and beautiful leisure environment (Tian, 2022). With the increasing focus on sustainable development, designing a beautiful landscape has become even more imperative. However, most landscape designs are based on modern architecture, which can lead to aesthetic fatigue (Alshuwaikhat & Abubakar, 2008). To make garden design more appealing, it is essential to combine the aesthetic demands of the public with the protection of the natural environment (Bates, 2018). By using different design methods, we can mitigate the conflict between modern science and technology and the natural environment. Core to any successful landscape design project is the idea of conforming to the geographical environment, thus ensuring that the design is both visually pleasing and practical (Naderi & Shin, 2008).

Before designing the distribution of gardens, the site should be comprehensively inspected and tested, and the common ground between design and the environment should be reasonably integrated from geographical factors to cultural and historical factors (Özersoy, 2019). On the premise of maintaining the ecological and natural style, improve the scientific goal of landscape design. Space
and geographical environment, as one of the main factors affecting the landscape scheme, can add more aesthetic elements under the standard definition of the designer (Clouston, 2013). Many garden landscapes can be combined with physical scenery, utilizing humanistic design and historical heritage to add interesting elements and improve the public’s perception of the garden landscape. To enhance the spatial characteristics of the landscape during viewing, it is necessary to place emphasis on utilizing ecological resources and optimizing and transforming through landscape design methods (Da-Hong et al., 2020). All design forms that are consistent with the ecological process, do not damage or minimize the damage to nature and minimize the impact on the environment can be called ecological design. The primary task of ecological design must fully respect the diversity of species, minimize the deprivation of resources, strive to maintain the circulation of nutrition and water, and maintain the environmental quality of plant growth and animal habitat, so as to improve the living environment and maintain the balance of the ecosystem.

In addition to focusing on the ecological environment, the garden design process should also meet the needs of modern society, starting from the overall layout and reflecting the concept of urban construction goals. On the basis of ensuring the functionality of the design, integrate the urban construction content, organically combine the two, and coordinate the generic relationship. Landscape architecture can increase the urban greening rate, promote urban economic development, and meet the living needs of the population (Grenier et al., 2003). Due to the different locations of national cities, there are obvious differences in topography and landforms. This geographical environment has brought many uncertainties to landscape design. We need to make use of the advantages of terrain to realize the design concept under the condition of ensuring the balance between the environment and nature. Provide more leisure and health preservation areas for people’s daily life. Based on the survey, many garden landscapes feature a variety of plants and crops and incorporate local customs and cultural elements to create a unique landscape structure. However, there is a positive correlation between the demand for a large number of plants for water resources. We also need to consider the problems of cost-saving and resource waste reduction in the selection of design methods. With the growth of national economic strength, people’s demand for living standards is also higher and higher. We must adopt scientific methods to change the traditional landscape design methods.

Solar energy, water energy, wind energy, etc. (Ni, 2021), in sustainable circular energy should be reasonably converted and applied in the garden landscape, so as to avoid the heavy pollution and energy waste caused by electric energy as far as possible. Common garden landscape design methods include artistic thinking design, cultural heritage design, physical architectural design, etc. The above design methods can only rely on the experience of designers to build the landscape layout, without adding the needs of the masses and modernization needs in the design process, which often does not coincide with and apply to the actual application (Geng, 2022). In today’s big data environment, we need to combine science and technology to change landscape design methods to improve practicality and scientificity. Therefore, in modern urban construction, landscape design should focus on environmental protection and sustainable development, while considering the aesthetic needs and cultural background of the public. Designers can find a balance between geographical environment and location characteristics by comprehensively utilizing modern technology and traditional methods, creating beautiful, practical, and eco-friendly landscape design solutions.

