Hindawi
Scientific Programming
Volume 2023, Article ID 9878425, 1 page
https://doi.org/10.1155/2023/9878425

Retraction

Retracted: Application Research and Case Analysis of Landscape Design in Artificial Intelligence Platform

Scientific Programming

Received 18 July 2023; Accepted 18 July 2023; Published 19 July 2023

This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] Y. Cao, "Application Research and Case Analysis of Landscape Design in Artificial Intelligence Platform," *Scientific Programming*, vol. 2022, Article ID 7122276, 10 pages, 2022.

Hindawi
Scientific Programming
Volume 2022, Article ID 7122276, 10 pages
https://doi.org/10.1155/2022/7122276

Research Article

Application Research and Case Analysis of Landscape Design in Artificial Intelligence Platform

Yunxia Cao

ZheJiang Guangsha Vocational and Technical University of Construction, Dongyang 322100, Zhejiang, China

Correspondence should be addressed to Yunxia Cao; 20192519@zjgsdx.edu.cn

Received 16 August 2022; Revised 13 September 2022; Accepted 19 September 2022; Published 5 October 2022

Academic Editor: Lianhui Li

Modern landscape greening plays an important role in the construction of modern cities and plays a positive role in improving the natural environment of cities and building a good image of cities. With the continuous progress of society and technology, human's understanding of artificial intelligence is deepening, and intelligent technology is gradually integrated into all aspects of life. Because media technology has rich design elements and can carry out rich design structures, it will be more intuitive to use multimedia means for garden landscape design. Therefore, for meeting people's requirements for the diversification of modern urban gardening construction, this study makes a deep analysis of the current status and problems of landscape design and tries to study the effective application methods of artificial intelligence technology in landscape design, to promote the combination of landscape design and artificial intelligence design. At the same time, the combination of AI lighting planning, AI water landscape planning, AI sprinkler planning, and AI paving planning is used to illustrate the application of AI in the specific project design of landscape design. The use of artificial intelligence not only promotes the innovation and optimization of landscape design, but also ensures the quality of modern landscape design and effectively improves the efficiency of modern landscape design.

1. Introduction

In the contemporary society, with the development of society, the design ideas, and methods of landscape architecture are increasingly enriched, coupled with the continuous improvement of social economy and technology level, people also put forward higher requirements for landscape design. People's economic level has been greatly improved, and their comprehensive quality has been improved. Their taste is also very different from that of the past, which can be reflected in all aspects of life. For example, theme parks and fitness squares have more and more requirements for landscape architecture. In addition, with the rapid development of science and technology, it has entered the era of big data, and landscape architecture design has also undergone great changes. With the development of modern civilization, modern landscape gardening design means are increasingly rich. At the same time, the steady development of social economy and technology has also led to the improvement of the requirements for modern urban landscape greening. The current stage of modern landscape architecture design is restricted by backward design concepts and inconsistent design schemes with reality, which is not conducive to improving the quality and efficiency of modern landscape architecture design, nor can it meet people's growing spiritual and entertainment needs [1–5]. Artificial intelligence technology has been rapidly applied to many fields of landscape architecture because of its high-efficiency data knowledge transformation ability, strong analytical ability, strict reasoning, and accurate ability to select the best. Artificial intelligence technology can not only convert the complex qualitative description in landscape architecture into quantitative analysis through efficient and accurate calculation of some relevant data, but also solve some difficult problems in landscape architecture research and reveal the internal mechanism behind the phenomenon through the establishment of intelligent models, so it is widely used in landscape architecture research.

From the point of view of today's society, landscape design has some limitations in the following areas, which

limits the development of landscape design. First, the design concept of landscape architecture is not advanced enough. According to the current situation of landscape design in Chinese gardens, traditional experience and imitation of other works are often the main design methods. In this application scenario of landscape architecture design, it will inevitably lead to innovation and uniqueness in landscape design [6–8]. At the same time, there is no certain concept of environmental protection in the design process, such as blind pursuit of beauty. Therefore, its design is often difficult to effectively play the actual utility of the landscape in the garden. At the present stage, China advocates the development of green economy. The precondition of green economy is to protect the environment and then promote the rapid development of economy on the basis of it again [9]. In addition, due to the involvement different cities, there will be great differences in culture, coupled with the existence of the same human characteristics, and landscape design can only fully reflect these different characteristics to meet the real needs of landscape design. However, in the current landscape design, these different properties are ignored, leading to appear in the landscape design a lot of similar scenes.

Second, the technical level of landscape design needs to be further improved. In the design of landscape architecture, art, and technology are usually integrated, which not only involves many fields, but also requires designers to have a rich variety of professional knowledge and technology, so that more different styles of landscape design can be completed with high quality and efficiency. However, in the current landscape design, designers do not have more professional expertise and technology, and cannot integrate art and technology [10–12]. Therefore, it will have a certain impact on the quality and effect of landscape design. In addition, due to the relatively backward construction technology of gardening landscape in our country at this stage, even if a large number of high-quality designs are developed, it is difficult to implement them in gardens, which will lead to the setback of gardening landscape design.

