Implementation of Landscape Design Instructional System Based on CAD

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Abstract. Computer aided design (CAD) modeling technology has the characteristics of simplicity, high efficiency and wide application, which plays an important role in landscape design teaching in universities, and also effectively makes up for the shortcomings of traditional landscape design teaching. As educators, they shoulder the heavy responsibility of cultivating outstanding talents for the country. How to use computer-aided software to teach landscape design is an urgent problem for relevant researchers. This article expounds the application and characteristics of CAD in the establishment, planning, design and rendering of landscape modeling system, and puts forward a landscape simulation design algorithm based on generative countermeasure network (GAN). Through the 3D reconstruction method of computer vision features, the landscape spatial environment design and image visual reconstruction are realized. It is not difficult to see from the results that the quality of visual reconstruction of landscape spatial environment design images using this method is good. The reconstructed 3D landscape model basically reflects the 3D shape, surface color and pattern of the original object, which proves the feasibility of this scheme.

Keywords: CAD; Landscape Design; Instructional System
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1 INTRODUCTION

Landscape design should not only be integrated with the landscape system and layout of urban areas, but also reflect the characteristics of regional context and satisfy people's spiritual and visual enjoyment. The computational modeling of climate change is an important tool that can help us understand and predict the impact of climate change on the environment and ecosystems. This modeling method can also be used to design adaptive and sustainable building and urban systems. Ackerman et al. [1] aim to address climate change and other environmental challenges by designing landscapes and urban systems that are adaptable and sustainable. This approach emphasizes designing resilient buildings and urban systems to adapt to constantly changing climate and environmental conditions. Simulation and visualization are important tools that can help us understand and predict the impact of climate change on buildings and urban systems. Through simulation and visualization, we can predict the performance and impact of building and urban systems under different climatic conditions, and evaluate the effectiveness of different design schemes and strategies. 3D renderings, garden animation and other ways are applied to the display of landscaping effects, so that people can enjoy the pre-built landscape effects before the project is completed. In landscape architecture design, acoustic analysis is an important consideration as it directly affects the user experience and functionality of the building. Bar et al. [2] took Munich Airport as an example, acoustic analysis played an important role in the entire design process. Munich Airport is a large international airport, and its architectural design requires consideration of a large amount of noise and pedestrian flow. During the design process, architects need to conduct detailed acoustic analysis to ensure that the interior space of the airport provides a comfortable travel and work environment. In the design of Munich Airport, architects used various acoustic techniques to reduce noise inside the airport. For example, they used sound-absorbing materials and soundproof walls to reduce the noise during aircraft takeoff and landing, while also taking into account the noise of internal traffic. In addition, Munich Airport has designed an acoustic garden that uses special landscape design and plant arrangements to reduce noise inside the airport. The design of this garden is also based on the results of acoustic analysis. The addition of CAD makes the landscape design reach a higher level. In the current information age, the growth of sci & tech also promotes the wider application of CAD in landscape design, and gradually becomes the mainstream way of landscaping. Its design works should not only have visual beauty, but also be in harmony with the surrounding environment. Compared with other courses, CAD course in landscape design teaching has strong knowledge logic and high requirements for students' practical application. Because most students' basic computer operation skills are not high, it will be difficult to learn CAD drawing technology. Chen et al. [3] conducted an exploration of empowering algorithms for novice computational design to assist in architectural design. The exploration of empowering algorithms for computational design novices in architectural design aims to utilize computer-aided design (CAD) and artificial intelligence technology to provide empowering algorithms for novice designers and help them better complete architectural design tasks. Firstly, it is necessary to clarify the goals of architectural design tasks, such as designing a residential, commercial building, or public facility. According to the goals and requirements of the design task, select suitable computational design tools and algorithms, such as genetic algorithm, neural network, simulated annealing, etc. Use computer-aided design tools to create a three-dimensional architectural design space. This can help novice designers better understand the spatial structure and shape of buildings. Provide inspiration and suggestions for novice designers on design solutions, such as the shape, structure, and materials of buildings, through empowerment algorithms. Utilize computer-aided design tools and algorithms to optimize and improve design schemes to improve the quality and efficiency of architectural design.