Garden landscapes can integrate many elements into the same space so that people can get a beautiful feeling in the environment of the combination of nature and society. Most garden landscapes are often designed in the way of borrowing scenery to construct a good view that can be observed within the scope of vision and integrate the ecological environment into it (Jing, 2018). Borrowing scenery is a common technique used in classical garden architecture, whereby natural scenery is incorporated into the garden’s line of sight. By organizing and focusing on the good scenery within the visible scope, borrowing scenery can create an infinite and expansive feeling within the limited space of the garden. Regarding borrowing scenery, there are various methods such as opening up perspective lines for viewing and removing obstacles, improving the height of scenic spots, and breaking through the
boundaries of gardens. In addition, borrowing scenery includes taking advantage of natural landscapes, animals and plants, buildings, and other scenery, as well as borrowing artificial, astronomical, and meteorological scenery. Among these techniques, temporary borrowing and mutual borrowing are the two most commonly used methods. Borrowing scenery can integrate the infinite into the limited, and incorporate the selected scenery creation into the garden space (Ni, 2021). Borrowing is a key component in landscape design as it adds depth and interest by incorporating natural scenery from multiple angles and distances. This technique not only enhances the composition of garden pictures but also adds a personal touch to the design. Additionally, to create a broader view of the scenery, trees and shrubs are often strategically placed within the garden. Take the viewing platform as the starting position, so that the masses can enjoy the garden style from multiple angles (Hami et al., 2018). It can also raise the angle of vision, break through space constraints and get the best visual experience. There are also some architectural gardens that mainly use frame scenery. This method has a strong artistic division, which can select the space scenery pertinently (Gazvoda, 2002). In order to let the masses have a complete view of the scenery in the garden, the space is divided by using door frames, pavilions, etc., and then the landscape is extracted in the spatial area. The method of selecting scenery by frame can combine natural beauty and human beauty to form a three-dimensional space environment and form a natural landscape painting (Ahern, 2006). Against the backdrop of frame selection, the public’s vision is guided, and it is easier to form an understanding of the picture (Bezák et al., 2017). Furthermore, frame landscape design has no geographical limitations and can be incorporated into both indoor and outdoor spaces. This versatility has made it a popular choice for landscape design around the world. To illustrate the concept, we have included two examples of borrowing and framing landscapes, as shown in Figure 1.

It can be seen from Figure 1 that the two kinds of landscaping have their own advantages, which can reflect the combination of natural and humanistic colors in garden landscape design. The landscape design should consider respecting the local living environment and local people’s cultural traditions, living habits, and customs, and meet all the needs of local people’s daily life. Because in the living space of local people, the water, soil, trees, mountains, and rocks have specific meanings, especially the ethnic minorities, who should pay more attention to their national habits and customs. We must seek design inspiration and ideas from local people or local traditional culture.

In order to pursue the harmony and unity between man and nature, different elements are combined to create an appreciation of artistic conception in line with the public. With the growth of U.S. economic strength, they also started early in the construction of urbanization. The average living standard and quality of residents are in the medium stage, which presents higher quality standards.
requirements for the living environment (Makhzoumi, 2000). The preferred living space for most American families is single-family villas. This living environment including landscape design makes designers pay more attention to the combination of nature and modernization (Gullino et al., 2018). They often use a combination of engineering technology and environmental technology in landscape design. By changing the geographical terrain, planting plants, and arranging garden roads, we can create conditions suitable for life. In the specific planning, we should also pay attention to the collocation of plants, so as to create a special effect under the construction mode (Jefferson, 2018). The most common method of landscape design in Japan is space transformation design. Due to the limitation of their own geographical area, how to add garden landscapes in modern cities is their main problem to be solved (Butler & Schultz, 2019). Using the space transformation method can improve the utilization rate of space, optimize the living environment on the premise of ensuring living conditions, and achieve harmonious coexistence between man and nature (Yang, 2021). From the above research status, this paper finds that using modern means in the process of landscape design can improve the applicability of the design scheme. Therefore, we build a data model based on distributed integration technology to explore the best effect of modern landscape design (Chen, 2013). The landscape design method based on distributed integrated model proposed in this paper can be regarded as a solution to the problem of visual data management, and is related to topics such as beyond Semantic Web, intelligent system, information system research flow, etc. The novelty of this method lies in using environmental and geographical conditions as input data to achieve rapid and accurate landscape design through imaging feature point retrieval databases. At the same time, this method meets the needs of modern society and is also relevant to areas such as sustainable urban construction and ecological protection.

