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Computer-Aided Design AND APPLICATIONS

Immersive Experience Design of Digital Media Interactive Art Based on Virtual Reality

Kunjian Li[1] and Jian Zhu[2]

[1]School of Design, Hefei University, Hefei, Anhui 230601, China, likj@hfuu.edu.cn
[2]China Broadcasting Anhui Network Co., LTD Hefei branch, Hefei, Anhui 230601, China, zhujianhf@dingtalk.com

Corresponding author: Kunjian Li, likj@hfuu.edu.cn

Abstract. The most important thing in the interactive stage of immersive virtual reality (VR) is to take human perception as the core, which is an interactive process between people and the real world, paying more attention to people's feelings. From the artistic point of view, we can understand that the content of immersive VR interaction extends from the original natural interaction to the interactive process between screens. As far as creators are concerned, they try to enrich the expression forms and information transmission channels of their works with new technologies, while as far as audiences are concerned, they expect to know more about the connotation of their works through effective human-computer interaction (HCI). VR immersive art meets the dual needs of creators and experiencers. This article studies the application of computer aided design (CAD) technology in VR scene modeling, and combines the image feature fusion model based on deep learning (DL) into the VR digital modeling process, thus enhancing the immersive interactive experience of digital media interactive art. The results show that the feature fusion model in this article has high operating efficiency and modeling accuracy, and has a strong sense of substitution, 3D sense and HCI experience.

Keywords: Virtual Reality; CAD; Digital Media; Human-Computer Interaction; Immersive Experience
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1 INTRODUCTION

Compared with the virtual space built by traditional media, the virtual world built by digital media art is more simulated and has a sense of substitution. Ban and Hyun [1] analyzed directional force feedback: the application of mechanical force concentration in immersive experiences in virtual reality. It believes that in virtual reality, users integrate themselves into the virtual environment by wearing special devices such as gloves and helmets, and gain an immersive experience. However, this experience usually only stays in the visual and auditory aspects, and users cannot feel the physical characteristics in the virtual environment, such as directional forces, friction, etc.

Directional force feedback is a technology that enhances the virtual reality experience by simulating the interaction forces between objects. By simulating directional forces, users can feel the physical characteristics of objects such as weight, direction, and friction in the virtual environment, thereby more realistically integrating into the virtual environment. In the field of Applied science, directional force feedback can be applied to many fields, such as game design, simulation operation, remote operation, etc. Through directional force feedback technology, users can feel the weight, direction, and friction of objects in a virtual environment, providing a more realistic experience of the operation process. As the times require, VR immersive art has become the focus of public attention, which emphasizes the complete immersion of the audience and the sensory feast aimed at bringing multi-sensory feelings to the audience at the scene of the work. With the continuous development of technology, virtual reality technology has become increasingly mature, providing people with a more immersive experience. In virtual reality, music is a very important element that can enhance the realism and emotional resonance of the virtual environment, and change the user experience and behavior. This article will explore the music experience of audio priority VR in virtual environments and how to apply it to the fields of education and entertainment. Traditional virtual reality applications often prioritize visual effects while neglecting the importance of music. Research by and Hamilton has shown that music can significantly enhance the effectiveness of virtual environments, increase user engagement and emotional resonance. Therefore, audio priority VR has become a new trend, placing music at the core of virtual reality experiences, providing users with a more diverse and immersive experience [2]. VR is a display and control technology that immerses people in an interactive virtual environment generated by or mediated by computers. It uses stereo images and stereo sounds to form a 3D virtual space, and its strong interactivity can make people experience vision, hearing, touch and even taste and smell, and get an immersive feeling. As an important part of it, the fidelity and real-time display performance of visual simulation play an important role in the immersion effect, interactive performance and people's psychological state in the virtual space.