With the development of technology, network models have been widely applied in many fields. Especially in the field of landscape technology, network models can effectively describe and analyze complex landscape ecosystems. Ge et al. [4] explored how to construct an intelligent education framework based on landscape technology network models to provide more effective and personalized landscape education. The garden technology network model is an effective tool for describing and analyzing garden ecosystems, with its core being a complex network composed of multiple elements and relationships. This network includes multiple nodes such as plants, soil, climate, biodiversity, human interference, and the interactions and dependencies between these nodes. The network model considers the garden ecosystem as a whole, emphasizing the interactions and dependencies between various elements, avoiding the limitations of studying single elements. Network models can simulate and predict the dynamic changes of garden ecosystems, thereby better understanding and mastering the laws of garden development. With the growth of sci & tech, computer design software has increasingly replaced traditional manual design, and 3D design software has given modeling design a more intuitive and convenient design method. Due to the continuous progress of computer vision technology, it plays more and more roles in society, and its functions are gradually enriched and improved. As a solid model in graphics, 3D models are usually polygonal representations of objects, which can display real-world objects and fictional objects. Designers originally drew charts by hand. With the help of CAD teaching, the landscape will have greater authenticity, the whole picture will be displayed intuitively, and the later modification process will become simpler. This article expounds the application and characteristics of CAD in the establishment, planning, design and rendering of landscape modeling system, puts forward the landscape simulation design algorithm based on GAN, and then innovates the use of CAD in landscape design instructional system.

Habib and Pradhan [5] analyzed the application of feature positions for converting CAD based topographic maps. Low-cost spatial tools need to be able to accurately convert terrain map feature positions to ensure the accuracy of the conversion results. It can easily and quickly convert topographic maps without requiring too many operational steps and professional skills. It can adapt to different terrain map conversion needs and has a certain degree of scalability. Understand the conversion methods and formulas between different coordinate systems, and be able to convert CAD topographic map coordinates into actual measurement coordinates or map coordinates. Master the processing methods of topographic maps, including data cleaning, coordinate conversion, map registration, etc. In summary, low-cost spatial tools for converting CAD based topographic map feature positions need to combine geodesy and cartography techniques, taking into account requirements for accuracy, ease of use, scalability, and cost, in order to achieve efficient, accurate, and low-cost topographic map transformation and analysis. CAD software is more and more used in landscape pattern optimization. 3D technology has been widely used in the field of landscape pattern optimization because it can accurately and truly show the shape of products. As the most intuitive and rich means to obtain information, graphics appear in people's daily life in various forms. The design of landscape lies in creativity, and it is in urgent need of tools that can predict the design effect, so that when the landscape is not formally built, the effect map can be seen and corrected in time. Compared with people's expectations, the current 3D modeling technology is still far away. There are many problems and limitations in practical application, and both the speed and accuracy of modeling need to be greatly improved. This article studies the use of CAD modeling technology based on GAN in landscape design instructional system. Hurkxkens and Bernhard [6] analyzed that distance functions and terrain modeling are important techniques in large-scale landscape design. This can help designers better understand and represent terrain and landforms. The distance function is a method of calculating the distance between two points and can be used in terrain modeling. In landscape design, designers can use distance functions to calculate the distance from any point in the terrain to the nearest water source, road, building, etc., providing a basis for decision-making such as vegetation planting and road design. Terrain modeling is the process of creating a three-dimensional terrain model using terrain data. In landscape design, terrain modeling can help designers better understand the form and characteristics of terrain, thus enabling better landscape design. For example, designers can use terrain modeling to calculate parameters such as slope, direction, and elevation of the terrain, in order to better make decisions on road design, drainage design, and other related issues. In short, distance functions and terrain modeling are important techniques that can help designers better understand and represent terrain and landforms. In landscape design, these technologies can be used to calculate parameters such as distance, slope, and elevation, providing a basis for decision-making in vegetation planting, road design, drainage design, and other related fields.

This article introduces the application of CAD in landscaping teaching, and puts forward a CAD modeling method based on GAN. The feasibility of this method in landscape design teaching is analyzed through simulation test. Finally, the contribution of this article to the innovation of landscaping teaching methods is summarized.

2 APPLICATION OF CAD IN LANDSCAPE DESIGN TEACHING

Li et al. [7] analyzed the application of a flipped classroom based on rainwater classroom in computer-aided landscape design teaching. Rainwater classroom and flipped classroom are both popular online education models in recent years. Rainwater Classroom is an online teaching platform based on internet technology, which can provide teaching through various forms such as video, audio, and text. It has the characteristics of flexibility, convenience, and efficiency. Flipped classroom is a new teaching mode that flips the traditional classroom teaching mode. Students learn through pre class preview, in class discussion, and post class reflection, while teachers teach through guidance, Q&A, evaluation, and other methods. Before class, teachers can record the course knowledge points into videos and upload them to the Rainwater Classroom, while providing relevant learning materials and task lists. Students preview by watching videos, reading materials, completing tasks, and recording any problems they encounter. In classroom teaching, teachers can provide in-depth explanations through discussions, demonstrations, case studies, and other methods based on students' previews. At the same time, teachers can guide students to engage in group discussions and cooperation, jointly solve problems, and promote students' communication and cooperation abilities. Lin [8] analyzed the topology algorithm for developing architectural conceptual design using an algorithm framework. When applying an algorithm framework to develop topology algorithms for architectural conceptual design, it is necessary to clarify what topology optimization is. In this context, topology optimization may mean finding the optimal solution in a design space that satisfies specific constraints such as structural stability, material usage, etc. The architectural conceptual design needs to be transformed into mathematical models that can be processed by computers. This may involve converting design parameters such as material strength, structural shape, weight requirements, etc. into mathematical expressions.

