

Study on Spatial Distribution Method of Plant Landscape Pattern in Ethnic Scenic Spot

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Abstract: In the environmental art design of ethnic scenic spots, the method of extracting spatial information features for plant landscape planning is adopted, and a spatial distribution method of plant landscape pattern in ethnic scenic spots based on spatial level image feature analysis is proposed. The intention of plants is used to divide the space of ethnic scenic spots, and different plant configuration forms are used to form various ornamental spaces of ethnic scenic spots, resulting in different landscape effects. Through the design and display of plant landscape in ethnic scenic spot, the space design of plant landscape is realized, and the needs of people's appreciation can be satisfied, and the functionality of the design of national customs scenic spot can be improved. The use of tall trees not only creates a quiet and cool space environment, but also creates a variety of light and shadow effects. The rationality of spatial distribution of plant landscape pattern in ethnic scenic spots is analyzed with the method of spatial level image analysis. The research shows that this method is used to design the spatial distribution of plant landscape pattern in ethnic scenic spots, which effectively coordinates the space of ethnic scenic spots, and various plant allocation methods can meet the requirements of different spatial landscape composition of national customs scenic spots. Landscape composition has good utilization value.

Keywords: Ethnic scenic spot; Plant landscape; Pattern; Spatial distribution

1. Introduction

The plant landscape pattern planning of the national customs scenic spot carries on the landscape design method of the plant space layout according to the national customs element in the planning area. The plant landscape of ethnic scenic spot has the elements of landscape value, it mainly includes the original water landscape, the original plant landscape, the original terrain, the landform, the ruins and historical sites and so on[1]. The plant landscape planning of national customs scenic spots should also follow the principles of landscape aesthetics, combining with the functional beauty, artistic beauty and scientific beauty of national customs, which can effectively show the natural beauty, form beauty and social beauty of national customs scenic spots. In the design, we should apply all the elements contained in the plant landscape of the national scenic spot to the landscape planning and design, and expound it from the aesthetic point of view to achieve a starting point based on the natural environment. The relationship among nature, man and society is coordinated by the means of science and art to make it a kind of best running state. This paper expounds the classification of plant landscape in ethnic scenic spots, and it analyzes and discusses the aesthetic significance of its application in landscape planning. The research on the

spatial distribution of plant landscape pattern in ethnic scenic spots has a good application value in landscape design and art design[2-4].

With the development of economic times, the function of plant landscape in ethnic scenic spot is very great. To the public, it is not only a good public environment, but also an aesthetic art. Therefore, in the aesthetic design of plant landscape, the function effect is important, but the visual effect is also very important. That is to say, the function of visual elements should be highlighted in the plant landscape design of ethnic scenic spots, and its function should not be pursued blindly[5]. Visual elements are mainly composed of points, lines, surfaces, bodies and so on. This requires the designers of the ethnic customs scenic areas to take into account the function of the plant landscape of the national customs scenic spots while designing them, and at the same time, they should also combine the points, lines, surfaces, bodies, colors and spaces[6]. The pursuit of a visual sense of aesthetic shock, to give people a bright sense of beauty. To be more specific, the first thing that landscape designers should make clear is the important role of visual elements in plant landscape design[7].

According to the requirements of landscape planning of ethnic scenic spots, this paper presents a spatial distribution method of plant landscape patterns in ethnic scenic

spots based on spatial level image feature analysis. The intention of plants is used to divide the space of ethnic scenic spots, different plant configurations are adopted, and the use of tall trees not only creates a quiet and cool space environment, but also creates a variety of light and shadow effects. The rationality of spatial distribution of plant landscape pattern in ethnic scenic spots is analyzed with the method of spatial level image analysis. The model design and validity analysis of the spatial distribution of plant landscape pattern in ethnic scenic spots are carried out by using image processing method. Finally, the performance tests are carried out through simulation experiments. This paper shows the superior performance of this method in optimizing the spatial distribution of plant landscape pattern in ethnic scenic spots.

2. Principles and Characteristics of Plant Landscape Design in Ethnic Scenic Spots

2.1. Principles of plant landscape pattern design in ethnic scenic spots

People have an instinctive tendency and love for the natural and fresh national scenery. Plant is the most direct reflection of the national landscape elements of the national landscape form[8], it is an important carrier of landscape expression, so plant landscape design from the following points:

The plant landscape shall be arranged in a regional manner and in accordance with local conditions. The plants that grow well in this area can adapt to the environmental characteristics of the region, and at the same time, the plant landscape of ecological stability can be obtained by referring to the allocation of natural communities.