Cecotti [3] applied virtual immersive cultural heritage processing for application evaluation. The model was photographed and measured through 360 images, and differences in academic activities related to cultural heritage were analyzed. Fully immersive virtual reality can restore and protect cultural heritage. Through virtual reality technology, the original appearance and details of cultural heritage can be reconstructed and restored, allowing users to have a deeper understanding and experience of cultural heritage. At the same time, this technology can also digitize the preservation of cultural heritage to protect it from loss due to time and other factors. Secondly, fully immersive virtual reality can provide a more realistic experience. Through virtual reality technology, users can experience the details and atmosphere of cultural heritage, such as the structure, materials, colors, as well as the scenes and sounds of cultural activities. This experience can more realistically restore cultural heritage, allowing users to have a deeper understanding and experience of the connotation and value of cultural heritage. From the artistic point of view, we can understand that the content of immersive VR interaction extends from the original natural interaction to the interactive process between screens. Immersive VR is based on art, through which we can learn more about the content and form of art. From a practical point of view, we can analyze and sort out the contents in depth. Its ultimate goal is to constantly improve the content of art design for better feedback, so as to provide a better environment for the experiencer and finally improve the aesthetic level of the work. Chytas et al. [4] believed that immersive 3D modeling and virtual reality of surgical Neurosurgery anatomy enhanced visualization is a very interesting and valuable topic. With the continuous development of technology, the visualization level of surgical techniques is becoming higher and higher, providing doctors with more accurate and safe ways to perform surgeries. In Neurosurgery operation, accurate operation is very important for the rehabilitation of patients. Through the immersive 3D modeling and virtual reality technology of surgical Neurosurgery anatomy enhancement visualization, doctors can better understand the skull, brain tissue and other structures of patients, better plan the operation plan, and reduce the operation risk. Through immersive 3D modeling and virtual reality technology, doctors can operate more accurately and avoid damage to surrounding

normal tissues. In a word, the immersive 3D modeling and virtual reality technology of surgical Neurosurgery anatomy enhancement visualization is a very promising technology. Taking VR as the leading technology in scene visualization can improve the visual sense of scene visualization and greatly enhance people's sensory stimulation. And VR can reduce the design cost, the scene can be implemented in the computer, and the required design effect can be obtained in a short time. In order to improve the immersive experience of digital media interactive art, this article studies the application of CAD in VR scene modeling, and proposes a VR image processing method based on image feature fusion.

Harrington et al. [5] conducted a multimodal immersive interaction analysis of virtual reality programs. A database of augmented reality for botanical garden environments was constructed through the analysis of drone imaging reality based on computer domain information. The virtual botanical garden is designed as an immersive, multi-mode, interactive and Data and information visualization virtual field visit, which can allow users to experience the atmosphere and environment of the botanical garden more realistically, and can also improve users' understanding and understanding of plants. Firstly, virtual botanical gardens should adopt various modes, such as exhibition mode, exploration mode, teaching mode, etc., to meet the needs of different users. In the exhibition mode, users can see the overall plan of the botanical garden and the introduction of various plants; In the exploration mode, users can freely explore the botanical garden and see the real scenes and environments of various plants; In the teaching mode, users can learn knowledge and characteristics of various plants, such as plant classification, growth environment, growth process, etc. The current digital technology and Internet applications are constantly updated and developed, and the corresponding user experience is correspondingly improved and more in line with the public's operating habits. Through the application of VR, the user experience can be further improved to meet the characteristics needed by the experience economy This article studies the immersive experience design method of digital media interactive art:

Firstly, this article analyzes the current situation of VR scene modeling technology, and puts forward an image processing algorithm in the field of VR application design in combination with the requirements of service design, which provides reference for a wide range of VR applications.

⊖ The research combines the image feature fusion model based on DL into the stage of VR digital modeling, so as to enhance the immersive interactive experience of digital media interactive art.

(3) In the aspect of 3D model establishment and model integration, LOD technology is used to process patches, so as to reduce the amount of computer operation and speed up the operation of the whole system, thus achieving the real-time effect of the system.

The rest of the article is arranged as follows:

The second section is the method and model construction part, which introduces the concept of VR immersive interactive experience and puts forward the method of VR image feature fusion to optimize the 3D modeling of VR scene. Then the modeling performance and interactive experience of the model are tested, and the results prove the effectiveness of the method. Finally, the achievements and contributions of this article are summarized, and the possible improvements in the future are put forward.