Develop Algorithm: At this stage, we will write code based on the selected algorithm. This may involve using Python, MATLAB, or other programming languages to write algorithms. After developing the preliminary algorithm, we need to test it to ensure that it can effectively solve our problem. If any issues are found, we may need to go back to the code and optimize the algorithm. Once our algorithm can effectively solve topology optimization problems, we can apply it to practical architectural conceptual design. At the same time, we can further explore how to extend the algorithm to handle more complex problems. Ma et al. [9] designed a network architecture teaching system using Auto CAD. Using Auto CAD to design a network architecture teaching system is a very effective method that can provide high-quality architectural design education for students and teachers. Auto CAD is a powerful computer-aided design (CAD) software widely used in construction, engineering, manufacturing, and other industries. Using Auto CAD software to draw architectural drawings, students can clearly see the details and elements of architectural design. Add interactive elements such as annotations, tags, and animations to enhance students' learning experience. Before system release, conduct testing and evaluation to ensure system stability and reliability. Using Auto CAD to design a network architecture teaching system is a very effective method that can provide high-quality architectural design education for students and teachers. By determining teaching objectives, designing user interfaces, creating course materials, using Auto CAD to draw architectural drawings, adding interactive elements, testing and evaluating, and publishing the system, you can create a successful network architecture teaching system. Nie et al. [10] analyzed feature matching of ancient building images based on grid and multi density. Feature matching of ancient architectural images is a complex but important task that involves multiple fields such as image processing, computer vision, and machine learning. After image preprocessing, use feature extraction methods suitable for ancient architectural images, such as edge detection, corner detection, spot detection, etc., to obtain key features in the image. Divide the ancient building image into multiple grids, each containing a certain number of pixels. This step helps to convert large-scale images into small-scale local features. Calculate the distribution of pixel density for each grid. Density can be simply defined as the ratio of the number of pixels to the grid area. If there is a significant difference in density between a certain grid and other grids, then this grid can be considered as an important feature. It should be noted that feature matching of ancient architectural images is a complex task that may require the combination of multiple technologies and methods to achieve good results. In addition, due to the diversity and complexity of ancient architectural images, specialized adjustments and optimizations may be needed for specific situations.

Participatory ecological landscape design is a landscape design method that emphasizes community participation and ecological sustainability. This design method aims to create a landscape that harmoniously coexists with the natural environment by collaborating with local communities, utilizing local knowledge and experience. Okasha and Mekkawy [11] used the NRIAG Ecological Park in Helwan, Egypt as an example to analyze successful cases of local cultural and ecological sustainability. NRIAG Ecological Park is a comprehensive park that integrates multiple functions such as water management, agricultural practices, scientific research, education, and leisure tourism. This collaborative approach helps to leverage local knowledge and experience, and integrate local culture and traditions into the design of the park. In the NRIAG Ecological Park, the designer utilized local vegetation and materials such as palm trees, date palm trees, and mud bricks to create a landscape that is coordinated with the local environment. Tai and Sung [12] conducted a computer-aided digital archive analysis of architectural spatial perception experiences. The computer-aided digital archiving of architectural spatial perception experience is a technology that utilizes computer-aided design and virtual reality. It utilizes computer-aided design software to conduct three-dimensional modeling of building spaces, including building structure, spatial form, decorative elements, etc. Import the 3D model into virtual reality software to generate a realistic virtual environment of building space. Through virtual reality technology, it is possible to simulate people's real feelings in architectural spaces and achieve interactive experiences. Through virtual reality technology, people can have interactive experiences in the virtual environment of architectural space, such as walking, observing, touching, etc. This can help people better understand the design intent and characteristics of architectural spaces. Mining and analyzing data in the virtual environment of architectural space, such as people's walking paths, concerns, interactive behaviors, etc. Wang [13] analyzed coastal landscape design based on virtual reality technology and intelligent algorithms. The application of virtual reality technology in coastal landscape design can provide designers with a new way of design and expression. Through virtual environments, designers can test and optimize their designs before actual construction, thereby reducing rework and waste. When designing coastal landscapes, an important factor that designers need to consider is the relationship between the landscape and the ocean. The ocean is a core element of coastal landscape, therefore, designers need to consider natural phenomena such as tides, currents, and waves in the ocean and integrate them into landscape design. Parametric design is a design method based on computer programs, which constructs designs by using variables and parameters. In landscape design, parametric design can be used to construct elements such as terrain, vegetation, and architecture. By adjusting parameters, designers can change the shape, size, color, and other attributes of the design to create different landscape effects. In coastal landscape design, parametric design can help designers better control the shape and layout of the landscape, thereby making it more in line with the natural environment and design requirements. Dynamic nonlinear parameterized environmental landscape art design is a computer-aided design method that uses nonlinear dynamic systems to create and design environmental landscapes. This method uses mathematical models and algorithms to simulate natural phenomena, and generates various forms and patterns by adjusting parameters. Yu et al. [14] created more dynamic, complex, and natural environmental landscape design by combining dynamic nonlinear parameterization with fractal. This design method can use computers to simulate natural phenomena and generate various forms and patterns by adjusting parameters. For example, this design method can be used to create dynamic landscapes that change over time, or to create natural landscapes with self-similarity. In summary, dynamic nonlinear parameterized environmental landscape art design and fractal are two closely related methods and concepts. By combining them, more dynamic, complex, and natural environmental landscape designs can be created.

