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INFORMATION SHARING METHOD OF LANDSCAPE PLANT DESIGN BASED ON ARTIFICIAL INTELLIGENCE TECHNOLOGY

Yaxing Lu, Caibo Wang, Huanhuan Ge*
Institute of Architecture and Art Design, Hebei Academy of Fine Arts, Shijiazhuang, 050700, China
Corresponding Author's Email: 15930135728@163.com

Abstract: At present, the information sharing method of landscape design has the problem of imperfect database, which leads to the long delay of information transmission. This paper designs an information sharing method of landscape plant landscape design based on artificial intelligence technology. Using landscape aesthetics and other related theories, we can obtain the spatial elements of landscape plants, quantify the richness of landscape design levels, create three-dimensional space, build shared information database by artificial intelligence, calculate the diversity of plant space elevation levels, and establish information sharing mode according to fixed attenuation strategy and quantum evolutionary algorithm. Experimental results: the average transmission delay of the designed information sharing method and the other two information sharing methods are 4.1036ms, 6.073ms and 7.015ms respectively, which proves that the information sharing method integrated with artificial intelligence technology has higher practical application value.

Key words: artificial intelligence technology; landscape plants; landscape design; space elements; quantum evolutionary algorithm; information sharing;

0 Introduction

Garden plants are one of the elements of landscape planning. In Chinese classical gardens, there are five elements: plants, mountain building, water management, architecture and poetic. Plants not only create a beautiful environment, but also emphasize the artistic beauty of plants. Plants and other elements of the garden in accordance with a certain artistic mix, you can create a different artistic conception. The diversity of plant species and forms leads to its more abundant characteristics than other landscape elements. Combining different plants in different quantities and ways can form a rich and colorful space form, so as to meet the needs of users in many aspects and levels. Under the guidance of natural geometry and early philosophy, Western plant landscaping uses plants to express geometric beauty[1]. There are vineyards, arboretums, vegetable gardens and other practical gardens, whose design methods are regular and symmetrical. In the late 18th century, people began to imitate the growth law of plants for the study of plant landscaping. The first is the study of plant landscaping in British natural landscape architecture, which changed the history of Europe ruled by regular gardens for thousands of years. This is an extremely profound revolution in the field of Western Garden Art [2-3]. It is mainly characterized by undulating and open grassland, natural curved water bank, clumps of trees, sparse forest and grassland. The garden form and its natural charm. With the deterioration of the ecological environment, the related research of plant landscape is mainly carried out under the guidance of

ecology, environmental science and modern aesthetics and art knowledge. Plant landscaping in China started from the cultivation of flowers and trees. As early as the Wei, Jin, southern and Northern Dynasties, it began to pursue plant landscaping, and began to pay attention to the creation of artistic conception. Sui and Tang Dynasties were the heyday of feudal society, but also the heyday of gardens. Plant cultivation technology has made great progress, the scope of plant landscaping is constantly expanding. People also begun to introduce some artistic techniques to plant landscaping.

Information resource is the general term of information, technology, tools, funds and people in information activities. Information sharing refers to the activities between information service institutions under the premise of resources, equality and mutual benefit, through various cooperation and coordination, using the concept of science and technology and reasonable and effective methods, through the organization, utilization and construction of information resources, to meet people's demand for information resources [4]. Human processing to screen useful, orderly, resource needs, such as text, audio-visual, digital information, valuable and accessible features, to meet human needs. Information is accumulated by continuously inheriting and learning from previous knowledge, and is the common spiritual wealth of society, which can be copied, transmitted and regenerated [5-6]. However, with the rapid development of the information age, information presents spontaneous and explosive growth, which makes it difficult for a single organization or person to complete the work of information collection and processing. Therefore, it is necessary to strengthen cooperation and co construction to realize the maximum sharing of information resources. In China, information resource sharing is the forerunner of information opening. Government resource sharing refers to the process that the government obtains information from or from the outside. At present, the literature of landscape plant information in academic circles is not very rich, which needs further study.

