Design of animation multi view scene reconstruction model based on virtual reality

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Abstract: With the development of virtual reality technology in recent years, the requirements for the design and processing of animation image details are also increasing. The current simple two-dimensional animation processing mode has been unable to meet people's visual needs for animation scene reconstruction design. Therefore, this paper proposes a design method of animation multi view scene reconstruction model based on virtual reality. Combined with virtual reality technology and three-dimensional design software, it collects and analyzes the characteristics of scene structure deformation, bending degree, image scaling and other changes, so as to generate the corresponding geometric structure, and reconstruct and draw characters, plants, scenes, etc., so as to realize multi angle structure setting It can effectively enrich the image materials and ensure the clear texture of the image structure. At the same time, the color, reflection, transparency and other characteristics of animation multi view scene are optimized to effectively change the position and size of animation multi view scene, so as to optimize the animation effect. Finally, the experiment proves that the animation multi view scene reconstruction model design based on virtual reality has high effectiveness and authenticity in the practical application process, which fully meets the research requirements.

1. Introduction

Animation multi-perspective scene reconstruction design is the modeling design of all objects except characters in the animation film. It is one of the important design links in the animation design process. In order to ensure the design effect, it is necessary to collect and analyze the features of the visual scene, and the final style of the scene is decided by the design style of the scene. The reconstruction design of animation multi-view scene based on virtual reality needs to organize virtual space according to the original space structure, reconstruct and recreate the scene, improve the precision, authenticity and affinity of the animation multi-view scene.

2. Animation multi-perspective scene reconstruction model

2.1 Reconstruction of feature parameters for animation multi-perspective scenes

In the process of designing the multi-view scene reconstruction model, the first step is to input the first draft of the scene into the reconstruction system, and then combine the virtual reality and digital media technology to process the multi-view scene and make the animation according to the processed animation model. On the basis of the original animation multi-perspective scene design and based on digital media technology and virtual reality technology, the color configuration for the rebuilding of animation multi-perspective scene in micro-animation design is improved. The specific configuration parameters are as follows:

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Table 1 Color Configuration Equipment and Parameters for Animation Multiview Scene Reconstruction

Hardware	to configure	function
Embedded Server	4-core 2.56 GHz CPU, 8 GB memory, 500 GB hard disk	Content management
System running processor	Intel Core Duo, Windows 8.1 system	Application of digital media technology
database server	Four core 2.75ghz CPU, 4GB memory, 500GB hard disk	Store data
Display card	Resolution 1 280 × 1 024, 64 bit video card	Display production content
sound card	ASIO compatible sound card, 24 bit	sound playback

Based on the data in the above table, the color reconstruction model of animation multi-view scene based on virtual reality technology is further optimized and designed. On this basis, the composition and establishment process of animation multi-view scene are realized by combining software and hardware devices. The establishment of each model in animation multi-view scene is the summary of virtual reality technology and the establishment process of 3D scene. In the process of animation multi-perspective scenes, color rendering is mainly carried out on the 3Dsmax platform. Because of the complexity of the rendering steps, the animation scene color rendering flow chart needs to be optimized, the specific flow structure is shown in the following figure:

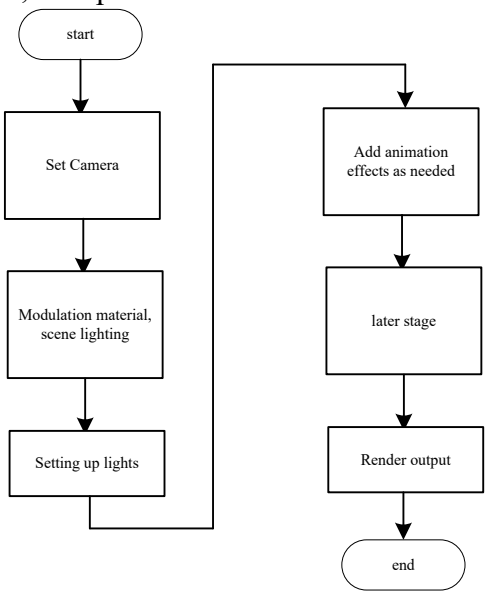

Fig. 1 Cartoon scene color rendering flowchart

In the process of multi-view scene color reconstruction, it is necessary to adjust the relevant parameters such as illumination change, brightness and grayness so as to ensure the multi-view scene color reconstruction. Because the traditional two-dimensional animation design method is difficult to meet the current people on the animation scene design visual needs. Based on this, we use virtual reality technology to optimize the structure and color, improve the structural texture change of the animation multi-view scenes, and carry out the detailed design for the reflection, transparency, color and other design requirements of the animation multi-view scenes. At the same time, we standardize the location and size of the animation multi-view scenes by adding lighting, camera and other equipment. The specific design model is shown as follows:

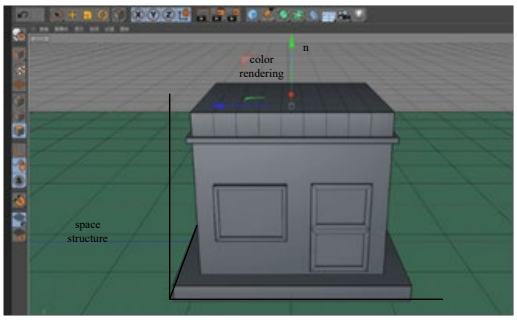

Fig. 2 Animation scene reconstruction rendering model demonstration

Based on the rendering model above, snow, fire and wire can be added in the process of animation scene reconstruction, so that the animation scene can be set off effectively, and the 3D structure of the animation scene can be designed with virtual reality technology to make the animation features more realistic. In the process of animation structure design of large scale scene, firstly, we need to standardize the dimension coordinate of the scene, then design the structure sketch of the 3D model, simplify the 3D structure of the scene by some special effects, such as squeezing and cutting, and modify and refine the structure features of the scene.

2.2 Animation multi-perspective scene reconstruction model running algorithm

In the process of animation scene design, we need to realize the effective combination of virtual and real scenes, so we need to schedule the parameters of dynamic scenes. It is necessary to design virtual scene in the process of animation multi-view scene reconstruction to ensure the animation multi-view reconstruction scene, viewpoint, composition, lens movement and so on. If there are multi-scene effects and shots to choose from in the process of reconstruction, it is necessary to randomly set the standard parameters of scene structure from different angles. In the modeling process, the node coordinates are calculated to ensure the continuity of the 3D animation scene. Describe the model nodes of various colors, shapes and materials in the 3D animation scene, and construct the node diagram. Based on this, the hierarchical structure of animation scene nodes is optimized as follows:

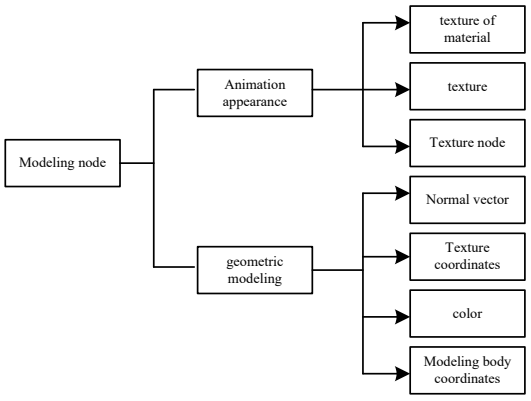

Fig. 3 Animation scene multiview node hierarchy

Further standardize the image rendering load balance parameters according to the decision results of multi-view reconstruction scheduling of animation scenes, so as to independently calculate the animation reconstruction strategy, allocate the received task requests to each computing node in a more average manner, and reconstruct the scene in the same manner at the end of a cycle, and allocate and adjust the parameters of the animation scene reconstruction model according to the real-time design and response, so as to eliminate the imbalance characteristics of load distribution. The following details compare static and dynamic load balancing parameters in the animation scene rebuilding process, as follows:

Table 2 Static and Dynamic Load Balancing Parameters

	Static load balancing	Dynamic load balancing
Applicable occasions	The difference of user requests is small and the execution time is short	Uncertainty about task related information
Operation mode	Decide task allocation plan before running	Real time monitoring of system status during operation
Advantages and disadvantages	Advantages: simple implementation, low system overhead Disadvantages: poor general-purpose, low efficiency, low resource utilization	Advantages: high resource utilization, greater flexibility and pertinence Disadvantages: high overhead

Based on the data in the above table, the pixel coordinates (m, n) and $(\mathrm{X_a}, \mathrm{Y_a}, \mathrm{Z_a})$ of the scene in the 3D animation scene are assumed as dynamic load parameters.