In computer-aided collaborative design systems, the color effect of landscape design is very important. Color can affect people's emotions and psychological states, so it is necessary to fully consider the use of color in landscape design. Zhang and Deng [15] conducted computer-aided atmosphere matching design for color psychology. By using different color combinations, different atmospheres and effects can be created. In computer-aided collaborative design systems, multiple color matching tools and schemes can be used to achieve the best color matching effect. In landscape design, colors can be combined with different landscape elements (such as plants, water features, sculptures, etc.) to create more rich and vivid landscape effects. The computer-aided collaborative design system can simulate color combinations between different elements to achieve the best design results. In landscape design, colors can also be combined with space to create different spatial senses and visual effects. For example, dividing a space into different areas by using different colors, or guiding people's vision and actions through color gradients. Computer assisted collaborative design systems can help designers better grasp the combination of color and space. Zhao and Guo [16] analyzed the design of a web-based intelligent computer-aided network teaching system. The design of an intelligent computer-assisted network teaching system based on the Web differs greatly from traditional classroom teaching. The web-based intelligent computer-assisted online teaching system adopts the form of online teaching, and students can access the system through the internet without being limited by time and location, achieving autonomous learning. Traditional classroom teaching is conducted at a fixed time and place, and students need to attend classes in the classroom. A web-based intelligent computer-assisted network teaching system can access a wide range of teaching resources through the Internet. Through 3D CAD, virtual construction scenes can be generated, helping designers and construction personnel better understand and preview the construction effect, thus formulating more reasonable construction plans. In landscape design, 3D CAD can be used to add different levels of detail, such as terrain, vegetation, water features, etc., to achieve richer and more refined design effects. At the same time, design details can also be optimized, such as the position of landscape lighting fixtures and the shape of landscape sculptures. Zhao [17] can create realistic terrain models using 3D CAD, and designers can achieve the best design results by adjusting parameters such as terrain height, slope, and shape. In 3D CAD, different types of vegetation can be added and their density, distribution, size, and other parameters can be adjusted to achieve the best greening effect. 3D CAD can be used to create realistic water scenery effects, such as lakes, rivers, fountains, etc. Designers can achieve the best design effect by adjusting the shape, size, water flow speed, and other parameters of the waterscape. Zhou [18] analyzed VR based urban landscape art design based on computer-aided design. Through this approach, realistic virtual urban landscapes can be created, modified, and optimized to achieve the best design results. Firstly, it is necessary to develop a design plan for the urban landscape, which usually involves detailed planning and design of urban terrain, buildings, roads, greenery, and other aspects. Create a 3D model of urban landscape in CAD software, including elements such as buildings, roads, and greenery. This can be achieved using 3D modeling techniques. Import 3D models into VR software to generate realistic virtual urban landscapes.

3 METHODOLOGY

The 3D model recognition algorithm refers to extracting the features of a 3D model to form a feature library, then recognizing the features of the model as needed, searching and comparing the features in the already formed feature library, and finding the features closest to the model, so as to determine the category information of the model. There is no distinction between the outside of adjacent buildings. Many houses with different ownership, different floors and structural properties are divided together, not separated by lines, but simply drawn in the middle of buildings as dividing lines, and some dividing lines do not intersect with the boundaries of buildings, and some are also distributed in other layers, not completely separated into layers. This will cause the computer to mistakenly think that it is the same building that is not the same building after being imported into the 3D landscape model. For houses with different elevations, the modeling will also cause a weak sense of hierarchy and realism.

In this article, single-channel image data is obtained by image channel decomposition, and then edge detection is carried out. Channel decomposition decomposes the image into blue, green, red and transparent single-channel images. After the decomposed channel images are processed separately, they need to be reassembled into color images. When using polygonal solid modeling, it is often needed to add a smooth command to the shaped body, but the corresponding edge will be softened. The template of image modeling matches the garden as shown in Figure 1.