2 RELATED WORK

Mobile terminal digital media application technology based on edge computing and virtual reality is a digital media application technology that combines edge computing and virtual reality technology. This technology can achieve efficient and low latency digital media processing and application on mobile terminals, providing users with more intelligent and personalized digital media services. Jiang [6] conducted a digital analysis of the virtual reality architecture of edge computing. By comparing and analyzing the delay time performance of algorithms, the digital media development of mobile terminals was analyzed. Compared with traditional cloud computing

institutions, it effectively reduces the corresponding delay recognition services. Jin et al. [7] conducted an analysis and exploration of data efficiency using a virtual reality environment touch surface. Learning traditional Chinese art through virtual reality and multi touch desktops is a very interesting and innovative way. Users can immerse themselves in traditional Chinese art, such as calligraphy, traditional Chinese painting, ceramics, etc., through virtual reality technology, in order to gain a deeper understanding and experience of the charm of traditional Chinese culture. In the immersive spring morning experience of the Han Palace, users can experience the atmosphere and environment of the palace, as well as the scenes and sounds of cultural activities, through virtual reality technology. This learning method has many advantages. Firstly, it can enable users to have a deeper understanding and appreciation of the connotation and value of traditional Chinese culture, and enhance cultural confidence and identity. Secondly, it can make learning more vivid, interesting, and interactive through virtual reality technology and multi touch desktop interaction. Finally, it can also break the limitations of time and space, allowing users to learn at any time and place, improving the convenience and flexibility of learning. Kader et al. [8] conducted an interactive immersive virtual reality crime scene construction in medical chemistry. In the field of chemistry and medicine, virtual reality technology can be used to simulate chemical reactions, molecular structures, drug discovery, etc. For example, virtual reality technology can be used to simulate the metabolic process of drugs in the human body, thereby helping doctors better understand the effects and side effects of drugs. In addition, virtual reality technology can also be used to simulate the surgical process, helping doctors better understand the surgical process and risks. However, building an interactive immersive virtual reality crime scene may require a significant amount of time and resources, as well as a high level of technical knowledge and skills. Therefore, I suggest that you seek professional assistance when needed. Virtual reality art is an art form that combines 3D immersive virtual reality technology and human-computer interaction. It provides viewers with a brand new and immersive artistic experience through virtual reality technology, while also providing artists with a more free and open artistic creation environment. Kim and Lee [9] conducted an artistic analysis of a new perspective on future art consumption through 3D immersive virtual reality. 3D immersive virtual reality technology is the core of virtual reality art. It allows viewers to fully appreciate and interact with art works in a virtual environment by simulating physical characteristics and interactive behavior in the real environment. For example, audiences can appreciate art works from different angles and distances through virtual reality technology, and can also interact with art works, such as touching, moving, rotating, etc. Human computer interaction is another important aspect of virtual reality art. In virtual reality art, audiences can interact and participate in artistic works through human-computer interaction. For example, the audience can interact with works of art through Gesture recognition, voice recognition and other ways, so as to better understand and experience works of art. Krietemeyer et al. [10] shared implementation of real-world workflow testing using interactive design of virtual reality and 3D depth sensing. By conducting interactive design in a virtual environment, adding interactive elements such as object manipulation, user interface, etc. for testing in the virtual environment. It checks whether the interactive design meets the design goals and requirements, and exports the virtual environment to shared reality (such as VR head display, 3D projection, etc.), allowing users to experience the virtual environment in shared reality. In summary, the shared reality workflow of interactive design using virtual reality and 3D depth sensing requires close collaboration between designers and developers, and requires continuous testing, feedback, and improvement to achieve the ultimate goal of the design. Langa et al. [11] analyzed distributed virtual environment aggregation and sharing applications. It designed a virtual reality scene to match the scene of a live TV broadcast. This can be a 360-degree panoramic virtual environment, or a more interactive virtual gaming environment. In virtual reality scenes, some augmented reality elements can be added, such as virtual characters, special effects, interactive games, etc., to enhance the audience's experience. The images and sounds of live television can be transmitted in real-time to virtual reality scenes and synchronized with the virtual environment. In this way, viewers can interact in a virtual environment while watching live TV broadcasts. Finally, a social sharing function can be provided to allow viewers to share their experiences in the virtual