1 Information sharing method of landscape plant design based on artificial intelligence technology

1.1 Obtaining the spatial elements of garden plants

Plant landscaping is the application of a variety of trees, shrubs, vines and herbs to configure and organize the landscape, to meet people's ornamental requirements. Plant landscaping is mainly based on production-oriented and garden oriented plants, taking into account the attributes of production and sightseeing, using landscape aesthetics, fruit tree science, ecology and other related theories to reasonably arrange the scenic spots in the garden, showing the seasonal community landscape of plants in spring and autumn, so as to meet the needs of agricultural production and visitors' viewing and entertainment. From the perspective of the spatial structure of plant landscape: from the perspective of the selected plants, it is mainly the combination of ground cover flowers and plants, and from the perspective of space construction, it is open space [7-8]. From the plane structure, this kind of plant landscape is a stable structure. Plant landscape effect: the landscape effect is rich, delicate and beautiful plant landscape, which can enrich the edge line and canopy line of plant forest. In the specific case design, this kind of plant landscape form should be used more, which can reflect the plant landscape characteristics of agricultural sightseeing park.

In the level effect, most of them are combined with the terrain changes to enrich the level changes of plant landscape. In terms of visual effect creation, it reflects the divergence of the line of sight. The first thing to introduce into the eye is the landscape effect presented by the "point, line and surface" of plants. The individual tree shape, leaf shape and texture of these plants are rich, and the formed landscape is also the most wonderful. Through the shape, size, direction, position, divergence and aggregation of plants and plants themselves, they bring people different visual experiences and artistic charm, convey to visitors a kind of natural beauty. Plant landscaping space is different from the space formed by natural forest or grassland, and also different from the space formed by artificial cultivation of special land plants, such as shelter forest. The plant landscaping space is a plant environment designed by designers to make full use of natural plants, which has high ornamental and practical value, Designers use certain artistic means for space layout, need to cooperate with a variety of garden elements. A good plant environment can provide people with a good environment for leisure and entertainment. In addition, the plant environment also belongs to a part of urban ecology [9]. Garden plant is the entity of plant landscape space. Plant environment is composed of all kinds of plants. Different kinds of plants match with each other to form a plant environment with different colors and forms, and then become an important part of garden space. The plant environment is also dynamic. By creating the plant environment, we can increase the ornamental value of the garden landscape and bring rich landscape levels. In the process of studying the entity elements of the plant landscape space, the overall plant space greening structure, the richness of the plant landscape space level and the plant color season are the same. Three tuples are used to express the information sharing structure, the calculation formula is as follows:

$$L=\sum_{n=1}^{e} Q_e \quad (1)$$

In formula (1), Q is the component factor, n is the feature attribute, and e is the spatial range. The components meet the basic requirements of the decomposition and combination method, that is, the boundaries of each component are clear, the types are limited, and there are fixed expressions and uses. The relationship between components is clear and can be modeled, defined and expressed. Plant landscaping space is a kind of physical space with plants as the main body and through artistic layout, which brings people different space experiences and pleasure. In the theory of landscape architecture design elements, physical space is a kind of enclosure composed of ground plane, vertical plane and top plane, or real or implied, which will produce a certain sense of space. Plants can be used in all aspects of space, but the practicability of the space or surface composed of plants is not very high. Plants can only form suggestive or virtual space. The plant landscaping space is composed of the bottom surface, the partition surface and the coverage surface. In the single plant landscaping space composed of plants, people carry out sightseeing activities. Different psychological perception is produced in different plant landscaping spaces [10]. As for the selection of plant materials, color leaf plants are mostly used for landscaping. For the selection of color leaf plants, there are two kinds of plants: basic color and landscape color. The selection of these two kinds of color leaf plants is often based on the

landscape theme. Due to the consideration of production, crops are often selected. The basic color is yellow plants, such as rape and sunflower, the decorative plants, such as wheat and corn, can be selected to highlight the characteristics and express the theme. Plant configuration: in the configuration of plants, there are two forms: intercropping and pure planting, and the configuration is another expression of sheet planting. In the plant configuration mode, the form of crops + crops is adopted. By using these plant landscape configuration modes, the changes of plant landscape can be enriched and the landscape theme can be highlighted. In terms of plant space construction, most of the selected plants are low plants, and the height of plants is below the video line, and most of them are planted in pieces, so they present an open space; In the boundary space of plant landscape, we should do a good job in the connection and transformation of space, so as to make the whole landscape into one. Based on the above description, the steps to obtain the spatial elements of landscape plants are completed.