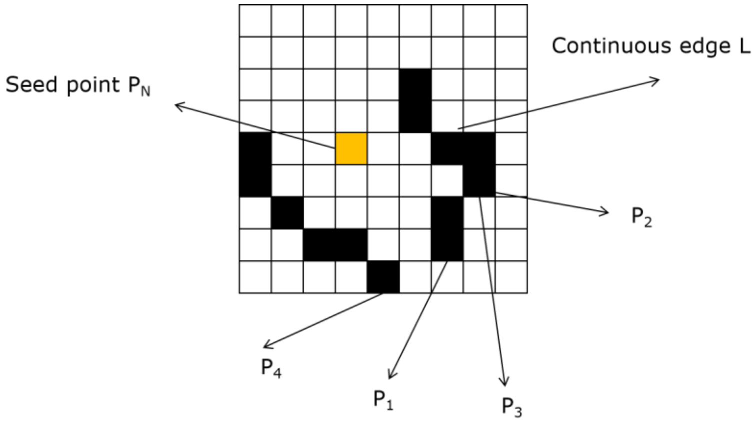


Figure 1: Template matching model.

In the virtual database, the design elements of virtual landscape are directly mapped with the design elements in the objective real world, which is the foundation of the 3D landscape design system. The 3D model of design elements will directly affect the performance of the whole system, and the realization of simulation is also one of the difficulties in the realization of the whole system. Data acquisition is to obtain the most original basic data through field collection, photogrammetry and remote sensing. Feature formation mainly refers to obtaining more specific levels of data information such as texture, buildings, roads, vegetation, street lamps, etc. based on the obtained basic data, which is equivalent to classifying the data. Model construction is mainly based on these feature data to write rules to generate 3D models. Computer graphics has solved the above problems and produced fine and high-precision graphics. Using computer software for image synthesis and image processing can produce special effects that do not match hand-drawn drawings. In the analysis of floor plan, hand drawing is very helpful to determine the design scheme. Subsequent environmental layout, cutting and rendering can make the computer draw an accurate base map, then polish and improve it on the hand-drawing, and then put them into the computer for final image processing.

Suppose the model after translation is $I(x,y,z)$:

$$I(x,y,z)=F(x-m_p,y-m_p,z-m_p) \tag{1}$$

The $L\times M\times N$ size landscape model is represented by the following formula:

$$I(x,y,z)=F(\text{int}(c\times x),\text{int}(c\times y),\text{int}(c\times z)) \tag{2}$$

$$c=1/k \tag{3}$$

When $k>1$, the landscape model is reduced; when $k<1$, the landscape model is enlarged.

In the problem of pattern recognition, there are many examples of pattern feature space change in imaging target recognition. For example, the posture, size and shape characteristics of a moving 3D aircraft target show dramatic changes in the sequence images. Therefore, the problem of target recognition under complex conditions is the problem of pattern recognition in different feature spaces. The surface texture data of ground objects can no longer affect the data management in the later period of digital city, but because the surface of the 3D ground object model is covered with real texture pictures, the authenticity of the digital 3D city will be reflected.

Detailed surface texture data of ground objects can create more realistic visual effects, more accurately represent the surface information of ground objects and highlight the information of urban landscape.

Based on the 2D GIS database, the height of the building is roughly estimated according to the quantity of high-rise buildings. The building height data obtained by this method is only an estimate, and all buildings can only be expressed by flat roofs or artificially added with decorative roofs. Before thinning the difference feature matrix, a series of preprocessing are carried out, including sample-by-sample average removal and normalization, that is, for the difference matrix of each image sample, the difference average value of the sample is subtracted and the difference value data of different samples are normalized to the same range. When the features of the target are transferred from large scale to small scale, it is impossible to complete the task of pattern recognition under a single scale model, but only with the support of multiple scale models can it be possible to deal with any pattern vectors at different scales. The network structure of 3D image segmentation of landscape interactive design is shown in Figure 2.

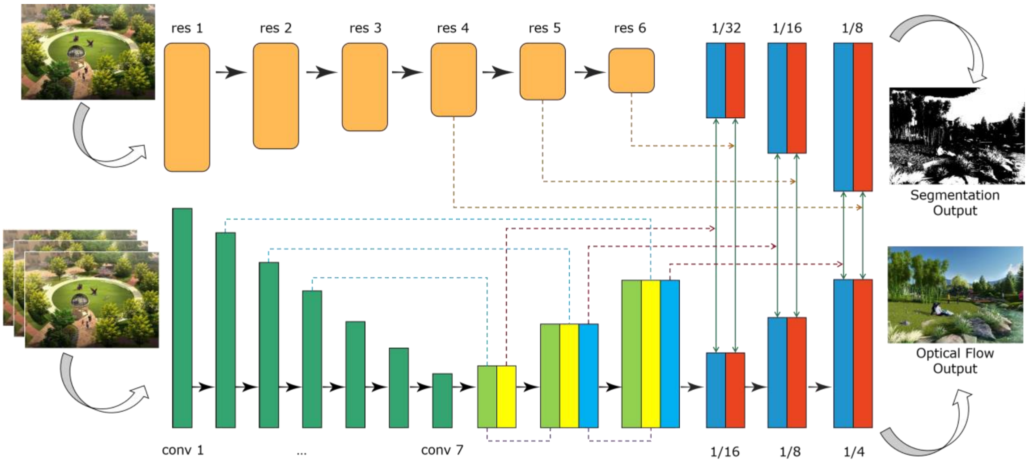


Figure 2: Network structure of 3D image segmentation in landscape interactive design.