Finally, there are often differences between design and reality. From the original intention of landscape design, it is a way to reflect the improvement of living environment and landscape design. However, for different areas, their living environment also has different characteristics, and considering different places, the climate and culture are also different. Therefore, when designing landscape architecture, it should be based on local actual needs to ensure that the landscape design conforms to the actual situation [13]. In the real society, some landscape gardens have invested a lot of manpower, material, and financial resources in the design process, but they have not got relatively excellent design scheme. This is because before the gardening landscape design work, no comprehensive collection and collation of data, coupled with the fact that the city is not the main basis, will have a big impact on the effect of the entire design [14].

On this basis, in order to ensure that the design of landscape architecture can be synchronized with the times, improve the efficiency of design planning, and develop high design technology. Therefore, the introduction of advanced

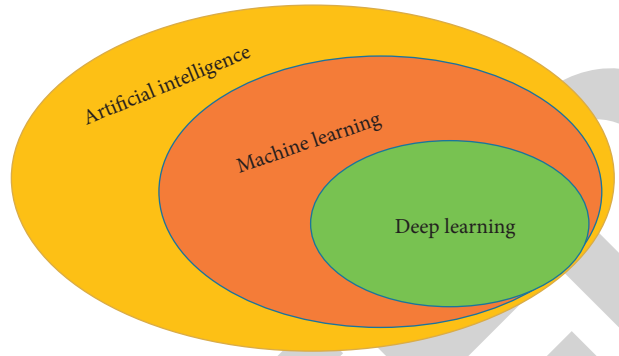

Figure 1: Scope of AI technology.

AI technology ensures that the leading technology in combination with landscape design, so as to maximize the effectiveness of landscape design.

2. Principles of Artificial Intelligence Platform

Artificial intelligence (AI) is a comprehensive technology to simulate various human behaviors with the help of high-performance computing platform on the basis of studying human behavior rules and thinking modes [15–17]. It mainly includes machine learning and in-depth learning technology, as shown in Figure 1. Until now, in the research of AI technology, the practical significance of intelligence has not been well reflected, often closely combined with human. However, through nearly 50 years of research, AI technology has been widely developed in all areas of the world. For example, in machine manufacturing, these technologies fully reflect the advantages of AI. Further development of AI technology can create a more intelligent society for people. From this aspect of landscape design, designers often combine artistic features with science and technology to artificially transform a certain area of the city and create a harmonious and beautiful urban atmosphere between people and nature, which is landscape design. Therefore, virtual tour technology, media, and multimedia technology are mainly used in landscape design [18].

2.1. AI Technology. There are two types of artificial intelligence: simulation, deduction, demonstration, and algorithm. The simulation deduction and demonstration further subdivide artificial intelligence into "reasoning type" capable of logical reasoning and theorem proving; "learning type" capable of deep learning and support vector machine; it is a "knowledge-based" expert system. The algorithm divides artificial intelligence into "symbolism" type that uses logical reasoning method to deduce the whole theoretical system to simulate the process of human like intelligence; the "connectionist" type that uses machines to simulate the neural system and connection mode of the human brain; a new method of controlling intelligence through behavioral activities is "behaviorism" with quantitative research attributes. According to the functions and attributes of artificial intelligence technology and its application in landscape architecture research, there are three types of artificial

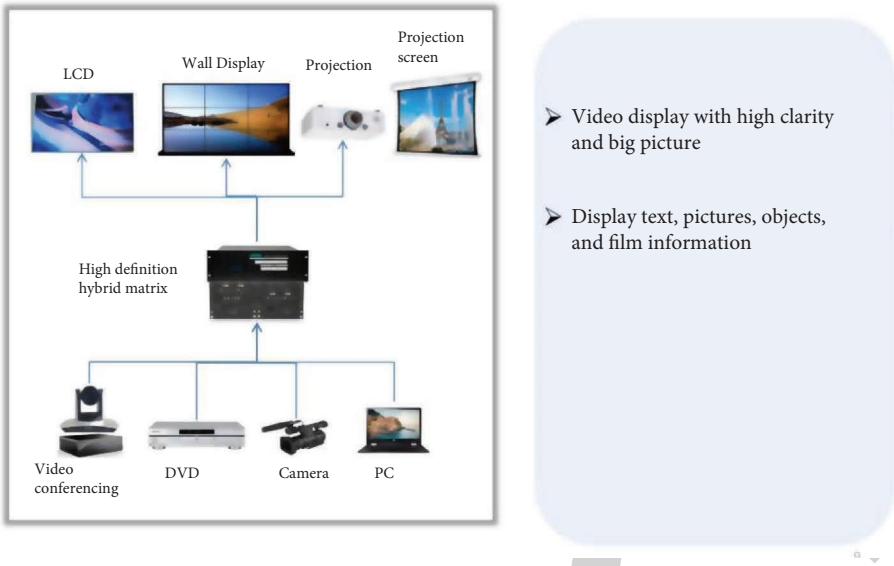

Figure 2: Virtual roaming technology architecture.

intelligence technology currently applied in landscape architecture: intelligent random optimization, artificial life, and machine learning.

Random optimization method is an optimization algorithm that generates and utilizes random elements. Randomness includes two aspects, one is the randomness of the data, and the other is the randomness of the algorithm itself. In the research of landscape architecture, intelligent random optimization method is mainly used to seek the optimal solution of optimization problems. Because the time cost of trying all possible solutions to find the optimal solution is too high, and the random optimization method speeds up the search process, it is easy to find the global optimal solution. Genetic algorithm and simulated annealing are common stochastic optimization methods.