environment on social media, in order to attract more audience participation. In short, achieving surreal and interactive social VR experiences requires certain technical and device support, but this is also a direction for the future development of television live streaming. Immersive Virtual Reality (VR) in digital media production is an emerging form of media that provides viewers with a brand new and immersive experience through virtual reality technology. Communication is one of the keys to achieving this experience, which includes the entire process from production to distribution, display, and interaction. Mills and Brown [12] conducted immersive artistic content exploration and analysis on 3D virtual painting programs. Through the sensing virtual painting of VR Head-mounted display, it has constructed a creative digital literacy practice. In the immersive virtual reality of digital media production, learning, media, and technology are inseparable. Learning is the key to achieving an immersive experience, as only by understanding the audience's needs and behavioral habits can we create virtual reality works that meet their interests and needs. At the same time, media is the main means of disseminating information and content, through which virtual reality works can be distributed to audiences and aroused their interest and attention. Finally, technology is the foundation for achieving immersive experiences, and only with advanced technology can high-quality virtual reality works be produced, ensuring their stability and playability. Immersive virtual reality is a technology that allows users to experience virtual environments firsthand through virtual reality technology. In immersive virtual reality, materials and equipment are crucial as they determine the realism and interactivity of the virtual environment. Pyun et al. [13] analyzed the materials and equipment natural review materials of immersive virtual reality. Commonly used immersive virtual reality materials include Head-mounted display, stereoscopic glasses, gloves, helmets, etc. These materials enable users to see, hear, and feel the realism of the virtual environment through special display technology and design. Head-mounted display is one of the most commonly used materials in immersive virtual reality. It enables users to see the pictures in the virtual environment through high-resolution screens and special lens technology. Soto et al. [14] conducted digital reconstruction of historical buildings and virtual integration of murals to create interactive and immersive experiences in virtual reality. Digital reconstruction technology can use computer technology and virtual reality technology to digitize and reconstruct historical buildings, reproducing their original form and atmosphere. Through digital reconstruction technology, users can experience the details and atmosphere of historical buildings in virtual reality, such as the structure, materials, colors, as well as the scenes and sounds of cultural activities. The virtual fusion technology of murals can integrate murals with virtual environments, allowing users to experience the details and atmosphere of murals in virtual reality, such as the themes, lines, colors, and historical and cultural backgrounds of the murals. By combining digital reconstruction and mural virtual fusion technology, a more realistic, interactive, and immersive experience can be created in virtual reality. Users can feel the details and atmosphere of historical buildings and murals in person through virtual reality technology, and can also interact with the virtual environment, such as operating and controlling through Gesture recognition, voice recognition and other ways. Zhao et al.'s [15] experiment showed that immersive virtual reality can realistically present urban environments and planning solutions, allowing participants to experience the planning effect firsthand. Compared with traditional representation methods, immersive virtual reality technology can more intuitively display planning schemes, enabling participants to have a deeper understanding and evaluation of planning schemes, thereby enabling better collaboration and decision-making. In addition, the experimental results of Zhao et al. also indicate that compared to traditional representation methods, immersive virtual reality technology can better improve planning efficiency and accuracy. By real-time modification and adjustment, the optimal planning solution can be quickly obtained, reducing the time and labor costs in traditional planning methods. In summary, Zhao et al.'s paper provides us with a new perspective on urban planning and design, which utilizes immersive virtual reality technology to improve planning efficiency and accuracy, and better consider the preferences of different populations. This research result will have a positive impact on the development of future urban planning and design.

3 METHODOLOGY

3.1 The Concept of VR Immersive Interactive Experience

Immersive interactive VR includes immersion, covering vision, spatial feeling and spatial confidence experience rendered by VR engine. As a designer, we should actively seek the balance between virtual technology and real life, and truly regard virtual technology as a supplementary form of reality, which is more suitable for people's lives. In the corresponding spatial perception, vision is the main way to obtain information. Because human eyes have the ability to receive and analyze visual images, they can distinguish the changes of the appearance and spatial attributes of objects, including space, color, shape and dynamics, and the information obtained visually is also rich and accurate. In the application of digital technology and Internet technology, users stay more on the visual surface in space experience, such as flat carriers such as display screen. Although the area is constantly increasing, it is more in line with people's needs, but people have more adapted to the two-dimensional plane space. In the virtual scene design space, perceptual space is the most important form, but it lacks other forms of perception. If you want to get a continuous 3D scene experience, you need to shoot and store a large number of pictures, and the amount of calculation is huge. The completed scene target cannot be used as a virtual target to interact with users.