In the existing map data of 2D geographic information, the building thematic information database is obtained, or it is obtained in other thematic databases containing building height field data, such as building height information, which can be directly extracted and used; If not, the building elevation information can be estimated according to the quantity of buildings and the nature of building use. As an initial basic reference material, it contains detailed information of various parts of a building, which sometimes plays an important role in building an accurate 3D model. However, when obtaining the data needed for 3D geometric modeling from it, it is needed to manually interpret and input a large quantity of data, and to put the 3D model in the same geographical reference frame. The distribution of visual characteristics of landscaping images is as follows:

$$G(\vec{x}) = \sum_{j=1}^{p} G_j(\vec{x}) \tag{4}$$

The fuzzy closeness function of landscape design is:

$$fitness(\vec{x}) = f(\vec{x}) + (Ct)^{\alpha} \sum_{j=1}^{p} G_j^{\beta}(\vec{x}) \tag{5}$$

Build a state transition frequency table. Scan each element in the entire landscape space for moments t_1 and t_2, respectively, for elements C_{ij} for moments t_1. Detect its combined status code, and check the code value table to obtain its code value serial number u. Detect the status code v of the element C_{ij} at the moment t_2 to count and calculate:

$$s(u,v)=s(u,v)+1 \tag{6}$$

The 2D array s is called the state frequency table, and this array should be cleared in advance. Establish a state transition probability table and a state transition probability matrix. Normalize the state frequency table:

$$p(u,v)=\frac{s(u,v)}{\sum_{w=1}^{l}s(u,w)},\ \forall u;v=1,2,\ldots,l \tag{7}$$

l is the quantity of space states. At this point there are:

$$\sum_{v=1}^{l}p(u,v)=1,\ \forall u \tag{8}$$

The image data used in automatic modeling can be obtained by a large quantity of devices, which can quickly model. However, automatic modeling increases the complexity of modeling, has high requirements for modelers and has a high model repetition rate. Therefore, we can combine the two methods to extract the image data and then manually model by mapping, which not only reduces the workload of manual modeling, but also reduces the requirements of automatic modeling for the level of modelers. At this time, the local coordinate system can be determined according to the specific situation. See figure 3 for GAN model of landscape spatial modeling.

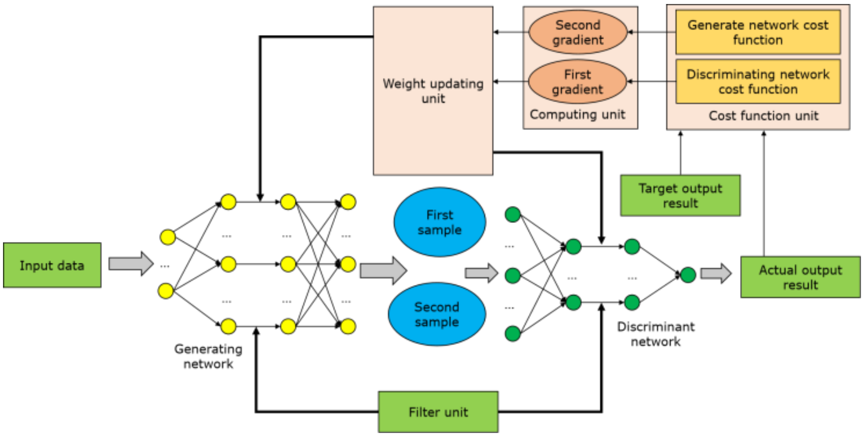


Figure 3: Landscape spatial modeling GAN model.

