International Journal of Science and Engineering Applications
Volume 12-Issue 01, 51 - 53, 2023, ISSN:- 2319 - 7560
DOI: 10.7753/IJSEA1201.1016

Perspective Data Analysis and Mining Algorithm for Interior Art Design from the Perspective of Virtual Metadata-Assisted 3D Modeling

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Abstract:This paper studies the virtual reality method of interior design based on 3D vision. Active and omnidirectional stereo vision sensors are used to collect 3D point cloud data of indoor scenes. Based on the point cloud data, the geometric relationship and placement of objects in the indoor scene are distributed. Independent synthesis of 3D scenes, training on the distribution of object placement. On the basis of image and color processing algorithm design, based on virtual reality and visual simulation technology, the development and design of a distributed 3D interior design system is carried out using 3dsMAX for distribution 3D modeling of 3D interior design, realize interior hierarchical structure design on Multigen Creator modeling software.

Keywords: Perspective Data Analysis, Mining Algorithm, Interior Art Design, Virtual Metadata-Assisted

1. INTRODUCTION

In higher vocational education, practical teaching occupies an important position, which can improve students' practical ability and play a vital role in students' employment. However, due to factors such as insufficient investment and difficult management and maintenance of practice places [1], it is difficult to establish practice teaching places, resulting in insufficient practical ability of some students. Strengthen practical teaching and improve students' practical ability [2]. Due to the rapid development of computer simulation and virtual reality and other technologies, 3D modeling of indoor scenes has important application [3] value in the fields of fire rescue, escape room and excavation. Optimize the layout of the indoor environment to improve the space use value of the indoor environment [4].

Research on distributed 3D interior design methods has important value in improving decoration style, beautifying home space and optimizing indoor environment design. Therefore [5], the use of effective methods for virtual realization of indoor 3D scenes has become a hot spot for relevant personnel to analyze [6]. The traditional 3D virtual reality method of indoor scene based on radiometric algorithm has disadvantages such as high time-consuming and poor modeling effect. If the indoor environment is relatively simple and the space is small, the plane image drawn by the common design platform can show the location of various landscapes. However [7], for environments with large indoor space and complex landscapes, it is difficult to accurately display the location of the landscape by using flat images [8], and it is difficult to draw corresponding three-dimensional images. Various sensors and microprocessors in the Internet age continuously accumulate data, and widely interconnected, the amount of data grows exponentially [9].

Usage data is not limited to the purpose of collection, but is more needed by users. The Internet has become a digital network platform [10], which has had a huge and far-reaching impact on the architectural and environmental design industry. How to use data to make data resources become the energy force to promote the development of design [11], to discover the knowledge that is beneficial to design hidden in the data, and to improve the knowledge productivity of the design industry, is a topic that the design [12] industry needs to think about in the data age. Location Based Service (LBS), also known as location service, relies on mobile communication network (such as GSM network, CDMA network, etc.) [13] or other positioning methods (such as WIFI, GPS, etc.) to obtain the actual location information [14] of mobile terminal users, providing users with provide information services closely related to its own location, including positioning, navigation, query, identification, etc. [15] Virtual reality technology is a pursuit of changing traditional computer operations to computers to create an artificial environment for people [16]. It studies how to use a more "natural" way to communicate with the system and the environment through people's own perception system, language system, and body action system [17].

This will fundamentally change the current situation of people passively adapting to computers, but to become computers actively adapting to a new system [18]. Interior design is closely related to the actual site, especially construction courses. While carrying out classroom teaching, teachers also It is necessary to carry out visits [19], inspections and practical teaching in combination with the training site or the decoration construction site [20]. However, this kind of teaching method combining theory with practice is more difficult, which is embodied in the following two aspects. In order to model the indoor scene, this paper uses [21] the Active Stereo Omnidirectional Vision Sensor (ASODVS) to scan the indoor scene and obtain the 3D ordered point cloud data of the indoor scene [22]. The distributed 3D visual reconstruction method is used to carry out the 3D design of the indoor environment, and the system design is carried out in the virtual reality and visual simulation environment, and the 3D simulation software such as MAYA, 3ds MAX, SoftImage, LightWave3D is used to realize the optimization

of the distributed 3D interior design system design [23], and through experimental analysis, draw conclusions about the effectiveness. When the traditional interior design platform is improved and processed [24], combined with the 3D virtual vision technology, the panoramic information can be used to record and analyze the results, and the corresponding image workflow can be generated to establish a fully functional interior design platform. Data is the measurement and record of the objective world, it represents the past and the future. As a tool for automatically processing data, data mining can help to extract patterns representing knowledge. It is a process of extracting potentially useful knowledge patterns hidden in a large amount of incomplete, noisy, fuzzy, and random data.

2. THE PROPOSED METHODOLOGY

2.1 The Virtual Metadata Aided 3D Modeling

For the teaching of interior design, some colleges and universities prefer design skills and theoretical course teaching due to limited teaching conditions, and practical teaching is relatively weak, resulting in a disconnect between theory and practice. The cases in course teaching are always virtual cases, and the design drawings drawn by students are very difficult to implement. Even if you overcome the above difficulties, you can enter the practice place for practical teaching. The ASODVS acquisition module is used to obtain indoor panoramic scanning slice images. The value of the vertical distance h(Z) from the viewpoint Om to the center S of the surface laser generator is taken as the file name of the panoramic scan slice image.