The targets in the 3D virtual modeling construction scene can interact with users as virtual targets. However, there is still a certain distance between 3D virtual modeling and the real scene in terms of scene fidelity, which leads to poor immersion experience. Being in the virtual space, you can interact with it. This state is formed under the computer network system and also in the space of various hardware facilities, which enables users to quickly enter this space state and interact with it in this space state, thus improving the experience. Under the research and growth of digital technology, VR and hardware development are becoming more and more mature. Compared with the traditional experience space based on large-scale equipment and devices, immersive experience products are light and convenient, easy to wear and rich in content. It can let users experience the space under multi-senses, and realize the change and iteration of content in a short time, so as to meet the diversified, real-time and differentiated needs of users.

In the continuous progress of digital media technology, people are strengthening the growth of VR and hardware. Compared with traditional technologies, the virtual space built by these large-scale devices can make people feel the characteristics of products and let customers feel and experience the virtual space better. At the same time, customers can transmit information in the shortest time, so they can make differentiated changes according to the individual needs of users. For users, interactive virtual space is the most important part. In the virtual space, people can feel these virtual and different phenomena in all directions, so users' acceptance of this information becomes more abundant and concrete.

3.2 Feature Fusion Model of VR Image

From the perspective of designers and creators, in the stage of interactive design, it is an inevitable choice to construct and promote works through artistic design methods, whether to improve the quality of works and the user's experience, or to obtain more novel and charming creative works. In this article, the image feature fusion model based on DL is combined with the VR digital modeling process. In the 3D model building and model integration, the LOD technology is studied to process patches, so as to reduce the amount of computer operation and speed up the operation of the whole system, thus achieving the real-time effect of the system. The dynamic fusion method of VR image features based on DL is shown in Figure 1.

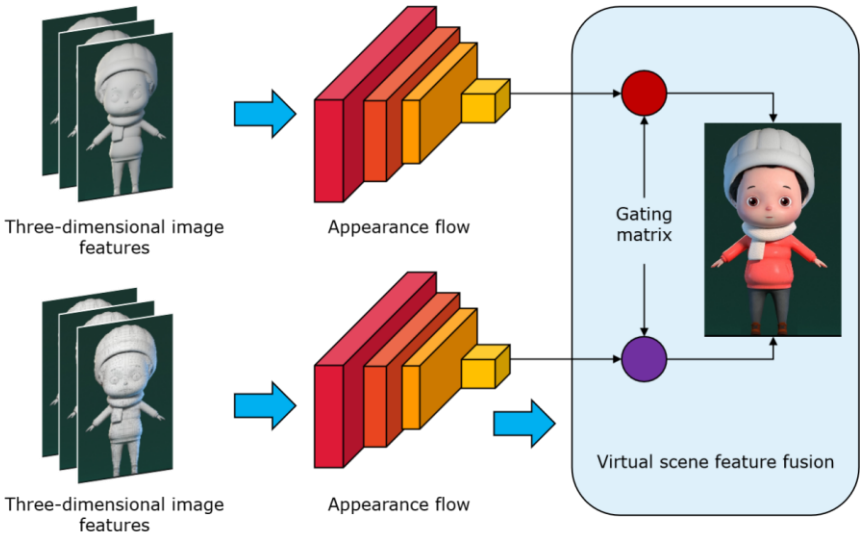

Figure 1: Dynamic fusion of VR image features.

Different from the previous task-oriented interaction in the service and interface design of products and software, the interaction in immersive VR is more about experience-oriented interaction. From the perspective of art design, it can be regarded as an interactive experience based on aesthetics, taking into account the effectiveness and pleasure of emotion and use. VR brings a new way of expression and perception, which shows a new angle of observing and understanding the world. With computer virtual environment and various display sensors as interfaces, the interactive stage of immersive VR is constructed through human perception, and multi-dimensional sensory effects are combined to form a dynamic digital work.

The boundary region is excluded in a neighborhood of each pixel, and the calculation formula is:

$$A(c) = F\sin(a,b) \tag{1}$$

Where: $\sin(a,b)$ represents a pixel; F is the image boundary area.