Respect for the diversity of plant species. Rich plant species can not only improve ecological scarcity but also make up for the single landscape. The plant collocation of tree, shrub and grass not only increases the stability of community, but also creates a sense of hierarchy in vertical space, which is beneficial to the formation of complex landscape and can improve ecological benefit[9].

Follow the timeliness of plant landscape. Plant landscape design should fully show its growth and seasonal changes, regardless of individual plants or plant communities, different configuration over time, the four seasons will produce different landscape effects. Plant configuration should be combined with the color, posture, flowering, fruit and so on, so that there are four seasons, three seasons have flowers.

Embody the artistry and culture of plant landscape. By means of contrast and harmony, change and unity, balance and stability, rhythm and rhythm, etc., to create the plant landscape with the aesthetics of the national scenic spot, and at the same time to express the cultural connotation of the plant landscape with the help of the cultural implication of the plant[10].

2.2. Characteristics of plant landscape space

The properties of plant materials are different from those of buildings and other artificial structures, so there are essential differences between the defined space and the building space. The space defined by plants has the following characteristics[11-13].

Softness of materials. The plants in ethnic scenic spots are living organisms. With the passage of time and the change of seasons, plants have experienced natural processes such as germination, growth, fallen leaves and so on. Even through artificial pruning, plants can still grow vigorously. Soft branches, oblique shadows, sweet fragrance, and the breath of life are revealed in the swaying posture, so the defined space is different from the soft nature of artificial buildings.

Dynamic variability. A series of changes in color and image will take place in the life cycle of plants, forming a sequential landscape with distinct seasons. When the plant space is surrounded by deciduous plants, the degree of spatial closure varies with the seasons: in spring and summer, the growth of plants increases the closeness of space, and in autumn and winter with the leaves of plants, the line of sight can gradually extend beyond the limited space. Visible, national customs scenic spot plant space landscape is dynamic change, not permanent.

Spatial permeability. The space formed by plants is not as airtight as the brick walls built by buildings. Plants define a space through tree trunks, branches and leaves, and the different parts of the interface are thinly combined, because of the soft nature of the plant material, part of the light. Airflow and sound can easily penetrate the space made up of plants and penetrate the adjacent space, which makes the whole of the space layered and connected to each other[14].

3. Space Design of Plant Landscape in Ethnic Scenic Spot

3.1. Simplicity

Simplicity is one of the conditions for beauty. Simple lines and shapes are always more expressive than complex ones. The most common way to create simplicity in plant landscape space is repetition. Repetition can be reflected by the shape, color, and texture of the plant. Different plants with the same shape or texture or color can unify the whole plant space through the repetition of this characteristic. Repetition of plant forms will give the viewer visual comfort, serenity. There can be duplicates of plants with identical characteristics in a space, which are commonly used in the formation of overlying plant space and vertical plant space. The drawback of this landscape is that it is simple, unchanged and monotonous for too long. In the design, the method of plant group repetition is more adopted, or one third of each group of plant groups is the same as the adjacent group, and this

repetition shows certain changes, or determines the size, shape, color, texture and other characteristics of the repeated plants. At least one of them is variable, so that groups and spaces are connected and unified[15].

3.2. Diversity

Too simple composition makes the viewer feel dull and monotonous. Using diversity can control too much repetition and arouse people's interest. The diversity of plant landscape space form can also be reflected by the change of plant form, color and texture. However, Diversity is not a combination of all irrelevant things, too much change can only lead to confusion. Changes should be made after the selection of a controlled plant species that runs through the composition. This kind of plant, which is the basis of the composition, is called the keynote plant, and the plant used to adjust the composition is called the key plant. In fact, no matter what kind of visual element changes in the plant space, the diversity will be produced[16-18].

At the same time, it is necessary to consider the formation of unity. In the plant groups of 3~7 different species of plants, the two plant characteristics are mainly expressed in morphology, color and texture, which are similar to those of most plants. Or in the plant group of 8~15 species, most plants have a similar characteristic, then the whole plant landscape can form diversity and unity. There are two ways of forming diversity: contrast and similarity. Contrast produces a strong visual effect, creating a sense of jumping, while similar diversity is gentle, giving people a sense of tranquillity and peace.