Machine learning includes three types: (1) it directly simulates the tree process of human judgment on concepts, and its representative algorithm is decision tree, which is called semiotic learning. (2) Connectionist learning, represented by artificial neural network, has the best application effect in the field of engineering. (3) It mainly combines the theoretical achievements of inferential statistics, which is represented by support vector machine, so it is called statistical learning. Machine learning can mainly solve the impact of each element on landscape results, scoring problems, and classification problems in landscape architecture. Connectionist learning and symbolism are widely used, such as convolutional neural networks, artificial neural networks, random forests, and decision trees and so on.

2.2. Virtual Roaming Technology. In recent years, with the rapid development of virtual three-dimensional technology, there are many new branches of virtual reality technology, among which virtual tour is an innovative development of virtual reality technology [19–21]. Virtual tours are often used to showcase design results and put people in a virtual three-dimensional environment. Through dynamic interaction, the immersion type of multi-angle and omnidirectional inspection of future buildings is carried out. This is beyond the traditional architectural effect maps. Virtual tour technology showcases the design results while also considering the overall audience. The architecture of the multimedia system is shown in Figure 2.

2.3. Landscape Design with the Media or Multimedia. With the continuous development of science and technology, various countries have increased their research efforts on new media, an emerging industry, and promoted the development of new media in many fields. In urban landscape design, multimedia is designed from a more scientific, advanced, and diversified perspective, matching with the information network of modern society, broadening the scope of design, broadening people's horizon, and changing the traditional design theory. The perfect integration of new media and landscape design marks the initial formation of modern urban landscape design, and also reflects the inextricable connection between them. The emergence of new media has made the Chinese urban landscape design transition and transformation from traditional artificial design to more modern design. New media art can not only give modern landscape design a new life, but also help designers directly absorb nutrients and knowledge through the visual experience and intuitive feeling conveyed by new media. New media use computers and other equipment to process information and images, use information and digital technology means for landscape design, expand the creative space, so that the human design concept and computer together organically, and is an important breakthrough in design [22, 23]. This has significantly broadened the original boundaries and scope. Using only multimedia for landscape design, as shown in Figure 3, is more intuitive with animation effects and certain visualizations.

In modern garden landscape design, we adopt advanced digital media technology, give full play to the advantages of

Figure 3: Visualization of landscape design using multimedia technology.

digital media technology, integrate landscape design resources, combine the application of modern design elements, form diversified design styles, and meet the personalized needs of modern people for landscape with the support of rich landscape design content. During the use of digital media technology, we can integrate the elements of the times, adjust the design style and scheme content, and automatically convert and process different design forms, so as to ensure that design is no longer limited to traditional paper design, but with the help of digital media technology, we can introduce innovative design ideas and modern design elements to form a more diversified and three-dimensional aesthetic orientation. Using digital media technology to carry out garden landscape design can integrate application, transform application, refine application design elements, integrate with modern social elements, and improve the aesthetics of design. On the one hand, digital media technology is used in the specific design. With the support of advanced technology, various artistic elements are readjusted and processed to integrate into modern design and enhance the sense of design art; on the other hand, through the network platform in digital media technology, we can provide a variety of aesthetic options, so that the design content is full of strong sense of art, and increase the artistic expression channel of the design, so that we can collect more creative content and elements of garden landscape design with the help of advanced digital media technology, and fundamentally improve the aesthetics of the design. In the process of innovative use of advanced digital media technology, the quality and level of each design can be improved. The application of digital media technology can broaden the scope of relevant design, integrate art theoretical knowledge and design practice, and broaden the source channel of design art and creativity; ensure the depth of design, create a mature landscape design system, ensure the efficient implementation of design work, and fundamentally improve the design quality and effect; by using the analog system and design research system in digital media technology, this paper analyzes whether there are problems in landscape architecture design and puts forward corresponding rectification suggestions and countermeasures. Through effective measures, complete the tasks of landscape architecture design, improve the current development situation, highlight the positive role and advantages of digital media technology in landscape architecture design, and form a systematic working mode and system.

3. Relationship between Landscape Design and Artificial Intelligence

In the modern landscape design, the design concept is backward and the technical level is not high. Design divorced from practical problems, the emergence of artificial intelligence technology, can solve these problems to a large extent. Changing landscape design with intelligent design not only allows us to play better, but also to engage with our environment more effectively, like smart lighting. In this way, we are not only protected from light pollution, but also can be a free man living in harmony with ourselves [24]. The combination of intelligent public facilities and background music not only brings people a kind of enjoyment, but also helps relieve people's psychological pressure. A large part of the carrier of landscape design is green plants and public facilities. In the past, park landscape was mostly for its own amusement, and artificial intelligence landscape can share the source, protect the environment, and help each other. Intelligent garden design is also conducive to the promotion of local cultural customs and do complement each other. Under the premise of not violating the law of nature, set a variety of interests as one.