Convert the viewpoint coordinates to spherical coordinates, and use binary $\langle \varphi, \theta \rangle$ to represent the deflection angle of viewpoint relative to the model, φ to represent the horizontal deflection angle, and θ to represent the rigid deflection angle:

$$\varphi = \arctan\frac{\sqrt{X_E^2 + Y_E^2}}{Z_E^2} \tag{2}$$

$$\theta = \frac{\pi}{2} - \arctan\frac{Y_E}{X_E} \tag{6}$$

When the viewpoint of scene observation is obtained, all two-dimensional models should be projected under this viewpoint to keep consistent with the structure of the object to be built.

The interaction centered on human perception includes the perception of the environment, the perception of one's own image and the perception of the interactive object, thus forming a mixed experience. The task, process, mode and feedback of interaction are preset by the creator, and the consequences are the results preset by the designer, which may stop in the virtual world or form

echoes and mappings in the real world through the connection of the network. In the stage of design, in addition to the understanding and research of people's general behavior habits in the real world, the observation and consideration of the characteristics and basic habits of the target experiencer will help to better build a natural interaction mode and bring more comfortable and effective interaction experience.

3.3 Optimization of VR 3D Modeling

Immersive VR interaction is an interaction aimed at experience. Generally speaking, the environment of immersive VR interaction is a digital virtual space, the subject of interaction is the experiencer immersed in it, and the object of interaction is the immersive virtual environment and all the digital 3D virtual objects and events in it. Because there are registration errors in the results of image registration, it is impossible to register accurately at every point. Therefore, the strategy of image synthesis should minimize the influence of residual deformation and brightness difference between images on the merging effect. VR interaction refers to the interaction that takes place in the digital virtual environment, which includes almost all the previous interactions in terms of presentation, perception and feedback. VR interactive art design is a design that constructs all the relationships between people and the virtual world, radiating to various senses from visual communication and aesthetic experience, and working together in a mixed way.

The purpose of image denoising and enhancement is to improve the image quality. In view of the fuzzy situation of the original image and its application occasions, the overall or local characteristics of the image are emphasized purposefully, so as to improve the clarity and make the image more favorable for processing. Image noise can be understood as the deviation between the real signal and the ideal signal. Generally speaking, noise is an unpredictable random signal, which is usually analyzed by probability statistics. The practice and research of interactive scene design is to create valuable and interesting works, at the same time, through the architecture of VR world, tap more expression space, better reflect the core intention of the works, and bring people richer and more multi-level perception and better experience. The structure of VR 3D modeling target segmentation network is shown in Figure 2.

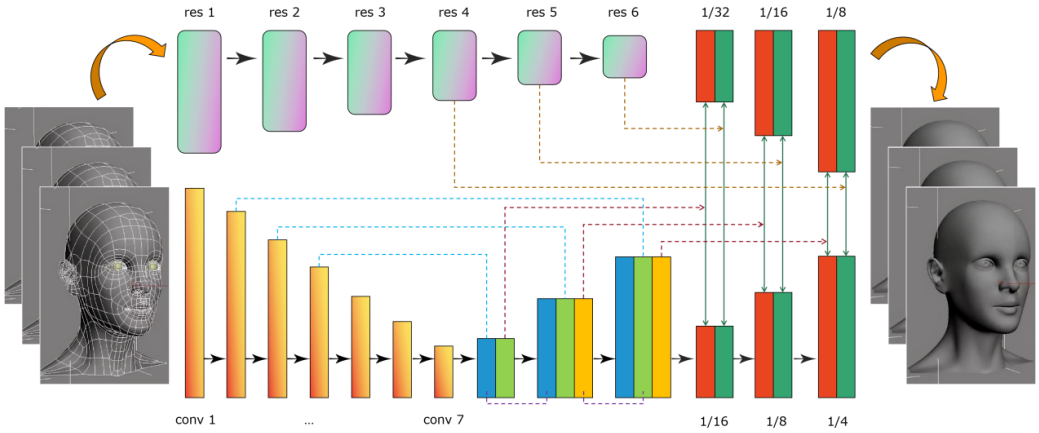

Figure 2: Target segmentation network structure.

The main problem to be solved in VR tracking is to eliminate the interference of background objects. Therefore, the filter passband range is set for $R^{'},G^{'},B^{'}$ with the characteristic color of the hand as the center. Assuming that the $R^{'},G^{'},B^{'}$ value ranges of the selected hand

characteristic colors are $R_1^{'} \sim R_2^{'}, G_1^{'} \sim G_2^{'}, B_1^{'} \sim B_2^{'}$, this article constructs the following continuous functions as color filtering functions:

$$F(x,y) = F_R * F_G * F_B \tag{4}$$

x, y is the coordinate of the pixel, $R^{'}, G^{'}, B^{'}$ is the value of the (x,y) point.