3.3. Order

The order of form is the order of low, middle, high and low order formed by using the order of similar shapes between horizontal expansion, spherical, conical and cylindrical shapes. For texture, order is fine, medium, coarse or vice versa. This order can be formed by form, texture and color, or by the combination of the three. In plant landscape space, the use of form, color and texture according to a certain rhythm can make the plant configuration coordinate.

Order is the rhythm of the plant landscape, which naturally leads the line of sight from one focus to the next, and plants are planted at a certain distance to form an order until the spacing changes. The changing plants will be easily seen to form order, but it is worth noting that the number of focal points in a field of vision can only be one, and it is important to carefully arrange the position of the main landscape plants in the plant landscape. Therefore, it is very important to make use of the law of order to make all forms and spaces of plant landscape coexist in an orderly and unified whole.

3.4. Equilibrium

In plant landscape space, equilibrium refers to the balance of various elements among plants. Equilibrium can be divided into symmetric equilibrium and asymmetric equilibrium. The symmetrical equilibrium of plant landscape is very obvious. If the focus is set in the center of the composition, the composition will be very stable if the plants are duplicated on both sides of the left and right, and the vertical image on both sides of the center can also play the role of emphasizing the balanced center. It usually has a guiding effect. Asymmetrical equalization centers are not placed in the center, forming a variable equilibrium. This visual irregularity is a matter of proportion and sensation of each component. Here the specific gravity refers to the shape, color, texture of the plant. In plant landscape composition, first of all, the equilibrium center should be determined. As the equilibrium center, the plant landscape should be strong in shape, color and texture. The clear calibration of the center can avoid the random and chaotic composition. The balance is also reflected in the depth of field. The composition must maintain the balance of the foreground, the middle view and the background plant in the line of sight. If there is no foreground or background, there is no level of space, and the balance of the picture is impossible. In addition, the foreground and background plant shape, color, texture should be relatively dull, so as to highlight the plant landscape, forming a sense of balance.

Equilibrium can be divided into symmetric equilibrium and asymmetric equilibrium. Symmetrical equalization is used to set off the theme, in shape, color, texture should be strong, the center of the clear calibration can avoid random and confusion; Asymmetrical balance is created by using multi-dimensional space of scenery. When composing pictures, we should synthetically measure the material factors that make up the green space of ethnic customs and scenic spots, such as virtual reality, color, texture, density, lines, body shape, quantity and so on. Asymmetrical and balanced arrangement produces the emotional freedom and flexibility in people's psychology, and it can change the scene step by step.

4. Plant Landscape of Ethnic Scenic Spot based on Spatial Distribution Method

The closed and suitable plant landscape is enclosed by the static private space which can be seen, rested and interacted, and connected with the linear dynamic space. The above three space types correspond to the space composition of point-line-surface. The spatial boundary was not obvious and the planting pattern of sparse forest and grassland was adopted. In order to form the spatial focus landscape, the plants in the national customs scenic spot should pay attention to one unique plant and three or five plants to form the space focus type landscape, attract the browse line of sight, and produce the staying psychology.

Plants are the main elements of the space prospect, the middle view and the closeness of the ethnic scenic spot. By means of contrast, borrowing, frame view, missing view, obstacle view, clip view and so on, through dealing with the relationship of size, reality, light and dark, the sense of hierarchy and depth of space is increased. The upper layer of tall Arbor is used as the background forest to form the forest, emphasizing the heterogeneity and far-reaching effect of the plant community. With small trees and shrubs as the midview, outline the canopy line and forest margin line, showing the spatial form. Closeness focuses on the individual beauty of plants or the group beauty of small plantations, reflecting the distinct sense of space and hierarchy, emphasizing the posture, color and height of plant collocation.

The combination of sparse forest and grassland is more abundant than the common grassland landscape, and has a sense of openness and permeability. Usually based on trees, interspace grass embellishment; Arbor-based, shrub-assisted design principles. By the waterside, the garden road uses the big trees and the flowers and shrubs to form the sparse forest landscape, which is conducive to the creation of the beauty of the hidden and dense, the void and the solid leaking through, and the beautiful artistic conception of the sun.

Sparse forests and grasslands are located on the periphery of the landscape and are used in isolation from the outer space. At the same time, as the background forest of the interior environment, it is the visionary element in the landscape, which can elevate the spatial level. Outside the hot spring experience area, the closed forest can create a good quiet space for outdoor bubble, adding natural wild atmosphere.