This article aims to study landscape design methods based on distributed integrated geographic models to solve the problems of urban community landscape construction caused by the acceleration of modern urbanization and the continuous expansion of urban scale. Modern landscape design needs to meet the goals of ecological conservation, pay attention to the combination of natural atmosphere and scientific design, and reduce damage and impact on the living environment. However, traditional landscape design relies entirely on the experience of designers and lacks the support of technological means. Therefore, this article proposes a landscape design method based on a distributed integrated model, aiming to improve the accuracy and speed of landscape design by constructing a distributed geographic model and a comprehensive retrieval database in an intelligent network environment.

This paper is mainly divided into three parts. The first part investigates and analyzes the development status of landscape design in various countries, and explores the impact of different design methods on the overall landscape planning. According to the advantages and disadvantages of the design method, choose the design method suitable for the needs of modernization. In the second part, we use distributed integration technology to build geographical models, share models and integrate data, and use big data to achieve the purpose of intelligent landscape design. Moreover, it explores the differences between the distributed integrated model and the traditional landscape design methods. The third part, starting from the distributed integration technology, combined with modern and economic thinking, renovates the landscape design scheme to create a landscape atmosphere that meets modern and ecological needs, and analyzes the above research results.

**LITERATURE REVIEW**

The distributed integration model is a method of utilizing network technology and geographic information systems to achieve landscape design. It can effectively integrate data from different sources and improve the efficiency and quality of landscape design. In recent years, landscape design methods based on distributed integrated models have been widely studied and applied, especially in three-dimensional landscape design and evaluation.
Peng et al. (2021) developed a 3D garden landscape planning visualization system based on FPGA processor and virtual reality technology, which can realize the rapid generation, editing and browsing of garden landscape, as well as user interaction experience. Li and Xu (2020) investigated the feasibility of utilizing 3D images and virtual reality technology in distributed landscape architecture. Shan and Sun (2021) studied the methods of 3D urban landscape design and evaluation based on geographic information systems, constructed an evaluation index system for urban landscape design, used multi-level analysis method to evaluate urban landscape, and utilized 3D visualization technology to display the effect of urban landscape. Guo et al. (2021) studied the design method of landscape architectural model based on big data intelligence, used deep learning algorithm to extract features and classify a large number of landscape images, built an intelligent landscape architectural model library, and realized the automatic generation of suitable landscape architectural model according to user needs. Deng et al. (2022) discussed the design method of digital city landscape planning based on spatial information technology, obtained urban spatial information using remote sensing, GIS, GPS and other technologies, analyzed and evaluated urban space using digital terrain analysis, digital hydrological analysis, digital ecological analysis and other methods, and proposed a digital city landscape planning design framework based on spatial information technology. Deng et al. (2022) proposed a digital city landscape planning and design method based on spatial information technology, which uses distributed geographic information system, 3D modeling, virtual reality and other technologies to realize the digital, visual and interactive design of urban landscape. Wang and Qin (2021) explored the impact of landforms on the spatial distribution characteristics of urban landscapes in Jiangnan, and extracted the spatial distribution patterns and characteristic parameters of urban landscapes in Jiangnan using distributed geographic information systems and spatial statistical analysis methods. Jia (2021) proposed an intelligent garden planning and design method based on agricultural Internet of Things technology. This method utilizes distributed sensors, wireless communication, cloud computing, and other technologies to achieve real-time monitoring, intelligent control, and optimized design of garden environments. Yang et al. (2021) studied the impact of cultural characteristics and geographical spatial distribution on landscape ecology from the perspective of regional culture, and revealed the characteristics and differences of landscape ecology under different regional cultures using distributed geographic information systems and multivariate statistical analysis methods. Gupta et al. (2022) propose an intelligent defense method based on supervised learning classifiers to defend against distributed denial-of-service attacks in IoT networks. Do et al. (2022) propose a method for building a knowledge graph on Apache Spark using cross-language transfer methods and distributed MinIE algorithms. Lv et al. (2022) propose a prediction method based on edge artificial intelligence to improve the efficiency of intelligent microgrids. These studies show the advantages and potential of distributed integration models in different scenarios.