After filtering, each pixel of $F(x,y)=1$ in the original image and its adjacent points are reserved, the contour extraction is calculated, and the Gaussian function is used for smoothing:

$$G_\sigma(x,y) = \frac{1}{2\pi\sigma^2}\exp\left(-\frac{x^2+y^2}{2\sigma^2}\right) \tag{5}$$

In an ideal situation, the half-wave Fourier algorithm can accurately calculate the initial value of the narrow band-pass filter, which makes the narrow band-pass filter directly skip the transient delay stage and directly enter the stable filtering state, thus ensuring the time response of the algorithm. However, the narrow-band filter itself has the important characteristics of filtering low-frequency and high-order harmonics, so the new algorithm formed by combining narrow band-pass filtering algorithm with half-wave Fourier algorithm can finally obtain high filtering accuracy. The filtered values of pixel points are:

$$BF_p^I = \frac{1}{w_p}\sum_{q\in\Omega} G_{\sigma_s}(\|p-q\|) G_{\sigma_r}(\|k-I_q\|) \tag{6}$$

p represents the pixel point at position p, q represents the adjacent point of pixel p, and k represents a fixed pixel point. Normalized factor plus. Ensure that the sum of the weights of pixels is 1.

The reason why the scene on the image can be clearly identified is that there is a boundary with significant gray level change between the objects, and when the pixels on the boundary are smoothed, the simple median or average value of the neighborhood of the selection will reduce the gray level significance of the boundary to some extent, which leads to the image blurring. Therefore, to keep the image clear, we can detect the boundary of the scene while smoothing, and then only smooth the noise part. In the artistic creation of the architectural space of the virtual museum, different spaces have different properties, thus containing different spatial meanings. Generally speaking, the nature of space is related to the function of space. Generally speaking, a ceremonial space in the central position or the end position of a space is also an important space.

The area where the visual information of the regional 3D image is reconstructed is $S^{'}$, and the edge feature point $(x^{'}, y^{'})$ is extracted from the edge contour part of the fuzzy regional 3D image, and the texture gradient decomposition is carried out, and the texture distribution set of the fuzzy regional 3D image is calculated as follows:

$$w(i,j) = \frac{1}{Z(i)}\exp\left(-\frac{d(i,j)}{h^2}\right) \tag{7}$$

Where $Z(i)$ is the first-order and second-order texture distribution operators.

After effective calculation, the pixel can realize the parameter analysis of visual communication constraint, and in order to simplify the calculation process, the relevant parameters are replaced and converted into:

$$W^{'} = \frac{1}{2} f(x^{'}, y^{'}, z^{'}) + E \tag{8}$$

Where: $x^{'}, y^{'}, z^{'}$ is the 3D coordinate value with visual constraint; E represents the weighted component of data, and the matching effect can be directly calculated by formula conversion.

4 RESULT ANALYSIS AND DISCUSSION

From the primitive natural interaction, to the interaction with tools and machines, to the different forms of interaction between people and computers, all the habits have been combed and integrated over time, which has become a prelude to human interaction in VR. It is the definition and reference, and it is also the basis for trying to return to natural interaction and create a better interactive experience in VR interaction design. In this article, 200 groups of pictures are collected as data sets, of which 145 groups are training sets and 65 groups are testing sets. Training is divided into two groups: (1) training with VR scenes; (2) Without the training of VR scene, each group carries out 20,000 iterative trainings, each of which takes 1 hour. The Loss curves of these two trainings are shown in Figure 3 and Figure 4. After training, the generator_loss of the two models is 0.041 and 0.066, respectively, and the curves converge, which shows that ANN has learned the characteristics of VR scene pictures and can generate a more realistic VR scene CAD model.