The elements of landscape planning and design include natural landscape elements and artificial landscape elements. Among them, natural landscape elements mainly refer to natural landscapes, such as large and small hills, ancient and famous trees, stones, rivers, lakes, oceans, etc., The artificial landscape elements mainly include cultural relics, cultural

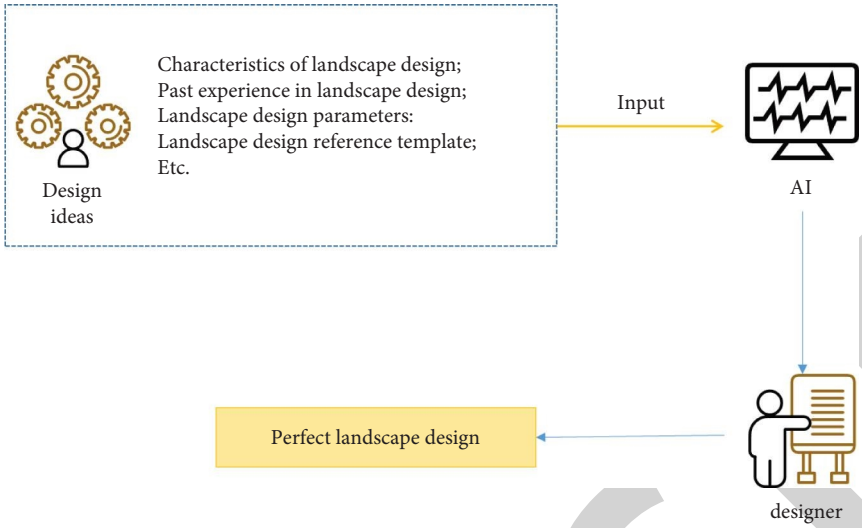

Figure 4: Relationship between designer and AI landscape design.

sites, landscaping, art sketches, trade fairs, buildings, squares, etc., These landscape elements provide a lot of materials for creating a high-quality urban space environment. However, to form a unique urban landscape, it is necessary to systematically organize various landscape elements and combine geomancy to form a complete and harmonious landscape system and an orderly spatial form.

The gradual improvement of scientific and technological level has played a great role in promoting the development of AI technology [25]. In landscape design, the application of AI technology can often effectively solve many adverse factors in the process of landscape design. In the past, some technical problems were often involved in the work of landscape design. It is difficult to ensure efficient and fast solution of problems when some technicians do not have enough knowledge reserve. In the long run, the quality and effect of landscape design will be affected. The application of artificial intelligence technology in landscape design not only helps to avoid light pollution, provides opportunities to get along with nature, but also alleviates psychological pressure. In addition, landscape design focuses on green plants and public facilities. On this basis, the application of artificial intelligence technology can achieve artificial intelligence landscape, promote resource sharing, provide favorable conditions for the complementary of landscape design and local culture, and ensure the maximum improvement of the actual benefits of the landscape.

At present, the concept of landscape design is still not closely related to society, so it is easy to see scenes where the design scheme does not conform to the actual situation. Therefore, the application of AI technology to design can greatly avoid such problems. In the process of landscape design in the current society, a large amount of information needs to be collected and sorted out in advance by designers, and there are also many technical problems that need to be adjusted, which requires designers to have enough knowledge reserve. Through the application of AI technology, computer programs will complete their own retrieval, collation and display of required data, technical data, similar designs, which to some extent reduces the difficulty of design. The relationship between designers and AI design is shown in Figure 4. At the same time, the introduction of AI into landscape design can provide better conditions for the combination of human and environment. For example, according to AI lighting technology, light pollution can be effectively adjusted, and the actual utility of landscape can be further enhanced.

Rebuilding landscape design with intelligent design not only allows us to have a better recreation, but also allows us to participate more effectively in the environment. Intelligent lighting, for example, not only keeps us free from light pollution, but also makes us a free person living in harmony with nature. The combination of intelligent public facilities and background music can not only bring people a kind of enjoyment of life, but also help to alleviate people's psychological pressure.

4. The Role of Artificial Intelligence in Landscape Design

As shown in Figure 5, each step of the landscape design phase can be participated in by AI technology.

4.1. Site Condition Analysis Phase. Investigation and analysis of site conditions is a key task of modern landscape design and a basic element to ensure the high practicability of design schemes. In this stage of practice, many projects can be completed using artificial intelligence technology.

For example, in the process of remotely scanning and taking pictures of a hill using an unmanned aerial vehicle, a 3D image of the hill in the range needs to be generated in the software and the corresponding vertical information obtained. In this section, manual operations are still required during the above operations. Once the routes are set, the UAV can automate the acquisition of required data information based on the settings. Similarly, in the landscape design, human behavior needs to be considered, and the

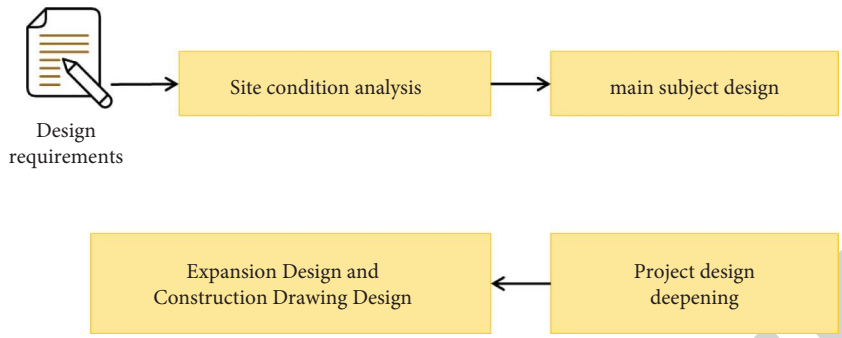

Figure 5: Landscape design stage steps.

