Optimization Analysis of Knowledge Label Personalized Dynamic Recommendation System Based on Artificial Intelligence Algorithm

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Abstract. There are many problems and shortcomings in traditional 3D modeling tech of environment design, and there is a great room for amelioration in reconstruction method and reconstruction precision. As an intelligent means integrating computer, info network and big data, CAD can create a more experiential and interactive environment design atmosphere. Based on this, this paper first analyses the concept and connotation of 3D modeling of environmental design, then studies the computer-aided environment design, and finally gives the 3D modeling tech of computer-aided environmental design.

Keywords: Simulation Tech Model, Construction, Computer

1. Introduction
The rapid development of computer tech makes it more in-depth research and analysis in many fields, especially in the field of environmental design, which greatly accelerates the rapid development of 3D modeling tech of environmental design [1]. On the other hand, the computer-aided environment design can organically integrate the elements as shown in Figure 1 below, and accelerate the in-depth utilization of modeling tech in environment design. There are many problems and deficiencies in traditional 3D modeling tech, mainly in its low degree of 3D restoration, and there is much room for amelioration in both reconstruction methods and reconstruction accuracy. With the help of computer tech, it can significantly ameliorate the stereo perception of the environment and accelerate the effective matching of modeling methods.

The 3D modeling tech of computer-aided environment design can more intuitively depict the details and granularity of the model, make up for the error of traditional modeling methods, and show higher advantages in the aspects of algorithm superiority [2]. With the help of computer-aided generation of 3D space of environmental design, it helps users to achieve high degree of freedom design and planning, and realizes the 3D interaction between relevant design elements, so as to accelerate the diversification and personalization of environmental design means, better match and meet the diversified needs of users [3]. As an intelligent means integrating computer, info network and big data, CAD can create a more experiential and interactive environment design atmosphere. In the
field of environmental design, in-depth utilization of computer-aided tech can significantly ameliorate the transparency and visualization of the design process.

In addition, the utilization of computer-aided in environment design realizes the development of 3D interactive image, and helps designers better realize real-time interaction and communication between design elements. With the continuous development of 3D space tech in environmental design, the integration of 3D space tech and computer-aided tech can break through the limitations of traditional software and hardware, and accelerate the significant optimization and amelioration of environmental design atmosphere [4]. In a word, computer aided environmental design has its own advantages and value. On the one hand, it can help designers to analyze the characteristics of environmental space objects better; On the other hand, it can also help users master the elements and contents of environmental design, and generate more interactive and interactive space. Therefore, the research on 3D modeling tech of computer-aided environmental design has important practical value.

![Virtual assistant](image)

**Figure 1. Integration elements of computer aided environmental design**

## 2. Concept and connotation of 3D modeling in environmental design

### 2.1. The concept of 3D modeling in environmental design

For the computer, it can directly obtain the data source is only two-dimensional plane image, compared with the real 3D scene, there will be a certain degree of info loss, so the use of two-dimensional image to reconstruct 3D objects will inevitably become a key problem. In the actual process of environmental design, the same object is imaged from different angles, and then these data are analyzed and synthesized to recover the 3D info of the object [5]. The traditional 3D modeling mainly uses the modeling method based on geometric modeling. The environmental designer creates the 3D model of environmental design by using geometric modeling software, computer graphics and environmental design theory.

### 2.2. Methods and characteristics of 3D modeling in environmental design

3D modeling of environment design achieves the purpose of browsing different scenes by switching in the panoramic space constructed by panoramic images. By adding links to other 3D panoramas or maps, or using computer vision tech and computer graphics and image tech, the corresponding environment model of panoramic image is obtained, and the mapping between panoramic space and real environment is realized [6]. Secondly, image-based modeling can generate accurate 3D geometric model of the object. According to whether the light source is actively controlled during image acquisition, image-based geometric modeling mainly includes active method and passive method. Among them, the active method represented by laser scanning, structured light method and shadow method has the advantage of getting accurate surface details of the environment, but it also has some typical disadvantages such as high cost, inconvenient operation, post-processing and lossy processing.
In addition, the passive method does not directly control the light source, but passively analyzes all kinds of feature info in the image to reconstruct the 3D model of the object. This method has many advantages, such as low lighting requirements, mature tech, simple operation and low cost.

The environment design modeling based on contour gets the 3D model of the object by analyzing the contour image or silhouette contour line of the object in multi view [7]. The 3D space of the object is discretized into voxels, and the voxels projected outside the contour area are eliminated by using forward trial to get the 3D model of the object. The contour method has the typical advantages of high efficiency, good versatility, and fast environment modeling speed, but it also has the obvious disadvantages of low accuracy, high input source requirements, lack of texture, less feature points and so on.