Too many settings will lead to excessive design variables; Otherwise, it will cause the problem that the network accuracy cannot be satisfied. Therefore, determining a reasonable and effective network structure is a key part that affects the performance of deep learning algorithms. The fitness function of landscape information fusion is:

$$fitness(\vec{x})=\begin{cases}f(\vec{x}) & If\ \ feeasible\\ 1+rG(\vec{x}) & Otherwise\end{cases} \tag{9}$$

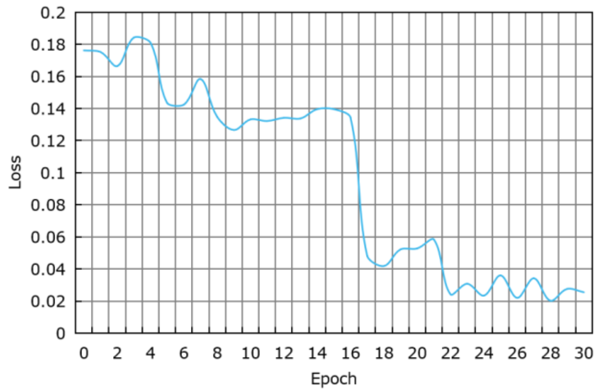
Constructing a visual discrimination model for landscape ecological space environment:

$$W_u(a,b)=e^{i2\pi k\ln a}\times\frac{K}{\sqrt{a}}\left\{\left[\frac{ae^{\frac{j2\pi f\min}{a}(b-b_a)}}{f_{\min}}-\frac{e^{\frac{j2\pi f\max}{a}(b-b_a)}}{f_{\max}}\right]\right.$$
$$\left.+j2\pi(b-b_a)\left[Ei(j2\pi f_{\max}(b-b_a))-Ei\left(\frac{j2\pi f_{\min}}{a}(b-b_a)\right)\right]\right\} \tag{10}$$

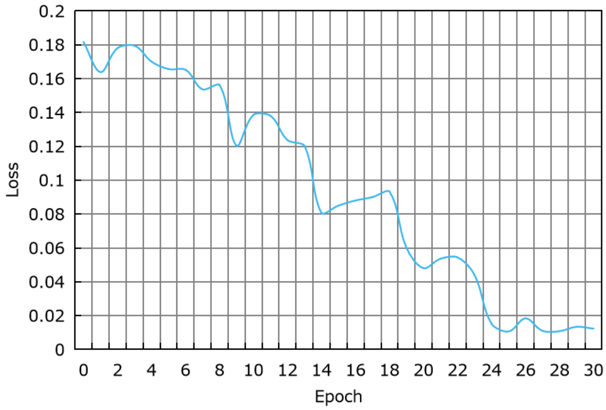
Among them, $b_a=(1-a)\left(\frac{1}{af_{\max}}-\frac{T}{2}\right)$.

4 RESULT ANALYSIS AND DISCUSSION

CAD software can make landscape design more vivid, and the error is smaller in the later improvement. Using CAD software can make up for the shortcomings of traditional manual drawing of design drawings, make the drawn renderings more realistic and vivid, and it is easier to find problems when reviewing and carefully reviewing design drawings in preliminary design, so as to improve or make up for them in time. A total of 150 images were collected, with 100 images as training images and 50 images as test images. Figure 4 shows the loss curves of these two trainings. The generator_loss of these two models is 0.024 and 0.019.



(a) Training Set



(b) Test set

Figure 4: Loss curve.

3D terrain model can be managed by integrated storage mode. One is to manage all information with spatial database, and the 3D terrain model enters the spatial database as a single object with corresponding attribute information. The other way is to adopt mixed management mode, in which the geometric model and corresponding texture data are managed by file system and the attribute data is managed by database management system. The error rate obtained by training the three views with CNN is compared with the GAN model, as shown in Figure 5.

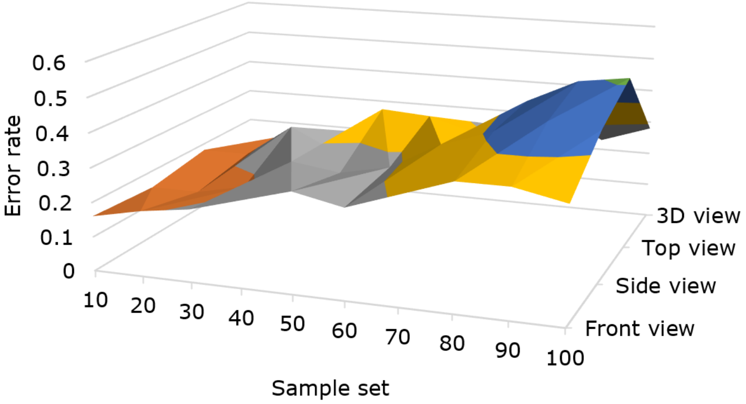


Figure 5: Error rate results.

The constraint information of ground object characteristics is often ignored when building terrain models, and when the two models are fused, it is easy for ground objects to sink into or float on the terrain. When you look at distant objects, it is fuzzy, so when you express these objects in a computer, it is not needed to express them accurately and in detail, just give a simple outline description; On the contrary, nearby objects have rich details, which must be expressed by detailed modeling in the computer.

If all this information is input into the input layer of the network, it is bound to input a lot of irrelevant or redundant information into the network. This will not only lead to a surplus of neurons in the input layer, thus increasing the training workload of the network, improving the structural complexity of the network, but also affecting the accuracy of prediction. Figure 6 shows the modeling accuracy test of different algorithms.