The above research indicates that the distributed integration model is a landscape design method with broad application prospects. It can fully utilize the advantages of spatial information technology, improve the intelligence level of landscape design, and meet the requirements of landscape design in different scenarios and needs. However, there are still some gaps and shortcomings in existing research. Firstly, existing research mainly focuses on three-dimensional landscape design and evaluation, lacking in-depth research on other types of landscape design. Secondly, most existing studies have not taken into account the landscape design requirements for different scenarios and needs, making it difficult to meet the personalized needs of different users. In addition, most of the existing research is based on virtual reality technology, and in practical applications, virtual reality technology requires high hardware equipment and operational difficulty, and there are cost issues. Based on the previous research, this article proposes a landscape design method based on distributed integration models that aims to reduce hardware costs while simultaneously improving the intelligence
level of the design. Additionally, the effectiveness and feasibility of this method are verified using a specific urban community as an example.

METHODS

Research on Landscape Design Based on Distributed Integrated Geographical Model

The main purpose of landscape construction is to solve the contradiction between people and the natural environment, so that people can have a comfortable living environment without destroying the ecological balance of the natural environment, and achieve the harmony between people and the natural environment. (Żychowska et al., 2021) Therefore, the development prospect of modern cities is closely related to the level of landscape art, which plays an extremely important role in the city. The development of landscape architecture in China has always been one of the important links of urban public construction. Landscape architecture can not only beautify the city, but also meet the aesthetic needs of people living. The garden landscape is a design content with the characteristics of the times, including landscape, landscape, and plants. Only when the three elements are well coordinated can they produce a harmonious effect. With the continuous development of landscape design, the design object and scope have also changed to a certain extent.

The traditional landscape design method often deviates from the reality, and the design scheme is seriously inconsistent with the design method. The gardens created by such environment often leave people with an empty feeling. Similarly, if a large number of gorgeous elements are added to the design, it will also make the design content more vulgar and superficial. Most landscape architecture design needs to complete urban greening, square construction, park construction and other needs. There is a strict time demand in the design and construction process, which is easy to cause perfunctory design and other phenomena. Therefore, we should choose scientific and effective design methods to assist the landscape design process. We use the distributed integration model to build the landscape design scheme. The goal of distributed system integration is to connect distributed applications without constraints and realize the sharing of data and functions among applications. Since the integrated application systems are independent application systems, and each application system (especially legacy systems) often solves problems in specific fields, the adopted architecture, integration points provided by the implementation language (externally accessible data and called functions) and interaction protocols are different. This leads to the complexity of distributed application integration (Olwig, 2011). First, we choose the information base related to landscape design in big data as the data support. Aiming at the coupling problems that often occur in distributed systems, data center adaptive integration optimization is carried out. The distributed integration model can carry out resource cooperation through data transmission in the computer. At the same time, it is a large environment composed of multiple independent heterogeneous and decentralized small sets. Each structural design of the distributed model is independent of the other, and the mutual coupling relationship is a dynamic and complex network structure. In order to solve the coupling problem in data processing, we use shielding settings in the design scheme to reduce the probability of data difference problems, so as to reduce the difficulty of data integration. At the same time, a central node can be added to reorganize and optimize the landscape design method by using the way of resource system sharing. We use the cycle diagram to show the difference between the data coupling relationship and the coupling relationship with shielding treatment and the coupling relationship with central node transformation, as shown in Figure 2.

It can be seen from Figure 2 that the coupling relationship after adding the central node is smoother in the process of solving the complexity of the data system. We add image feature recognition technology to the distributed model for key design extraction. Images in complex environments need real-time processing of the target to find the integrated central location information. In this case,
target detection technology is needed. The target detection algorithm can identify a variety of different objects in an image and locate them through the boundary box. The main performance reference of the target detection algorithm is the accuracy and efficiency (i.e. speed) of detection. Because target detection not only needs to classify images but also needs to locate different objects, the accuracy of not only classification but also object positioning should be considered. The key elements in the landscape design scheme are obtained by using the target detection method under the deep learning algorithm. The structural flow chart is shown in Figure 3.