2.3. The value of 3D modeling in environmental design
Compared with the traditional modeling method, the environment design modeling tech based on computer aided is simple, fast and realistic, so it has been widely used in practice. With the increasing demand for complex realistic models in the fields of computer graphics, virtual reality and multimedia communication, the computer 3D modeling tech represented by non-rigid 3D modeling, special scale object modeling, dynamic object modeling, large-scale environment design modeling and recognition and understanding has made remarkable progress.

3. Computer aided environment design
3.1. The concept of computer aided environmental design
Computer aided environmental design the idea that people reorganize and reprocess the environment where they live, and the process of putting this idea into a form of carrier. Environmental design has the typical characteristics of systematicness, publicity and artistry [8]. Among them, at the systematic level, though street facilities, display, logo design can appear as a single individual work, they are different from general products and are a coordinated system. Secondly, at the public level, computer-aided environmental design is a design that provides public enjoyment, display for public viewing and public service for the public. In addition, on the artistic level, environmental design works are not purely functional design, but should be designed as a work of art. In a sense, the quality of environment is determined by the good and bad environmental design.

3.2. The elements of computer aided environmental design
Most of the computer-aided environmental design works can appear in the form of monomer, so we must follow the design elements of product design, such as function, material structure and modeling, as shown in Figure 2 below. Among them, in the functional level of computer-aided environmental design, it mainly includes two aspects: material function and spiritual function, in order to meet the fundamental requirements of people-oriented [9]. Secondly, in the aspect of material structure and tech of environmental design, environmental design works are generally located outdoors, so they generally choose materials with good weather resistance. In addition, in the modeling level of computer-aided environmental design, the modeling of their works is often quite different.

![Figure 2. Elements of computer aided environmental design](image-url)
3.3. The process of computer aided environmental design

The process of computer aided environmental design usually includes environmental investigation and analysis, determination of design objectives, comprehensive design, monomer design and comprehensive design related to water, electricity and structure [10]. The design process of computer aided environment design is open and circular. The whole design process is composed of several relatively independent design stages. Each design stage should have continuous info feedback, and then the design and built environment should be revised and transformed repeatedly, so as to make it rationalized and idealized, and meet the changing needs of people's life. Through these different processes, we can meet the needs of symbolism, identification, convenience, diversity, artistry, engineering and national culture of environmental design.

4. 3D modeling tech of computer aided environmental design

4.1. 3D modeling tech of environmental design

3D modeling of environmental design is the basis of computer simulation reality system, which mainly includes geometric modeling, motion modeling, physical modeling, object feature modeling and model segmentation. Among them, the geometric modeling tech is to define the geometric entity exactly in the way that the computer can understand, give the mathematical description, data structure form and geometric entity description, so as to construct the entity model inside the computer. Geometric modeling usually uses geometric info and topological info to reflect the shape and position of objects. The set operation theory of geometric modeling is a tool to combine simple objects into complex objects according to various operations in set theory. It is shown in the following equation 1-3.

\[ C = A \cup B = B \cup A \]  \hspace{1cm} (1)

\[ C = A - B (\text{with } C \neq B - A) \]  \hspace{1cm} (2)

\[ C = A \cap B = B \cap A \]  \hspace{1cm} (3)

4.2. 3D modeling of computer aided environmental design

The geometric model of the design entity is automatically compared with the features in the pre-defined feature library in the system to determine the specific types of features and other info, and form the feature modeling of the environment design entity. The segmentation and optimization of the environment design model can not only ameliorate the real-time performance of the system, but also ameliorate the interaction speed of the system. In short, different environment design 3D modeling tech can effectively match different utilization scenarios, and the requirements of computer software and hardware are also different. With the development of computer tech, the tech represented by voxel volume rendering will be more deeply applied in environmental design in the future.

5. Conclusion

In summary, with the help of computer-aided generation of 3D space of environmental design, it helps users to achieve high degree of freedom design and planning, and realizes the 3D interaction between relevant design elements, so as to accelerate the diversification and personalization of environmental design means, better match and meet the diversified needs of users. Through the analysis of the concept and connotation of 3D modeling of environmental design, this paper studies the methods and characteristics of 3D modeling of environmental design. Based on the research of computer-aided environmental design, this paper analyzes the elements and process of computer-aided environmental design, and the development of 3D modeling of computer-aided environmental design.

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5

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