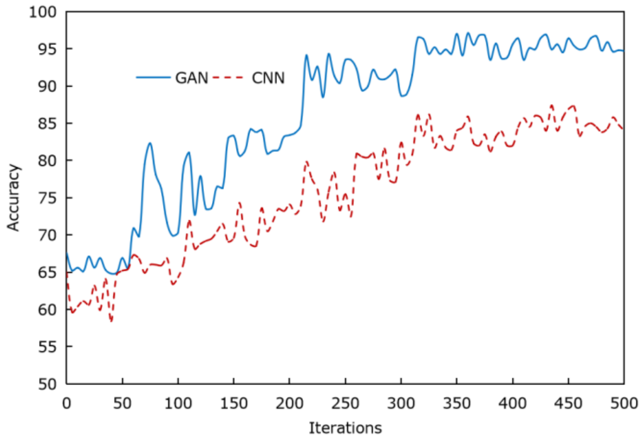


Figure 6: Accuracy test results.

There are many kinds of garden landscapes, and the modeling changes greatly. We should choose different modeling methods according to the characteristics of different garden landscapes, and we can't simply think that which modeling method is powerful, so we should adopt this modeling method for all modeling methods. Subdivision modeling is very important to grasp the overall space of the model, and this process is like a sculpture process. It is needed to have an overall understanding of the scale and spatial relationship of the model before making it.

For the images with different resolutions in the same area, with the decrease of resolution, the image size decreases step by step, and these images form a pyramid structure with decreasing resolution, with low-resolution images at the top and high-resolution images at the bottom. When the viewpoint is higher, the field of vision is wider and less attention is paid to local details. In order to reduce the calculation and improve the rendering speed, the top image data with low resolution can be called; On the contrary, when the viewpoint position is low and the image data is required to show rich details, the image with high resolution is called. Figure 7 shows the subjective scoring results of learners' experience in using different instructional systems.

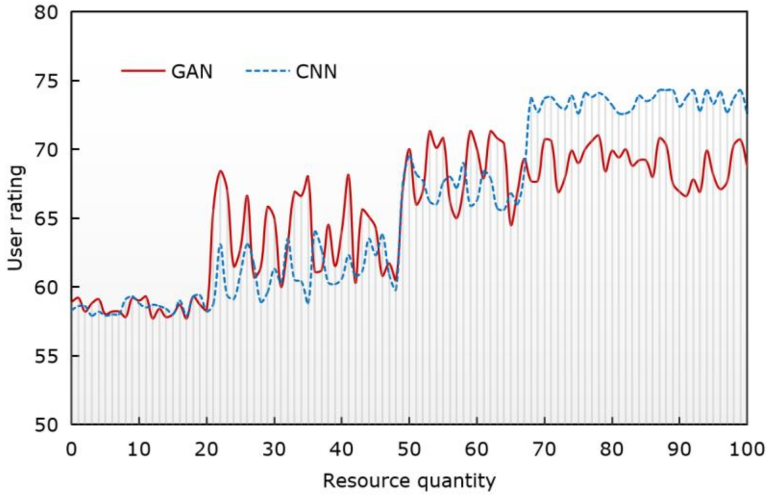


Figure 7: Learner subjective rating.

Using CAD software can make up for the shortcomings of traditional manual drawing of design drawings, make the drawn renderings more realistic and vivid, and it is easier to find problems when reviewing and scrutinizing the design drawings in the initial design, so as to improve or make up for them in time. Many auxiliary software are needed in landscape design. Teachers should explain the specific usage of each software in detail and collect relevant cases, so that students will have a good understanding and make better use of this kind of software.

5 CONCLUSIONS

With the advent of the information age, the relationship between CAD software and landscape design is closer. Auxiliary software can make landscape design more vivid, and there will be less errors in later improvement. Using computer-aided software can make up for the shortcomings of traditional manual drawing of design drawings, make the drawn renderings more realistic and vivid, and it is easier to find problems when reviewing and scrutinizing the design drawings in the initial design, so as to improve or make up for them in time. This article expounds the application and characteristics of CAD in the establishment, planning, design and rendering of landscape modeling system, puts forward the landscape simulation design algorithm based on GAN, and then innovates the use of CAD in landscape design instructional system. The image processed by the auxiliary software can well present the effect that the landscape design is close to reality, and spy on the whole design. Such a design can withstand repeated scrutiny and research, and it is easier to modify, adjust and make up. The system expresses the design intention well through virtual scene, 3D rendering and 3D animation, thus upgrading the landscape design technology from the 2D construction drawing stage to the 3D simulation design stage, greatly improving the teaching efficiency of landscaping. The construction method of 3D model of landscaping needs to be further studied. In particular, image-based modeling methods and laser scanning-based modeling methods have good application prospects, and further research is needed.

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