Then the key data is added to the computer-distributed system for calculation. This kind of computing work for a large amount of data must first be decomposed into several small problems. Each large data set can be expressed as:

\[ b_x = \sigma(t_x) + c_x \]  

Data loss will also occur in the process of distributed computing. We predict the accuracy of the model from three aspects: confidence loss, distribution rule loss and offset coefficient loss. The loss function is as follows:

Figure 2. The difference between the coupling relationship of shielding treatment, and the coupling relationship of using the central node transformation

Figure 3. Flow chart of target detection
The calculation of confidence loss is determined by binary cross-entropy, and the truth value is determined by assuming the existence of the target. The loss calculation of distribution rule and offset coefficient is obtained by subtracting the prediction coefficient after obtaining the actual deviation. In the distributed integration model, we change the angle and distance of the image categories in the data set. In order to reduce the design differences caused by the above changes, it is also necessary to standardize the feature elements to reduce the probability of error. Taking the distance of landscape feature elements as the standard, the center distance of the target object is selected for updating and iteration. Such as the formula:

\[
x_i = \frac{X_i}{X_{10} - X_9}
\]

\[
y_i = \frac{Y_i}{Y_{8} - Y_2}
\]

Based on the standardization of plant distribution, the accuracy of plant feature recognition is high and stable, so the formula is as follows:

\[
x_i = \frac{\sigma X_i}{\sigma X_{10} - \sigma X_9}
\]

\[
y_i = \frac{\sigma Y_i}{\sigma Y_{8} - \sigma Y_2}
\]

In the formula, \(X_i\) and \(y_i\) represent the coordinate position of the central key element after standard processing. Next, taking the excellent works of landscape design as an example, we use distributed box selection to extract the important elements, and the formula is as follows:

\[
area_i = \text{width}_i \times \text{height}_i
\]
distance \_ij = \sqrt{(x_i - x_j)^2 + (y_i - y_j)^2} \tag{10}

angle = \arctan\left(\frac{y_j - y_i}{x_i - x_j}\right) \tag{11}

In the formula \(x_i\) represents the coordinate position of important areas, \(y_i\) serial number represents important feature points. The important characteristic points obtained by the above formula are easy to reduce the efficiency of the model in the calculation. For this, we should screen the existing characteristic coefficients, so as to reduce the computational complexity of the model. Through the distribution distance of the data set, take the ratio between the prediction and the actual data as the standard to find the maximum screening matrix:

\[r = \frac{\text{dis tan ce}_{i,j}}{\text{dis tan ce}_{i,k}}\] \tag{12}

Among them, \(i, j\) represents a discrete data matrix, \(i, k\) represents a continuous data matrix. Spatial planning of distributed data sets according to the types of data greatly improves the running speed of the system. Due to the different design methods of each garden landscape, there are individual differences in the data set. In order to reduce the errors caused by differences, we also need to introduce additional features at the central target, which are defined as follows:

\[S_w = \sum_{j=1}^{c} S_i\] \tag{13}

\[S_b = \sum_{i=1}^{c} n_i (m_i - m)(m_i - m)^T\] \tag{14}

\[S = \text{trace}(S_b) / \text{trace}(S_w)\] \tag{15}

Representing the three areas of distributed integration, the above formula can extract the important influencing factors of landscape design. According to the integration advantages of the distributed model, the design elements that do not conform to the characteristics of modern practicality are eliminated, so as to form a new design scheme.

**Research on Distributed Modern Intelligent Landscape Design Method**

Urban landscape construction is the main way to enhance regional culture and improve the strength of spiritual civilization. It not only meets the needs of the people for spiritual life but also enriches the cultural connotation of the current region. Therefore, landscape design and landscaping work is becoming more and more important. The research on landscape design methods has also become an important topic in the development of environmental science across different countries. The choice of
landscape design methods can be planned from the geographical location and climate environment. Let the plant landscape in the garden echo the humanistic landscape to achieve the best design effect.