1.2 Quantitative landscape design level richness

Based on the requirement of land use proportion, the proportion of greening should be considered when studying the overall greening structure of plant landscaping space in a certain range. More and more plant species are used in green space, and their planting methods are different. In green space, there are generally three basic plant species, they are arbor, shrub and lawn. These plant species produce a variety of structural changes through the ever-changing collocation. By adjusting the proportion of plant species, different green space planting methods can be obtained, the proportion of arbor, shrub and grass is also an important factor [11-12]. In the use of medium range or close range space, people pay more attention to the rich space experience brought by the combination of plants with different heights and areas. Therefore, when evaluating the richness of medium range or close range space level, the shape coefficient can not reflect the richness of its space level in more detail. Green space rate is the ratio of the total green land area to the urban land area in the urban land. The green space rate of the park refers to the ratio of the green land area to the park land area in the park land. This index can effectively reflect the overall green space level of the horizontal structure in the park, the expression formula is as follows:

$$R = \frac{D}{F} + h \quad (2)$$

In formula (2), D is the area of green land, F is the landscaping area of the park, and h is the ratio of multiple layer green structure. Plant landscape refers to the combination of all kinds of arbor, shrub and grass plants or ancient and famous trees to form a diverse and beautiful plant community landscape for people to enjoy. In this definition, special attention is paid to the natural attribute of plant diversity, and various plants can form different landscapes [13]. The level richness of plant landscape space is in a large scale space. The current academic research on the spatial form and level richness relies on the shape coefficient. The smaller the shape coefficient is, the more unitary the spatial level is. The specific expression formula is as follows:

$$T = \frac{u}{2\sqrt{\pi w}} \quad (3)$$

In formula (3), u is the area of the area and w is the perimeter of the area. According to the calculation result of formula (3), the two variables of projection area and basic surface area are needed to calculate the space capacity. Under the guidance of limit thinking, the plant space is regarded as a spatial structure composed of a single plant level, and the calculation formula of the total area of plant landscaping is as follows:

$$S=\sum_{m=j}^{j}\left(G_j \times P_j\right) \quad (4)$$

In formula (4), G is the vertical projection area of landscaping, P is the plant height, j is the plant arrangement density, and m is any plant layer in the space. On this basis, the expression formula of plant space capacity is obtained as follows:

$$I=\frac{S}{K}=\frac{\sum_{m=j}^{j}\left(G_j \times P_j\right)}{K} \quad (5)$$

In formula (5), S has the same meaning as formula (4), and K represents the basic total area of plant landscaping. The lower the spatial capacity, the simpler the spatial structure and the more single the plant type; The higher the spatial capacity value is, the more complex the spatial structure is, the higher the diversity of plant types is, and the richer the spatial level of plant landscaping is. The elevation space of plant landscaping space has a single tree as the elevation, a combination of arbor and shrub, and also a combination of arbor, shrub and grass. The plant materials have a certain height and area, and the rich plant space level is composed of different plant materials to form a variety of plant community landscape space. Plant communities can form different levels of landscape in the garden space. When the plant community is used as a long-term perspective, it is generally located in the mountain forest area or the flat land of the waterfront, which is the role of the plant community as the spatial background, and it is necessary to fully show the high and low rise and fall levels of the forest edge line of the plant community [14-15]. When it is used as a medium or close range, it focuses on the different richness of landscape caused by the change of plant height. Therefore, in the study of entity elements of landscape space, the richness of spatial levels is very important. A variety of plant art combination landscaping is mostly set for rendering a certain theme. Plant landscape effect: most of the plants selected are color leafed plants, and different kinds of plants are selected to make landscape together. The formed landscape is a surface plant landscape effect. The surface plant landscape is used as a combination to express a certain plant landscape, which not only emphasizes the mutual cooperation between different plant elements, but also emphasizes a kind of unity and integrity. Based on the above calculation, the steps of quantifying the level richness of landscape design are completed.