The Snake algorithm is used to decompose the edge contour features of the distributed 3D interior design visual images, and the adaptive information fusion enhancement processing is performed according to the feature decomposition results. The product modeling in the interior design platform is to select different models according to the complexity of the model. mode. For those models with simple appearance, for example, tables and chairs in the platform can be combined with shape nodes to complete the design. The application of 3D virtual vision technology can provide simple modeling nodes such as cubes and spheres. The extension interior design is oriented to design problems. According to the extension architectural design theory, starting from the primitive model that can be recognized by the computer, with the expansion and Transformation is the characteristic, under the guidance of clear transformation process and direction, break through the thinking obscure box, and use logical analysis and rational reasoning to generate the operation method of design. The extension data mining technology is applied to the research of interior design, and it is a method to solve interior design problems with data.

Developed and published by Adobe Systems, the world's most famous and widely used image processing software that integrates image production, editing and modification, creative drawing and other functions. Its diversified editing and drawing tools can perform various image editing tasks such as plane processing, image format and color mode conversion, simple geometric figure drawing, image size change and image resolution adjustment. According to the descending distribution of h(Z) values, the indoor panoramic scanning slice images are collected from the indoor panoramic image storage folder; 2) Real-time preprocessing is performed on the acquired indoor panoramic scanning slice images to improve the range of laser projection points; 3) based on different azimuth angles to retrieve the overall indoor panoramic scanning slice images successively, and obtain the spatial coordinates of the laser projection by operation.

2.2 The Perspective Data Analysis of Interior Art Design

In terms of teaching goals, the classroom teaching goal is to improve students' ability to read the drawings of light steel keel ceilings. The goal of virtual practice teaching is to master the connection between the three-dimensional models of light steel keels in the virtual space of the teaching platform. The goal of on-site practice teaching is to verify the accuracy of light steel keel model construction in virtual practice. On the basis of image and color processing algorithm design, based on virtual reality and visual simulation technology, the development and design of a distributed three-dimensional interior design system is carried out. 3dsMAX performs 3D modeling of distributed 3D interior design, and realizes interior hierarchical structure design on Multigen Creator modeling software.

The information transmission model of the distributed 3D interior design system is constructed by using PCI bus technology. As a special feature of virtual reality technology, interactivity is also an important content of the entire virtual interior design platform. The interaction design of the platform for product selection, position transformation, etc. should be completed by using VRML (Virtual Reality Modeling Language) interaction. Among them, VRML interaction function is mainly realized by interactive sensors, external creation interface EAI and other methods, among which, EAI interaction mode is the main method. The information of interior design contains not only objective existence that can be quantitatively described, but also qualitative concepts and consciousness. Quality and quantity are closely linked and mutually restrictive.

The primitive model is good at formalizing and quantifying the unity of quality and quantity by qualitative and quantitative dialectical methods, which is convenient for database storage and computer application, and is conducive to online application and network communication of design data. The building only needs to present the outline features of the main body and load a low-resolution model, but it also needs to present detailed features such as doors and windows during close-up observation, and a higher-precision model needs to be loaded. Therefore, when the model of the building is established, models with different levels of detail can be established, and different models can be displayed according to the position of the user's viewpoint during virtual roaming. The implementation procedure of the professional design of landscape architecture assisted by virtual reality technology mainly includes the following important steps: first, the determination of the design scheme, then the basic plane drawings of the scene are drawn in the AutoCAD drawing software, and after cleaning the lines.

2.3 The Perspective Data Analysis and Mining Algorithm for Interior Art Design

The basic entity object of the distributed 3D interior design system is constructed [9], the multi-thread scheduling method is used to process the local information of the distributed 3D interior design system, and the client/server model is used to construct the virtual reality scene application support layer. The research and development of distributed 3D interior design system is carried out under the 20 development platform. The main function of the 3D visual virtual model is to obtain various landscape information in an interactive

environment, and to study the mapping relationship between different landscapes in an all-round way. It cannot be a universal standard template. Even if you master the design rules, you will encounter problems of one kind or another in application. The contribution of extension design theory to data mining is to expand the binary choice of the established rules into multiple choices under different conditions and goals. The expansion of primitives is the core concept of primitive theory.

This is not groundless. And build the corresponding 3D model through 3DSMax and other software. In addition, determining the specific part of the landscape is also an indispensable part of the interactive function. According to the location of the landscape, it can provide designers with more intuitive and detailed information. The core problem of the 3D model establishment is the collection and processing of the overall planning of the campus, road routes, terrain height, vegetation coverage, and building layout, size, and contour characteristics. The accuracy and detail of the data directly affect the similarity between the model and the real scene, which in turn affects the user experience. Due to the complex terrain of Chongqing University of Posts and Telecommunications, in order to ensure the similarity between the virtual scene and the real scene, most of the design contents proposed by the landscape design at the beginning of the concept are in the ideal state of the designer.

3. CONCLUSIONS

The distributed feature information fusion method is used to construct the color image model of distributed 3D interior design, and edge contour detection and feature extraction are performed on the distributed 3D indoor spatial distribution image; Decomposition; extension interior design based on extension data mining has clear advantages; extension data mining analysis method can effectively classify indoor data for different design problems, and the limited number of cases does not affect the classification method. Explanation; the excavated design knowledge will help the computer to realize the thinking extension of the human brain and the application of human-computer interaction interior design.

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