Figure 6: Design elements and drawings in AI.

behavior of human in the landscape needs to be analyzed in advance in Guilin. The traditional way of working for this task is to make final design decisions based on-site survey, planning information and work experience around the site. By using AI technology, the software system can automatically analyze and determine the direction and pattern of crowd gathering, avoiding the subjectivity of experience.

4.2. Project Conceptual Design Phase. In the concept stage of landscape greening, designers are required to complete the preliminary design drawings according to the actual needs. However, due to some subjective and relatively abstract needs, the current level of AI technology can hardly be completed by itself, and manual help is still needed. However, it is not impossible to design with AI. Current AI technology has a high advantage in collecting information. In the original process of finding ideas, designers tend to store according to their previous experience, relying on the past design, although it will be efficient, but easy to produce uniform but poor results. But now, with the help of AI technology, AI can automatically retrieve and store related designs, or it can automatically design based on large data. The elements and design drawings in AI are shown in Figure 6. Designers just need to enter keywords into the AI system to get new designs and enhance their uniqueness.

4.3. Design Deepening Stage. AI technology plays a more advantageous role in the design deepening phase, especially because the conceptual framework has been initially defined in the previous conceptual design phase of the project. So, this stage only needs to start the specific work layout, including material selection, color matching, determining the size of each detail part, each streamline relationship, the distribution of each function space, and so on. At this point, AI technology can help designers make decisions.

4.4. Expansion Design Phase and Construction Drawing Design Phase. When this stage is reached, the landscape design scheme has initially emerged, which can quickly achieve the operability of the scheme according to AI and solve its potential minor imperfections. At the same time, if the design needs need to be changed, AI technology can give full play to its advantages and help designers to adjust and change the landscape design through artificial intelligence technology.

Taking artificial neural network (ANN) as an example, ANN can interact with the real world like biological neural system and is composed of simple units and parallel interconnected networks. In the field of cognitive science and machine learning, artificial neural networks have learning ability. The network will automatically recognize

similar images through learning. This function is of a great significance to the prediction problem in the field of landscape architecture; moreover, it has strong expression ability and can fully approach complex nonlinear relations. The ability of associative memory is also a feature of artificial neural networks. When modifying or adding new features, only the parameters corresponding to the new features are trained, which has little effect on the original network parameters. Therefore, artificial neural network can provide scientific and efficient research methods and theoretical basis for landscape architecture design and resource management. In recent years, artificial neural networks have been widely used in simulation prediction, evaluation, and landscape classification.

5. Application of AI in Landscape Design

Through the intervention of AI technology, the landscape construction has begun to transform from traditional to modern, and the design mode of AI has endowed the modern landscape construction with new significance. In the past, traditional design concepts pursued practicality and function, ignoring the satisfaction of aesthetic feelings. AI uses computers to make perfect processing in graphics, sound and animation, and brings wonderful visual experience to people, so as to produce beautiful effects. The new design method innovates the landscape design, satisfies people's pursuit of beauty, and makes the modern landscape design enter a new era. [26–28]. Artificial intelligence will energy technology applied in the landscape construction, can make up for the inadequacy of human technology, break through the technical problems, artificial unable to complete the construction work, for example, in the early stages of the design, artificial intelligence can be used to calculate the accurate virtual images, simulate the real design, improve design scheme is practical and scientific nature in the design stage of implementation. artificial intelligence can calculate the actual topography, climate, temperature, and other corresponding plant and structural material types through a large amount of data, so as to carry out site construction more scientifically and effectively, and achieve the purpose of improving the quality of the project [29, 30].

5.1. Application of AI in Landscape Architecture Construction. The application of artificial intelligence technology in gardening construction can make up for the shortage of artificial technology, break through the technical difficulties, and complete the construction work that cannot be completed by artificial. For example, at the beginning of the design, artificial intelligence is used to calculate accurate virtual images and simulate real design scenarios, so as to improve the feasibility and scientific of the design scheme. In the design and implementation stage, AI can calculate plant species and building materials corresponding to the actual terrain, climate, and temperature through large data, so as to carry out field construction more scientifically and effectively, and to achieve the purpose of improving the project quality.

5.2. Application of AI in Water Landscape Design. Water landscape plays an important role in landscape design, and its design is often closely related to the effect of the whole landscape design. In the past landscape design, fake waterfalls, artificial hills, simulated fountains, and so on will be introduced to expand and enrich the landscape of the whole garden. Such a design can bring visual appreciation to a certain extent, but lacks vitality, cyclicity, and sustainability, and has a relatively high maintenance costs in the later stage, and is easy to cause tourists to fall into aesthetic fatigue. Based on this, AI technology will play a very important role in water landscape design.

In practice, the role of smart sensor technology can be fully used to form light shadows pools, music fountains, and so on, to build a water landscape system with sustainable recycling performance, giving more vitality to the water landscape. For example, you can set up an open space in the center of a fountain and install a gravity sensor on its bottom. When the gravity of the corresponding surface area reaches a certain value, the flow of water and light from the surrounding fountain turns on and stops within 30–60 seconds. At this time, people can take photos and play in the center of the fountain to interact with the water view. In this way, the purpose of improving the effect of water landscape design is achieved, and the upgrade of the whole modern landscape design is also promoted, the flow of which is shown in Figure 7.