In garden landscape design, plants and crops play a vital role in creating a natural and ecological environment. Effective combinations of various trees and flowers are crucial in achieving this. Seasonal changes should also be considered when designing the layout, as different plant characteristics bring diverse landscape effects. Additionally, regional characteristics, including soil composition and climate status, must be taken into account to ensure that landscape design is suitable for the specific environment. Lastly, diversity is key - balancing the growth differences between landscape crops is important in creating a visually appealing and sustainable garden design. The different effects of landscape architecture are mainly due to the diversity of plants. How to scientifically match plants and design the final ornamental effect is one of the important contents of the discussion. Therefore, in landscape design, attention should be paid to protecting the number of local animal and plant populations, protecting various types of ecosystems and various stages of their succession. The future landscape designers should pursue the ecological design of the landscape pattern to maintain the biodiversity and the balance of the ecosystem.

Traditional landscape design methods have higher thinking restrictions, and most of them are based on empirical design, which is prone to be inconsistent with the actual application. In order to get rid of the limitations of traditional design, we need to combine science and technology to transform and innovate landscape design methods, establish new design thinking, and use data analysis to improve the overall design effect. The design method model constructed by distributed integration classifies and summarizes a large number of landscape design schemes, extracts the key feature points of relevant design contents, and recombines the design process by using data processing and key point analysis. The garden landscape design scheme formed by this modern means can grasp the aesthetic and practical needs of the masses. It is to screen, investigate and analyze on the basis of innovative technology, and use data analysis to understand the impact of natural factors such as geographical environment on landscape design, so as to effectively avoid it. We compare the efficiency changes of traditional landscape design methods and distributed landscape design methods in obtaining design data, as shown in Figure 4.

It can be seen from Figure 4 that the amount of information in traditional landscape design methods has not changed significantly with the increase of acquisition time. With the increase of data analysis time, the amount of relevant information obtained by using the landscape design method optimized by the distributed integrated model has also increased rapidly. It can be seen from the above that the traditional landscape design methods lack scientific and objective analysis and evaluation processes,
and the use of digital analysis and design is relatively small, which is difficult to meet the needs of the combination of modern technology and art. We transform the graphic information, data information and evaluation information of landscape design into the input digital signal of distributed model, so as to realize the research of intelligent design method. With the increase of data analysis time, the amount of design data obtained by landscape design methods based on distributed integration mode far exceeds that of traditional methods. This is because the distributed integration mode can utilize multiple data sources simultaneously, quickly obtain data and analyze it through parallel computing. From the perspective of intelligent digital, appropriate computer-aided modeling equipment is selected for landscape setting creation, as shown in Figure 5.

It can be seen from Figure 5 that this computer-aided drawing method integrates plant collocation, geographical environment analysis, ecological environment analysis and landscape architecture design in landscape engineering to form a complete framework. Although aesthetic data cannot be measured by software, it can restore the actual effect of landscape creation in a simulated environment, which is very helpful to save construction materials and construction funds. It can be seen that the landscape design method based on distributed integration mode is significantly superior to traditional methods in terms of design quality. This is because methods based on distributed integration patterns can analyze various data more comprehensively and accurately, resulting in better design solutions.

RESULTS AND DISCUSSION

Analysis of Research Results of Landscape Design Based on Distributed Integrated Geographical Model

Landscape design and planning is the integration of science and art, which requires the acquisition and analysis of geographic information, the acquisition and analysis of influencing factors, and then the preliminary design, construction and modification. The factors that affect the effect of landscape design include the surrounding environment, traffic conditions, geographical ecology, audience, and so on. This paper uses the distributed integrated model to improve the landscape design, and constructs the integrated scenario of the landscape geomorphic model in the distributed network environment. It involves the process of data integration and data resource docking, but the heterogeneity of data will also affect the model docking and effect. Therefore, based on the distributed integration model, we constantly change the running behavior to optimize the output effect of the design model. In order to fully verify the feasibility and effectiveness of the model method proposed in this paper, we randomly select two landscape design cases. In the traditional analysis model, errors and faults may occur as the key points generated by multiple cases are distributed across different regions. The input data and output data are also simple, and there are obvious disadvantages in the application of a large

Figure 5. Landscape setting under computer-aided modeling equipment
number of landscape design schemes. We compare the accuracy of the traditional analysis model and distributed integration model in the processing of landscape design data, as shown in Figure 6.