The road is the transportation system of the garden, which has important guiding function. The landscape on both sides of the road is created by plants. A regular arrangement of shading trees is designed along the main road, the lower layer is equipped with pruning shrubs, the secondary road is mainly flowers and shrubs, the twists and turns of flower paths, the shrub with lush and natural disposition, the lower layer planting shady ground or grass flowers; Especially in the turn of the road should be planted color leaf tree species or beautiful posture tree species, easy to attract the attention of visitors. Microtopography is used to create abundant plant communities, different configuration techniques and patterns are used to give people the feeling of moving different scenery.

In a word, plants in ethnic scenic spots have gradually become the main materials of landscape space construction in ethnic scenic spots. Whether the plant configuration is successful or not has a direct impact on the quality of landscape space. The use of plant materials to create the space landscape of ethnic scenic spots can no longer remain in the former kind of plane, perfect the concept of drawing, but should use positive, "three-dimensional"

space consciousness to conceive and design. Only if we have a good sense of space, attach importance to the role of plant materials in the space landscape of national customs scenic spots, comprehensive consideration, reasonable allocation, can create a colorful, comfortable and pleasant landscape space of national customs scenic spots.

5. Image Feature Analysis of Spatial Distribution of Landscape Pattern

5.1. Image Generation Technology of Plant Landscape in ethnic Scenic spot

On the basis of the design of the spatial distribution method of the plant landscape pattern in the ethnic scenic spots, this paper proposes a spatial distribution method of the plant landscape pattern based on the spatial level image analysis. It is necessary to collect the spectral remote sensing characteristics of the urban landscape pattern by using the plant intention to divide the space of the ethnic scenery spot, and to build an expert evaluation system for the plant landscape pattern analysis of the national customs scenic spot. Extracting the feature points of green spots[19], the spectral remote sensing collection formulas of green landscape pattern are expressed as follows:

$$y = \bar{y} + R_i d \tag{1}$$

$$z = \bar{z} + R_h d \tag{2}$$

Where, R_i indicates that the edge change pixel, R_h is the green landscape structure. The spectral remote sensing statistical model of greening patches is designed by expert evaluation system, and the formulas group of evaluation coefficient of characteristic information are obtained as follows:

$$\begin{aligned} \Psi_{11} &= PA + A^T P + Q_1 + R_1 + R_2 + K_1 + K_1^T \\ \Psi_{12} &= W_1 - K_1 + M_1 + K_2^T \\ \Psi_{13} &= PB + L_1 + M_1 + K_3^T \\ \Psi_{14} &= -L_1 + K_4^T \\ \Psi_{15} &= -W_1 + K_5^T \\ \Psi_{23} &= L_2 - M_2 + W_3^T - K_3^T + M_3^T \\ \Psi_{24} &= -L_2 + W_4^T - K_4^T + M_4^T \\ \Psi_{25} &= -W_2 + W_5^T - K_5^T + M_5^T \\ \Psi_{33} &= -(1-m)Q_2 + L_3 - L_3^T - M_3 - M_3^T \\ \Psi_{34} &= -L_3 + L_4^T - M_4^T, \quad \Psi_{35} = -W_3 + L_5^T - M_5^T \\ \Psi_{44} &= -R_1 - L_4 - L_4^T, \quad \Psi_{45} = -W_4 - L_5^T \\ \Psi_{55} &= -R_2 - W_5 - W_5^T \\ U &= h_1 Z_1 + h_2 Z_2 + h_3 Z_3 \end{aligned} \tag{4}$$

In the plant landscape analysis of ethnic scenic spots, the product of two independent random fields can be ex-

pressed, for the spectral greening corridor, the $C = \{C_i : i \in I\}$ can be expressed as:

$$C = S \cdot m = \{S_i \cdot U_i : i \in I\} \quad (5)$$

Due to the progressive rules of information extraction and extraction precision of C_i and V_i , the optimization equation of extracting plant landscape pattern in ethnic scenic spots is obtained as follows:

$$\begin{aligned} I_{GSM} &= I(C^N; D^N | s^N) \\ &= \sum_{i=1}^N I(C_i; D_i | s_i) \\ &= \sum_{i=1}^N (h(D_i | s_i) - h(D_i | C_i, s_i)) \\ &= \sum_{i=1}^N (h(g_i C_i + V_i | s_i) - h(V_i)) \end{aligned} \quad (6)$$

According to the design description of the above algorithm, the distribution of plants is used to divide the space of ethnic scenic spots, and different plant configurations are adopted to form a variety of ornamental space of ethnic scenic spots[20].