5.3. Application of AI in Ground Paving. In landscape design, the paving of the ground should first have a hardening effect and preferably be enjoyable to enhance the visual aesthetics. However, the traditional floor paving only has a hardening effect, it is just an ordinary paving, wasting the value of appreciation [31]. Using large data in AI technology for color analysis and changing the color of the ground paving according to different natural light can make the paving not only have hardening effect, but also display certain visual effect, and achieve the unified design effect of aesthetics and function.

Ground paving is also an important content in modern landscape design. On the basis of guaranteeing its intensity (guaranteeing its function), we need to further optimize its visual effect and aesthetic level. However, in the past landscape paving design, under the condition of ensuring the overall function, it is difficult to obtain more rich and diverse visual effects, and the overall aesthetic feeling is not ideal. With the application of artificial intelligence technology, the above design goals can be achieved and the coexistence of function and aesthetics can be achieved. In practice, large data technology can be used to carry out color analysis, adjust the color of ground paving according to natural light, and improve the aesthetic degree of garden tiles, as shown in Figure 8. At the same time, it can also play the advantage of projection technology, put dynamic images on the ground, and promote the upgrade of landscape ground paving design.

In addition, when carrying out ground paving design relying on artificial intelligence technology, you can also

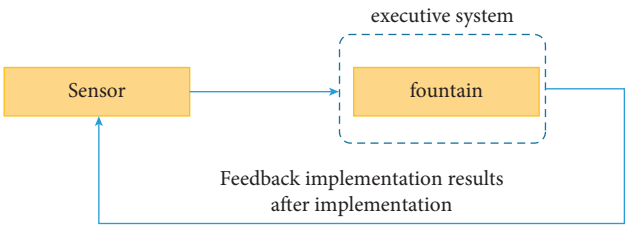

Figure 7: Intelligent water landscape design diagram.

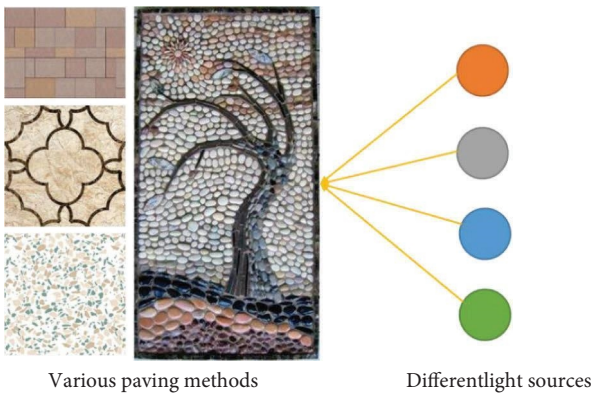

Figure 8: Dynamic adjustment of the paving image under different light sources.

refer to the setting of "stair piano" to create similar landscapes such as "ground piano board," which will attract people to the landscape garden experience, realize the interaction between the landscape and people, and enrich people's experience. This will make the landscape interact with people and enrich their experience.

5.4. The Application of Artificial Intelligence in Visual Lighting. In the past, in landscape design, lighting paid more attention to function (lighting) and atmosphere adjustment, and relatively ignored the aspects of humanization and interaction. The emergence of artificial intelligence technology has brought a new visual experience to lighting design. The application of artificial intelligence technology can bring more rich visual experience to people and make up for the defects of lighting landscape design in the past landscape architecture. For example, smart lighting includes an intelligent sensor system that can effectively perceive the light in the environment, and on this basis, adjusts the light intensity and color of the lighting to reflect the humanization and interaction of the lighting landscape.

In practice, artificial intelligence technology is widely used in three aspects of modern landscape lighting design:

(1) time controller and latitude and longitude controller. Based on the change of latitude and longitude in different areas, the accurate prediction of time change can be achieved, and on this basis, the landscape lighting system can be intelligently controlled.

(2) GPRS wireless landscape lighting remote monitoring device. With this equipment, the gardening administrator can grasp the actual operation of all the lights in the gardens in real time, comprehensively and truthfully. Through the analysis of these data information, the parameters such as the electrical power of lighting fixtures can be determined, which can provide data information support for fault analysis and treatment, and ensure the long-term stable operation of the lighting system in gardens.

(3) Semiconductor landscape lighting. Depending on the reasonable adjustment of lighting time and intensity, and on the basis of meeting the actual lighting needs of modern landscape gardens, the use of electric energy is reduced.

In the future, landscape design and artificial intelligence technology can also be applied in more areas, such as: the intellectualization of background music, combining people with music, can not only heal the mind, enlighten life, but also promote national culture; intelligent lighting not only combines buildings with people organically, but also creates a living place free from light and pollution to better entertain the public without affecting others. Intelligence of public facilities, such as changing some garbage cans to smart robot garbage cans, can be moved to facilitate garbage disposal etc.,

6. Discussion on the Application of AI in Landscape Design

Will designers be replaced by AI? What is the meaning?