1.3 Construction of shared information database by artificial intelligence

For the realization of the concept of artificial intelligence, the relationship between computer science and intelligence is self-evident. The most concentrated embodiment is intelligent computing and intelligent information processing. Computer science is the basic dynamics of intelligent realization. The relationship between neuroscience and intelligence can be divided into two levels, namely, the structural level and the operational mechanism level, with the most

concentrated performance in intelligent behavior and intelligent cognition. The realization of machine intelligence is based on human intelligence. The overall structure of neurons is the condition of human intelligence. The continuous interaction and stimulation between neurons bring infinite sensory knowledge, which provides an excellent model for intelligent cognition. Data transmission: data transmission is very frequent in the grid environment. In addition to the usual customer request and server response data, it also needs to migrate data, exchange intermediate data in the operation process, submitting the input data required by the user's job and the result data generated by the application operation. Data transmission needs to meet the requirements of transmission speed, data integrity and fault tolerance, so there are also a variety of transmission modes: parallel transmission, fault tolerance transmission, third-party transmission, distributed transmission and pooled transmission [16-17]. The cost function expression formula of database is as follows:

$$Z = \beta \frac{g_c}{2} \quad (6)$$

In formula (6), β is the plant transportation cost, g is the marginal demand coefficient, and c is the cost coefficient. According to the calculation result of formula (6), the data storage interface is designed. Data storage: grid data module provides users with a unified data view and a unified access interface, without the need for users to understand the specific underlying implementation mechanism of data objects under management. As an important part of data management, data storage directly affects data access. The new functions and requirements of data environment also put forward new requirements for grid data storage. On this basis, the expression formula of optimal equilibrium decision is obtained:

$$Y = \frac{\sqrt{\varphi}}{2l} \cdot r \quad (7)$$

In formula (7), φ represents the information transfer rate, r represents the uncertain information in the process of landscape design, and l represents the final decision result of data. There are some differences and connections between data and information. Data is the carrier of information, but it is not information. Data includes numbers, words, graphics and sound [18]. Information is the processed data, which is the representation of the nature, characteristics and state of the data. We hope to calculate the vertical level diversity of plant space within a certain range of landscaping space. This paper puts forward the index of space capacity. The space capacity of plant landscaping space is calculated to express the capacity of all kinds of plants in a single plant landscaping space. Therefore, taking the plant height into account can reflect the capacity of plants in a single plant landscaping space. To sum up, spatial capacity reflects the diversity of plant types in a certain range, that is, the diversity of plant community and the complexity of plant community level. Information sharing of landscape design is the future development trend of landscape technology. Whether landscape information sharing has value in digital information resources, what is the value measurement standard, and what is the value; If information sharing has a significant impact on digital information resources, what are the influencing factors and how to encourage this kind of information sharing are the main research

contents of digital information resources information sharing. The definition of information sharing in digital information resources database can be discussed through the difference between digital information resources and traditional information sharing. With the development of information technology, the traditional information database also needs the electronic database supported by network technology to strengthen the database management. The information transmitted on the network is often the product information, ordering information, demand information, cost information, user information and other related information between the upstream and downstream of the database. In addition to the upstream and downstream product information, ordering information, demand information, cost information, user information and other related information, the digital information resource database also transmits the information product itself [19-20]. This helps to distinguish information sharing between digital information resource database and traditional information sharing in the field of Library and information science. Digital information resource database information sharing refers to the sharing of ordering information, demand information, cost information, user information and other related information transmitted by digital information resource database on the network in addition to the upstream and downstream product information of the database. The traditional information sharing in the field of Library and information science mainly refers to the sharing of information products themselves. Therefore, the information sharing of digital information resources database is to obtain higher profits, save costs and improve the competitiveness of different subjects of the database. The traditional information field usually refers to the information resource itself in information sharing, which aims to transfer information and knowledge through information resource sharing, promote resource sharing, save the cost of information resource procurement and maximize the utility of information resource. Based on this, the steps of sharing information database are completed.