Analysis of Spatial Hierarchical Image Features of Plant Landscape Based on National Scenic Spot

A 3×3 sub-map pattern area division module is constructed, each pixel node generates a remote sensing texture number, and the urban landscape pattern analysis and the spectral greening corridor characteristic information based on the greening patch combining technology are realized:

$$u^{(n+1)}(x, y) = u^{(n)}(x, y) + d u_1^{(n)}(x, y) \quad (7)$$

$$u_1^{(n)}(x, y) = M \Delta_s u^{(n)}(x, y) + N \Delta_t u^{(n)}(x, y; d) \quad (8)$$

Where, $n = 1, 2, \dots, T$, it is the number of iterated steps, T is the total number of iterations, and $u^{(n)}(x, y)$ is the main information source for landscape analysis. d is the velocity of corridor renewal, and it acts together with the iterative coefficient of $u^{(n)}(x, y; d)$ patches to form the partition treatment of green corridors. A 3 × 3 sub-map pattern region partition module is constructed, each pixel node produces a remote sensing texture number, which realizes the analysis of urban landscape pattern and the extraction of spectral green corridor feature information based on greening patch merging technology.

In summary, through the design and placement of the plant landscape of the national customs scenic spot, the space design of the plant landscape can be realized, which can meet the needs of people's appreciation and improve the functionality of the national customs scenic spot design.

6. Test Analysis

In order to test the application performance of this method in the design of space distribution of plant landscape

pattern in ethnic scenic spots, the simulation experiment is carried out, and the experiment was designed with Matlab 7. The training vector size of laser image acquisition for scenic spot is 256×256×224 .The codebook size is 120, the frame number of space scanning of landscape pattern is set at 100 frames, 200 frames respectively, and the morphological segmentation is carried out in 10×10 block mode. The wavelet coefficient of wavelet denoising is 0.43 and the scale of wavelet is $K = 50$.According to the above simulation environment and parameter setting, the spatial distribution of landscape pattern of scenic spots is analyzed, and the spatial distribution of landscape pattern of ethnic scenic spots is obtained as shown in figure 1.



Figure 1. Spatial distribution of landscape pattern in ethnic scenic spots

This paper uses the method to extract the image features, analyzes the effectiveness of different methods for the distribution of plants in ethnic scenic spots, carries out experimental analysis, and obtains the design results is shown in Figure 2.

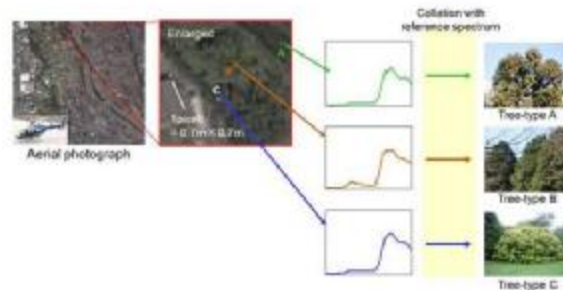


Figure 2. Image analysis of plant landscape pattern in ethnic scenic spots

The analysis figure 2 shows that this method can effectively extract the plant landscape information features of ethnic scenic spots, meet the needs of people to appreciate, and improve the functionality of the design of national customs scenic spots.

7. Conclusions

In this paper, a spatial distribution method of plant landscape pattern in ethnic scenic spots based on spatial level image feature analysis is proposed. The intention of plants is used to divide the space of ethnic scenic spots, and different plant configuration forms are used to form various ornamental spaces of ethnic scenic spots, resulting in different landscape effects. Through the design and display of plant landscape in ethnic scenic spot, the space design of plant landscape is realized, and the needs of people's appreciation can be satisfied, and the functionality of the design of national customs scenic spot can be improved. The use of tall trees not only creates a quiet and cool space environment, but also creates a variety of light and shadow effects. The rationality of spatial distribution of plant landscape pattern in ethnic scenic spots is analyzed with the method of spatial level image analysis. The research shows that this method is used to design the spatial distribution of plant landscape pattern in ethnic scenic spots, which effectively coordinates the space of ethnic scenic spots, and various plant allocation methods can meet the requirements of different spatial landscape composition of national customs scenic spots. Landscape composition has good utilization value in practice.

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