It can be seen from Figure 6 that in the case of landscape design, background factors have a greater impact. The accuracy of traditional analysis models for data resources cannot meet the actual needs, and the accuracy decreases with the increase of the amount of data. Traditional analytical models are usually based on manual experience and rules for data processing and result prediction. For example, in the field of landscape design, traditional analytical models may use expert opinions and rules to evaluate the aesthetic value, spatial organization, and other factors of landscape elements, thereby generating landscape design solutions. In contrast, distributed integration models utilize machine learning methods and information from multiple data sources for data processing and result prediction. The distributed integration model used in this paper combines the Relevant generic information into multiple subsets in the process of data processing, and the accuracy coefficient remains above the standard range with the increase of the amount of data. At the same time, the distributed integrated system also has the advantages of fast processing speed and reduced storage space. In order to reduce the load pressure caused by a large number of landscape image resources, we add edge computing to the distributed acquisition system to improve the speed of generating landscape design schemes. Edge computing refers to an open platform integrating network, computing, storage, and application core capabilities on the side near the object or data source to provide the nearest end services. Its applications are launched at the edge side, generating faster network service responses, and meeting the basic needs of the industry in real-time business, application intelligence, security, and privacy protection. Compare the speed at which the system automatically generates landscape design combinations before and after adding edge calculation, as shown in Figure 7.

It can be seen from Figure 7 that in the same data space, the distributed system with edge computing can store more data resources. When the system calls the data combination design scheme, the overall running speed changes by leaps and bounds. When the data transmission volume is the same, the traditional distributed system can only maintain the basic output volume. The system with edge computing not only ensures the output volume, but also improves the real-time transmission. We provide the basic data type of the test in the standard database language, and detect the resource
Analysis of Research Results Based on Distributed Modern Intelligent Landscape Design Methods

As an important ecological environment in modern cities, the construction of garden landscape has gradually attracted attention with the development of society. Garden landscape can beautify the urban ecological environment and show its own ornamental value on the premise of ensuring the harmonious coexistence between man and nature. With the continuous expansion of urbanization, landscape design also plays an important role. It can not only decorate the city, but also improve the aerobic substances in the city. Through scientific planning and design, plants, mountains and rivers, cultural buildings, etc. are integrated to present a pleasing landscape for the public. The research of landscape design methods has also become a hot topic today. The traditional landscape design has some deficiencies in the way. Although it conforms to the Convention in terms of aesthetics and landscaping, it lacks popularity and applicability in practical application. Most garden designs choose the method of ecological technology, and use ecological products to show the natural landscape. Water purification scenic spot is one of the typical representatives. The purification technology is used to treat the Waterscape in the garden landscape, change the microbial environment and enrich the ecosystem. However, the factors that affect landscape design also include geographical characteristics, plant species, climatic environment, cultural connotation and so on. We choose three aspects to analyze the degree of influence on the final evaluation index of landscape design, as shown in Figure 8.

Figure 8 illustrates that the majority of the public’s evaluation of landscape design is based on investigation and research. Among them, the impact evaluation index of geographical features is high, and many landscape designs need to strictly consider the local landform in the layout process. The ecological landscape design should make full use of the natural resources and energy such as soil, vegetation, water, wind, sunlight, terrain and energy in the site according to the natural process.
of the site where the landscape is located, and try to integrate these natural factors into the design, so as to maintain the ecological balance of the site. Cultural connotation is in the second level, and the change of impact assessment indicators is higher than that of climate environment. It can be seen that the people have a better acceptance of the climate difference of garden landscape. With the transformation of modern scientific concepts, intelligent landscape design methods have become the main content of today’s research. This paper inputs the relevant design data from the distributed integrated model to screen out the information that does not meet the needs and improve the quality of landscape design. In the experiment, first, through the sketch drawing stage, the initial design scheme is described by hand by using data analysis and fusion of feature points. Adjust the element proportion according to the style of the hand-painted manuscript, and establish a multi-layer model for post-editing. The relationship between hand drawing and actual landscaping is shown in Figure 9.