It is found that the algorithm can summarize the universal laws of site design through a large number of mature cases, such as "the relationship between layout and site conditions," "the relationship between the layout in the park and the layout outside the park," "the relationship between spatial functions and specific design language," and even summarize some abstract design feature information. However, the design work is far from this. Take a common example of design work. Assuming that a large-scale country park is to be planned at this time, it is likely to experience the following situations: party A proposes that it should adhere to national policies and make "characteristics," but the budget is not high. After a week of discussion, we finally decided to take "carbon neutrality" as the main goal. At this time, I immediately encountered a new problem: how to calculate the carbon reserves? How to balance the revenue and expenditure of carbon source and carbon sink? After another week of discussion, the overall technical route was finally defined. However, once the report was made, there was a new problem: how to make features? At this time, we need to summarize the existing relevant planning and design cases, study the characteristics of the site, and study how to put forward a scientific and objective overall planning and design scheme for the site under the condition of low budget. In the course of design revision, we will also face various problems, ranging from land policy and ecological pattern to special budget, materials, and plant selection. In contrast, a designer is an expert in solving problems, and landscape architecture is a comprehensive discipline that balances society, nature, and economy. These are the meanings of

designers' existence, and also abstract problems that cannot be solved by AI alone. Therefore, automatic design is only a link in the design work.

Therefore, the application of artificial intelligence in landscape architecture design belongs to the exploration of new productivity in landscape architecture industry and the exploration of new production forms in landscape architecture industry. As the landscape architecture industry has become normal to work overtime and stay up late for repetitive drawing, the generation system driven by artificial intelligence can also achieve the production efficiency of thousands of solutions per second. Why is such an amazing productivity meaningless? And mining the universal laws in planning and design with the help of generative confrontation network to build a new human-machine collaboration method, which is only focused on the application research of a small stage in the design industry workflow. The comprehensive intelligent upgrading combining BIM, Lim, UAV, Internet of Things and other cutting-edge technologies will come in the near future, and the new human-machine cooperation forms matching the new productivity will also be accelerated.

7. Conclusion

Explore a more technical parameterized design method for architectural landscape design, combining artificial intelligence with landscape planning and design, and developing a landscape planning and design method that integrates artificial intelligence parameterized analysis. This is a new design branch, which is an extension of landscape design method based on artificial intelligence technology.

Multimedia is becoming more and more important in landscape applications. Due to the public demand and the diversity of social strata, contemporary landscape also shows a diversified trend. Although the future landscape may not necessarily be developed in the direction of multimedia, the future landscape will increasingly use multimedia technology, which represents one of the future directions of landscape development.

Electronic information expressed by multimedia devices has become an important element of landscape design, carrying the fusion of different cultures and technologies in a new form.

8. Limitations and Future Work

Although artificial intelligence technology is more and more applied in landscape architecture research, the ability of artificial intelligence to solve the uncertainty and complexity problems of landscape architecture still fails to meet people's pre-requirements, and it is even more difficult to integrate the uncertainty and complexity problems of landscape architecture into a system framework. First of all, the technology of integrating a variety of artificial intelligence methods is not perfect. At present, there is no more suitable advanced architecture for integrating a variety of artificial intelligence methods. Secondly, to build an artificial intelligence model in landscape architecture research, we need not only landscape architecture knowledge, but also computer science, geography, biology, and other multidisciplinary knowledge. If there is a lack of professional knowledge, we cannot build an ideal artificial intelligence model. This requires that each modeler should have a wide range of knowledge. Although the application of artificial intelligence technology in landscape architecture is not mature at present, with the rapid development of artificial intelligence technology, more artificial intelligence will be applied to landscape architecture research. The intelligent development of landscape architecture in the future needs to actively try to integrate a variety of technologies to establish a landscape model with mixed artificial intelligence methods, and accelerate the automation level of landscape architecture research.

Data Availability

The experimental data used to support the findings of this study are available from the author upon request.

Conflicts of Interest

The author declares no conflicts of interest regarding the present study.

References

[1] T. Teng and C. Qu, "Urban landscape design based on sustainable development innovation," *Open House International*, vol. 43, no. 1, pp. 68–72, 2018.

[2] E. B. Rogers, *Landscape Design: A Cultural and Architectural History*, Harry N. Abrams, China, 2001.

[3] M. L. Cadenasso and S. Pickett, "Urban principles for ecological landscape design and maintenance: scientific fundamentals," *Cities & the Environment*, vol. 1, no. 2, pp. 9–13, 2008.

[4] H. Liu and Y. P. Xia, "Aquatic plants in landscape design," *Journal of Chinese Landscape Architecture*, vol. 1, no. 9, pp. 4120–4132, 2003.

[5] O. Dusan, "Landscape architecture and its articulation into landscape planning and landscape design," *Landscape and Urban Planning*, vol. 4, no. 8, pp. 41–52, 1994.

[6] H. Yang, B. Y. Liu, and U. Patrick, "Traditional Chinese medicine as a framework and guidelines for therapeutic garden design," *Chinese Landscape Architecture*, vol. 11, no. 7, pp. 36–42, 2009.

[7] L. I. Bo-Gang, "The connotation of plant culture in Chinese classical garden and its enlightenment for modern garden design," *Journal of Anhui Agricultural Sciences*, vol. 6, no. 9, pp. 42–48, 2009.