1.4 Information sharing model based on quantum evolutionary algorithm

Quantum evolutionary algorithm is a special quantum evolutionary algorithm. The core idea of this kind of algorithm is to use the probability distribution model to model and estimate the region in the solution space where the optimal solution is expected to appear, and then use the model to guide the algorithm to converge to the global optimal solution quickly. Quantum evolutionary algorithm (QEA) effectively avoids the problems of genetic algorithm, such as difficult to set the population size, and the damage of crossover and mutation to good patterns. The existing research results show that for many problems, quantum evolutionary algorithm has similar effect to standard genetic algorithm. However, the computational complexity of this algorithm is much lower than that of traditional genetic algorithm. Many optimization problems in the real world have an inherent and complex structure, which can be described mathematically as the dependence between multiple decision variables. If the optimization algorithm can effectively learn and use this internal structure, it will help to solve the optimization problem quickly. Traditional evolutionary algorithms, including genetic algorithms, have very limited ability to solve this kind of optimization problem with internal dependence. The fundamental reason is that the traditional evolutionary algorithms generally assume that the variables of the problem are

independent of each other, most of the evolutionary operators are based on the operation of a single variable, and lack of effective methods to learning and using the dependence between variables. The emergence of quantum evolutionary algorithm (QEA) provides a new research idea for learning and utilizing the internal structure of optimization problems. Since there have been a lot of research results on multivariate statistical models in the field of statistical learning, with these results gradually introduced into quantum evolutionary algorithm, quantum evolutionary algorithm is likely to effectively solve the optimization problems with internal dependence. For continuous random variables, the Gauss distribution formula is as follows:

$$M\left(x\right)=\frac{1}{2\pi\left|A\right|^{\frac{1}{2}}}b^{-\frac{1}{2}(x-\eta)} \quad (8)$$

In formula (8), A is the mean vector, x is the random variable, b is the variance of attenuation, and η is the convergence of the algorithm. To reorganize the information sharing structure, to make it more structured, and to establish a consistent retrieval channel and access site, to form a network information resource service center integrating learning, research, forum and management, to provide simple and efficient retrieval services for the public, is the main purpose of opening large capacity information sharing. According to a fixed attenuation strategy, the value of decreasing variance is obtained to control the convergence level of the algorithm:

$$\delta^2 = y\times\sum vf \quad (9)$$

In formula (9), y represents any constant, v represents the neighborhood function of the variable, and f represents the variation step size. In order to achieve a variety of information coexistence mode and mutual circulation of resources, a large capacity information sharing platform is proposed. Its main purpose is to share various resources. So as to break the "information island" situation. The main goal of the establishment is to build a more simple, independent and open sharing mode for the whole people. If unified science and technology are needed to support the network environment, network services need to be more information-based, so as to achieve the goal of safe control of information data, mutual transmission, organizational structure and inquiry mode, and implement information resources. The specific goals should be as follows: 1 To improve service efficiency, open resource information service has been limited to manual operation, so that the service quality is extremely low. In the open environment of big data resources, the information sharing platform constructed can rapidly improve the efficiency of information services to a high degree. After the open information resource sharing platform runs in the big data environment, the public can enjoy information services through the network at any time and any place, saving a lot of time and human and material costs. According to a fixed attenuation strategy, the value of variance is gradually reduced. Given a group of samples, the number of Gaussian components, the mean value and covariance matrix of each component are estimated by various learning algorithms. Then the expression formula of quantum individual in the sample is as follows:

$$\left|\xi\right|^2+\left|\theta\right|^2=1 \quad (10)$$

In formula (10), ξ is the quantum state and θ is the superposition state of the basic quantum state. In addition, in order to facilitate the access of information sharing platform services, the application standard and protocol layer can be unified service window, which is also the most necessary layer in resource sharing. Application information services, information integration and application platforms of various departments are combined to rectify all aspects of information services and literature services. After consistent authentication, users can also be authorized to personalize their web pages and set their access rights, so that they can share information with all kinds of service types and information. To achieve the goal of information sharing, it is necessary to guarantee the organization with all kinds of resource services. This kind of service includes the processing and processing of metadata, the processing and management of digital information, the joint arrangement of directory, the management authority of members themselves and the evaluation of services, etc., which are mainly used in the data layer, service layer and technology layer. Through efficient management and the state of sharing mode operation, the popularization of resource sharing is realized. The service layer can make the information resources in different places through the way of spanning, to achieve the purpose of decentralized data access, data search, information union and filtering. Based on the above description, the establishment of information sharing mode is completed.

2 Experimental test

2.1 Experimental preparation

According to the principles of standardization, scalability and practicability, combined with the actual application scale and user characteristics, considering the expansion of sharing methods, this paper analyzes the functional requirements of spatial data management and geographic information sharing as well as the current domestic and foreign software and hardware conditions. The development scheme is implemented by the combination of client / server and browse / server. The client realizes the organization and management of marine functional zoning data, spatial analysis and auxiliary decision-making, and the browser realizes the browsing and query of marine functional zoning data. Users can browse and query marine functional zoning data through the browser to achieve marine functional zoning data sharing and web publishing. Different implementation technologies are adopted in server, client and browser. It needs to ensure that each module can work normally, and then coordinate with each other. After debugging and verification, it can be used reliably in the experiment, including key, MCU minimum system, led, ADC, serial port debugging, PLC program and human-machine interface testing.

2.2 Experimental result

In the experiment, the information sharing method based on big data technology and grid theory was selected to compare with the designed information sharing method. Under different pressure conditions, the transmission delay of the three methods is tested. The smaller the value is, the better the performance of the method is. The experimental results are shown in table 1:

Table 1 Experimental results of transmission delay(ms)

Pressure value(kPa)	Information sharing method based on big data technology	Information sharing method based on Grid Theory	Information sharing method of design
10	3.667	4.115	1.976
30	4.028	6.027	3.331
50	5.136	6.339	2.287
100	6.119	7.584	4.664
150	8.334	8.019	5.028
200	9.155	10.007	7.336

According to table 1, the average transmission delay of the three sharing methods can be obtained, as shown in Figure 1:

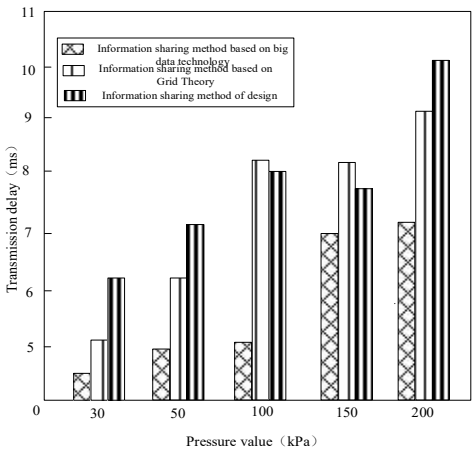

Fig. 1 Average transmission delay

As can be seen from Figure 1, the average transmission delay of the information sharing method of this design and the other two information sharing methods are 4.1036ms, 6.073ms and 7.015ms respectively, which indicates that the information sharing method of this design is more suitable for the actual landscape design project.

3 Conclusions

The information sharing method of the design, according to the content of the study, from the component elements of plant landscape are classified and studied, and the types and characteristics of the component elements of plant landscape are studied and analyzed. The characteristics and characteristics of each plant landscape element are extracted, and the characteristics and characteristics of each plant landscape element are analyzed in detail, and the corresponding database is established. At the same time, it has laid a theoretical and practical foundation for academic research. Due to the limited research conditions, the application research of artificial intelligence technology in other fields is not comprehensive enough, and we will continue to work on related topics in the future.

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