It can be seen from Figure 9 that the difference between the hand-painted manuscript and the actual landscaping is not obvious in computer-aided design. It also shows that the garden landscape designed by intelligent model is basically consistent with the actual effect. In order to pursue more realistic scene effects, we can also add real-time visualization tools to the distributed system, add plant colors to garden landscape modeling, and adjust materials such as light and water. Finally, we randomly choose an experimental site from a place in the south, use the distributed intelligent model to design the landscape, and compare the traditional landscape with it. Explore the passenger flow of the two garden landscapes, as shown in Figure 10.

It can be seen from Figure 10 that the garden landscape with distributed intelligent design has a large passenger flow. Through interview and investigation, people have a high evaluation index
of this landscape. It shows that using science and technology to optimize landscape design is very effective in the development of modernization.

This study used a distributed integrated model for landscape design and drew some important conclusions during the process of data acquisition and analysis. Firstly, compared to traditional landscape design methods, intelligent landscape design methods based on distributed integration models are more in line with the needs of modern society, effectively reducing application differences in landscape design and improving the fault tolerance of design schemes. Secondly, the distributed integration model has obvious advantages in data processing speed and storage space, which can effectively process a large amount of landscape image resources and improve
the generation speed of landscape design schemes. In addition, adding edge computing can further improve the output and real-time transmission of the system, providing a faster and more efficient solution for landscape design. From the experimental results of this study, it can be seen that the garden landscape designed by the distributed intelligent model is basically consistent with the actual effect, and the passenger flow is large, indicating that optimizing landscape design using science and technology is very effective in modern development. However, it is important to note that landscape design should not solely rely on technical aspects, but should also prioritize humanistic considerations. Therefore, we suggest paying attention to humanistic care in the landscape design process, taking into account people’s feelings and needs, and continuously optimizing the design scheme through communication and feedback with users. At the same time, landscape design should also focus on environmental protection and sustainable development, promoting the rational utilization of resources and protecting the natural environment. Finally, a scientific and standardized evaluation system needs to be established to comprehensively evaluate landscape design schemes to ensure that they truly meet the interests and needs of society and the people.

CONCLUSION

With the continuous acceleration of urbanization, how to create a harmonious urban landscape between humans and nature has become a hot research topic. Traditional landscape design relies entirely on the experience of designers, combining local historical customs to match the scenery, but more and more people demand a combination of spirit and object. In this paper, an intelligent landscape design method based on distributed integrated model is proposed. Through the use of modern scientific and technological means and data analysis, the urban garden landscape is optimized and innovated. The landscape design method proposed in this paper utilizes several modern scientific and technological means, such as distributed geographical models, feature extraction of landscape image resources, and edge computing, to achieve a greater harmony between the designed landscapes and the natural ecological environment, as well as the aesthetic preferences of the public. The experimental results show that the landscape design method based on distributed integration mode has obvious advantages in public interest and evaluation coefficient, can improve the efficiency and accuracy of landscape design, and has a positive role in improving urban quality and people’s quality of life. This method meets the needs of modern society and is also relevant to areas such as sustainable urban construction and ecological protection. The limitation of this paper is that it is only from a smart digital perspective, and more other factors are not discussed in depth, and have not been fully verified in practical applications. In the future, intelligent landscape design methods based on distributed integrated models can be applied to a wider range of fields, such as rural landscape design, interior design, etc. In addition, it is also possible to consider combining this method with other technologies, such as virtual reality technology, to further expand its application scope.

DATA AVAILABILITY

The figures used to support the findings of this study are included in the article.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.
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