$$R = \begin{bmatrix} X_a \\ Y_a \\ Z_a \end{bmatrix} = \begin{bmatrix} a & x & u \\ 0 & a_y & u_0 \\ 0 & 0 & 1 \end{bmatrix} \quad (1)$$

Formula $\mathrm{a}, \mathrm{x}, \mathrm{u}, \mathrm{a_y}$ represents the characteristics of the animation scene structural parameters. Based on this further use of virtual reality technology to obtain the animation scene node group size, the specific formula is as follows

$$C_x = \frac{1}{Rz} \sum_i a(i,k) \quad (2)$$

According to the characteristics of image scene nodes and real-time design state, the scheduling strategy of visual scene reconstruction parameters is adjusted, and the model is further optimized. If $\mathrm{C}(\mathrm{s_i})$ represents the changeability of the i drawing node, its algorithm is:

$$C(S_i) = [k_1 k_2 k_3 k_4] \begin{bmatrix} n_i C(C_i) \\ C(D_i) \\ C(M_i) \\ C(N_i) \end{bmatrix}, i = 1, 2, \cdots, n; \sum_{j=1}^{4} k_j \quad (3)$$

Based on this, the 3D animation nodes are further partitioned by using the virtual reality method, and the complex scenes are divided into several small units according to the distribution area. Finally, the latter is partitioned through nodes. The detailed steps are as follows:

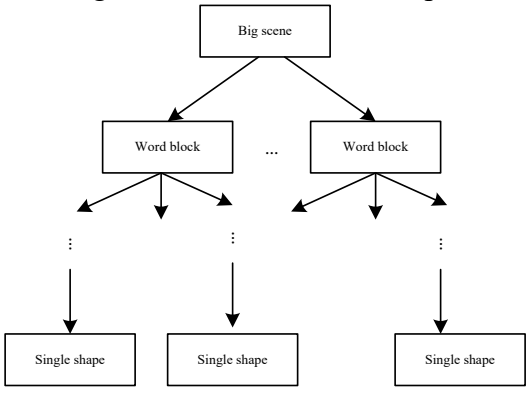

Fig. 4. Scene structure partitioning process

In the process of comic scene reconstruction, the scene is further segmented, and the coordinate parameters of the scene nodes are calculated. N is assumed to represent the 3D scene node of the

organization, which is used to compensate the 3D scene images with iterative radial and tangential distortion, and ϕ is used to represent the tangential distortion components of the 3D scene. Then compute available:

$$\begin{cases} g_{\text{saf}} = t_2 + km \\ \varphi = k\left(r^2\right) + d_2 xy \end{cases} \tag{4}$$

In the process of multi-view scene modeling, both virtual roaming and model making need the support of software. Therefore, it is necessary to combine 3D modeling software for image processing and virtual 3D engine. The theme of animation scene is the core of animation scene, is an important part of the creation of animation style, so in the design process, the need to analyze the scene style, color, light and lens optimization. Therefore, it is necessary to express the structure of the main space environment. After determining the design form of the main scene, we can design other scenes, objects and props around the style and form of the main scene, and the relationship and form of other scenes and main scenes. According to the characteristics of the theme, choose software such as unity3d as the design platform. Based on the adoption of virtual reality technology, which simplifies the complicated rendering process of animation multi-view scene reconstruction and simulates the real effects of some scenes, the detailed structure of scenes under different perspectives shall be further arranged, and the more realistic visual effects shall be presented to the audience after the scene is constructed by virtue of virtualization technology. Based on this, the animation scene reconstruction process shall be further simplified, specifically as follows:

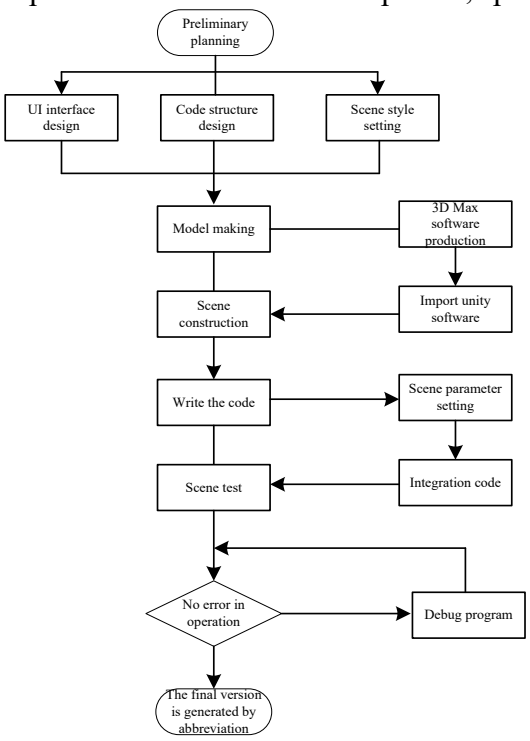

Fig. 5 Animation scene reconstruction process

In the process of animation scene reconstruction, the animation model needs to be modeled according to the scene generated by the partitioning script, and the tiny scene which does not appear at first can be neglected. In order to improve the quantity and precision of model surface, virtual reality technology is used to generate dynamic model. Because the animation scene design content is the same theme, so the design of the site is a closed room, its structure layout is also very particular, so need to optimize the details set diagram, can be used in the future modeling.

2.3 Realization of Cartoon Scene Reconstruction

Furthermore, the basic tools of 3D modeling are reasonably selected in the 3Dsmax platform. To

complete the animation scene 3D reconstruction project, improve the animation scene multi-perspective standard library, expansion library, composite objects, curved surfaces and other related factors effective treatment, to achieve effective modeling ins. Usually, the animation multi-perspective scene base design is composed of rectangular, spherical, cylindrical and other geometric components. The extended base reconstruction of cartoon scene needs to be optimized by tangent base. The synthesis base in the process of animation scene reconstruction is mainly used for the reasonable design and operation of the equipment placement area. In the process of scene design, it is necessary to cut, chamfer and lengthen the structure of the animation scene, and convert it into an editable polygon for point-to-point operation. By reasonably changing the structure shape, adding curved, twisted and other volumetric objects, the scene can be reconstructed to ensure the rationality of the model. In order to ensure the continuity of the animation screen, the beauty of the melody and the realism of the digital effects, the theme and structure of the animation scene are taken into consideration. Thus a more comprehensive and complete display of the animation in the scene, based on the scene style and content of the form of comprehensive treatment. Only in this way, in order to create a more distinctive, more novel animation works. On this basis, the virtual reality technology is used to establish the 3D animation scene node model. The diagram shows the basic features of virtual reality technology

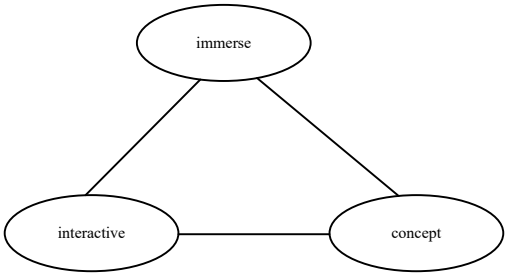

Fig. 6 Essential features of animation scene reconstruction technology

Through the definition of the surface features of 3D animated objects, the average number of pixels of 3D animated scenes can be obtained, and then the same number of pixels can be obtained. Form a representation image with the following algorithms:

$$I(x,y)=\varphi \operatorname{avg} g_{\text{saf}} \sum_{d} a(i,k) \tag{5}$$

Based on the above algorithms, we further use virtual reality technology to describe the geometry information of 3D animation, combine the geometry information with the node coordinates in virtual reality technology, comprehensively search the point set in the animation image, find the best conversion relationship between the point set and the point set, and obtain the depth information of all scenes in 3D animation. The specific algorithms are as follows:

$$f=\frac{1}{N}\sum_{i} z\left\|y_i-(r+t)\right\| \tag{6}$$

In the algorithm, r is the feature point of the animation scene image, i is the 3D vector sampling point, and t is the field scene cloud fusion factor. Based on the above algorithm, the depth information of 3D animation scene can be obtained, and the point cloud in 3D scene image can be fused by virtual reality technology. Suppose Q represents the vector sampling points in the scene image space, simplifies the point cloud data in the animation scene image, and obtains the total number of point clouds in the 3D scene image:

$$\operatorname{ds}(E,s)=\phi \in D \mid s-n \mid \tag{7}$$

In this formula, ϕ represents the point cloud value of a point in a 3D animation scene; s, n represents an image of a point in 3D space. In the modeling of landscape design, in addition to forming the overall shape of the material modelling style and modelling characteristics, but also

includes the object structure style. Based on this, the background layer is drawn again. The background layer includes foreground, close shot, middle shot, background shot, light and shadow effect, adopting polygon, separating surface modeling, as many quadrangles as possible, reasonable designing curve and surface parameters and so on. The structure of light and shadow is optimized by modifying the filled layer. When modeling dynamic scenarios, each form of modeling has its advantages. According to the different characteristics of scene modeling, a reusable scene model is constructed, which facilitates the creation and generation of the scene. Based on this, the operational structural framework of the animation scene design and reconstruction model is optimized as follows:

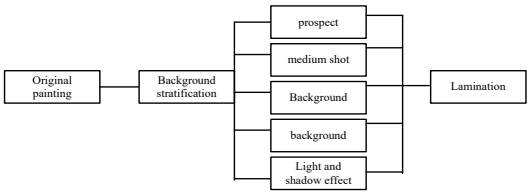

Fig. 7 Cartoon scene design reconstruction model structural framework

In the animation scene design process has used the drawing, the sculpture, the construction, the practical decoration and so on many kinds of visual art forms. Typically, each photo consists of dozens of scenes, major scenes, and minor scenes. In the early stage of animation scene design, not only consider the characteristics of each scene and spatial relations, but also consider the interaction between the scenes. Comprehensive analysis background layer, dynamic scene layer, scene decorative layer, interactive unit layer. Based on this further optimization of the animation scene model structure optimization process, as shown in the following figure.

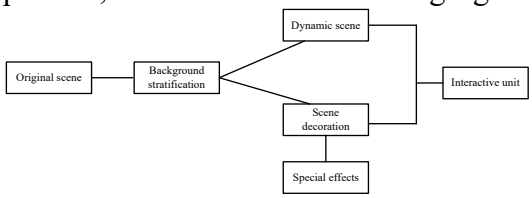

Fig. 8 Animation scene model structure optimization process

As shown in the picture, in the creation of the theme landscape elements, it is necessary to reasonably grasp the story elements, role molding and atmosphere construction, so as to make the overall landscape elements harmonize with the design form of the film, at the same time, embody excellent artistic features, and ensure the effectiveness and rationality of the actual design of the multi-perspective scene reconstruction model.

3. Analysis of experimental results

In order to verify the design effect of multi-view scene reconstruction model of animation based on virtual reality, 5 groups of animation scenes taken from different angles by CCD camera were used as experimental data to obtain 380 × 600dpi resolution animation scene images. Using the traditional 3D animation modeling method and the design of the 3D animation modeling method for comparison. For test environment settings, see the following table:

Table 3 Experimental environment configuration

Software Configuration	Hardware environment configuration	Development Language
Windows XP	Client: computer frequency 1.7 GHz	Web page layout, web page management
Browser plug in	Server: memory 256MB, video memory 64Hz, hard disk 40Gb	VRML editor
	Network environment: Windows XP	Java development platform

Using DF software to generate experimental data, together with more animation models, the

animation model in the scene for processing. Comparing the actual application effects of the two groups of models, the scene continuity of the reconstructed model is used as a reference index. The specific detection results are shown as follows:

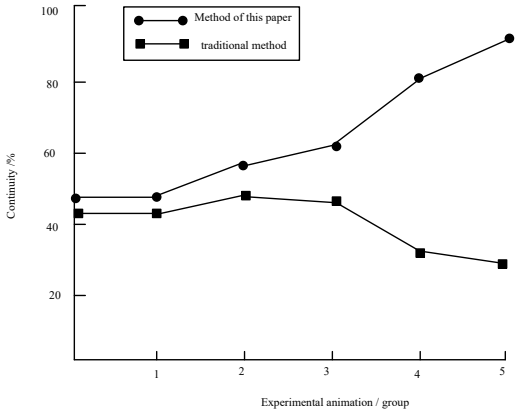

Fig. 9 Comparative experimental results

Experimental results show that the proposed modeling method can ensure the continuity of the scene. But the traditional reconstruction model, along with the animation scene quantity increase, the model coherence drops obviously. It is proved that the 3D animation modeling method based on virtual reality technology can guarantee the continuity of the scene and improve the quality of the scene reconstruction.

4. Conclusion

Scene reconstruction is not only an indispensable element in the process of animation design, but also an effective means to create the atmosphere, enhance the artistic effect and appeal of animation and attract the audience's attention. In order to ensure the reconstruction effect of the cartoon scene, the 3D cartoon modeling method is optimized based on virtual reality technology, and the real world scene is combined to give people a real feeling.

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