[8] S. S. A. Sun, "Study of the theories of Chinese landscape planting related to the compositon of garden design," *Acta Horticulturae Sinica*, vol. 234, p. 23, 1964.

[9] R. C. Corry and J. I. Nassauer, "Limitations of using landscape pattern indices to evaluate the ecological consequences of alternative plans and designs," *Landscape and Urban Planning*, vol. 72, no. 4, pp. 265–280, 2005.

[10] M. Najafi, K. Zhang, and M. Sadoghi, "Hardware acceleration landscape for distributed real-time analytics: virtues and limitations," in *Proceedings of the 2017 IEEE 37th*

International Conference on Distributed Computing Systems (ICDCS), Atlanta, GA, USA, 05-08 June 2017.

[11] G. Paolinelli, M. Cei, N. Cristiani, L. Marinaro, and F. Veronesi, "Don't split them up! Landscape design of multifunctional open spaces suitable for coping with flash floods and river floods," *Sustainability*, vol. 14, no. 4, pp. 2316–4142, 2022.

[12] J. Bai and Y. Tang, "Application of landscape trilism in landscape design of rural public spaces:A case study of landscape restoration in Villagers'Committee of madian village," *Landscape Research: English version*, vol. 14, no. 3, p. 5, 2022.

[13] G. Sun, X. Niu, and W. Liu, "Analysis on the experimental teaching reform of landscape design under the new situation," *Asian Agricultural Research*, vol. 14, no. 4, p. 2, 2022.

[14] M. Hein, A. Pusch, and S. Heusler, "Modeling in nuclear physics: a visual approach to the limitations of the semi-empirical mass formula," *European Journal of Physics*, vol. 39, no. 4, pp. 315–346, 2022.

[15] D. Wall, *Enhancing diagnosis of disorder through artificial intelligence and mobile health technologies without compromising accuracy*, US, US20140304200 A1[P], 2021.

[16] C. Maduabuchi, "Thermo-mechanical optimization of thermoelectric generators using deep learning artificial intelligence algorithms fed with verified finite element simulation data," *Applied Energy*, vol. 315, p. 118943, 2022.

[17] C. J. Wei, S. Zou, and B. Tao, "Research about rain flood management in campus landscape design," *International Seminar on Artificial Intelligence, Networking & Information Technology*, vol. 22, no. 99, pp. 47–60, 2017.

[18] N. Leach, "Design in the age of artificial intelligence," *Landscape Architecture Frontiers*, vol. 6, no. 2, p. 8, 2018.

[19] L. Shi and X. I. Ruibo, "Research on the application and development of computer virtual technology in urban landscape planning and design," *Automation & Instrumentation*, vol. 39, no. 4, pp. 315–346, 2018.

[20] X. Luo, D. D. Zhao, and L. I. Sheng-Ao, "3D model optimization and roaming analysis of virtual landscape with big data amount," *The Journal of New Industrialization*, vol. 3, no. 4, pp. 310–326, 2019.

[21] L. Chen, H. Wang, and L. Chen, "Research on dynamic simulation of landscape design based on Quest3D technology," *Revista de la Facultad de Ingenieria*, vol. 32, no. 5, pp. 677–685, 2017.

[22] Y. Wang, J. Wang, and S. O. Art, "Study on the development of urban ecotourism:A case study of the bund of shanghai," *Journal of Landscape Research*, vol. 18, no. 5, pp. 97–106, 2013.

[23] G. Zhang and X. Kou, "Research and application of new media urban landscape design method based on 5G virtual reality," *Journal of Intelligent and Fuzzy Systems*, no. 1, pp. 1–9, 2021.

[24] M. Liu and S. Nijhuis, "The application of advanced mapping methods and tools for spatial-visual analysis in landscape design practice," *Sustainability*, vol. 2021, no. 13, p. 34, 2021.

[25] M. Fan, A. A. Jamaludin, and H. Hussein, "Wellbeing in an Urban University: sensory perception for salutogenic landscape design," *Journal of ASIAN Behavioural Studies*, vol. 5, no. 16, pp. 65–80, 2020.

[26] W. Zhang, "Application of artificial intelligence in landscape design," *Value Engineering*, vol. 56, p. 897, 2012.

[27] S. Sun, Q. Meng, and Y. Ma, "Application of virtual reality technology in landscape design," in *Proceedings of the 2021 International Symposium on Artificial Intelligence and its Application on Media (ISAIAM)*, vol. 28, no. 1, pp. 218–221, Xi'an, China, May 2021.

[28] Y. Wu, S. Xue, and M. Zhao, "Construction and application of digital landscape design under the background of smart landscape," *Digit*, vol. 43, p. 8734, 2020.

[29] B. Goertzel and G. Yu, "From here to AGI: a roadmap to the realization of human-level artificial general intelligence," in *Proceedings of the International Joint Conference on Neural Networks*, vol. 61, no. 2, pp. 1719–1733, IEEE, Beijing, China, July 2014.

[30] E. A. Beever and A. Woodward, "Design of ecoregional monitoring in conservation areas of high-latitude ecosystems under contemporary climate change," *Biological Conservation*, vol. 144, no. 5, pp. 1258–1269, 2011.

[31] L. . Zou, "Application of artificial intelligence algorithm in visual guidance of industrial robot," *Journal of Physics: Conference Series*, vol. 1533, no. 3, p. 032087, 2020.