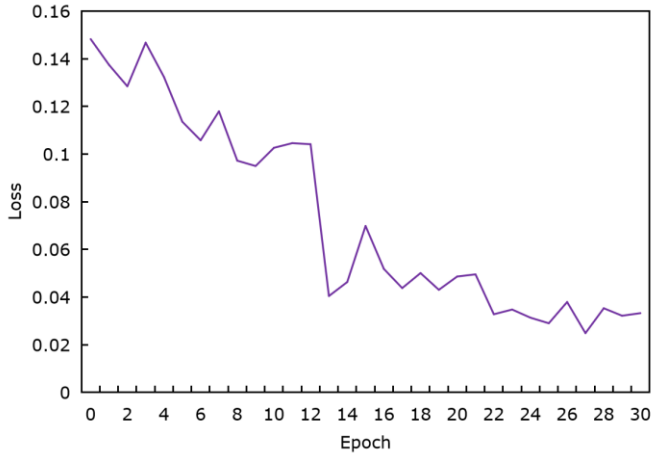

Figure 3: Loss curve of training set.

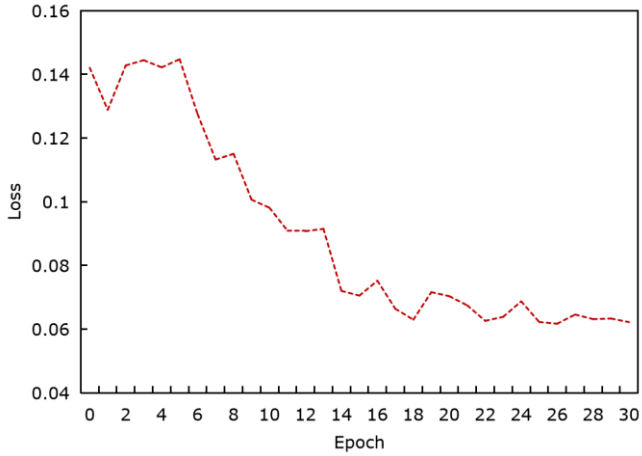

Figure 4: Loss curve of test set.

In the stage of media form renewal, the interaction brought by media characteristics, such as multi-channel perception and feedback, has different characteristics from the past, so the characteristics of VR interaction are different and prominent. By comparing with the previous media, it shows its strength, limitations and possible dangers. The relationship between entities is nonlinear or random; The system has no complete mathematical theoretical model, and the overall function cannot be directly or indirectly described by element function. Compare the mean absolute error (MAE) of different algorithms for virtual scene information feature recognition, as shown in Figure 5.

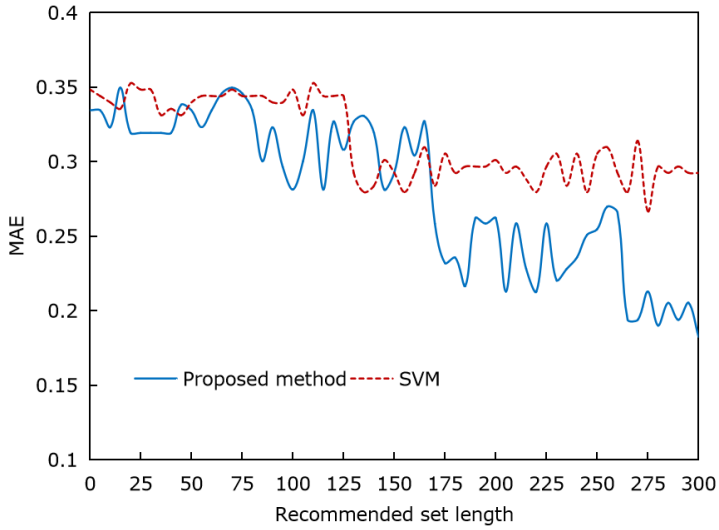

Figure 5: Virtual scene information feature recognition error.

From the detection results, it can be found that the algorithm has a low error in the identification of virtual scene information features, which is more than 20% less than that of the traditional algorithm, and can locate the edge contour of virtual scene images more accurately. This method does not need to know the information of 3D model, and directly obtains multiple images by realistic drawing or camera shooting, and then interpolates to generate images with new viewpoint parameters.

In real-time rendering, the binary tree is traversed hierarchically to determine whether the image of a certain area stored in each node is still valid. If it is valid, the image stored in this node constitutes the current image of this area, otherwise, it continues to traverse the front and back subtrees of this node, and it is determined whether it is necessary to generate the current graphic picture of this node and store it as an image according to the motion parameters and error accuracy. In this algorithm, the maximum angle change of each space point in the quadrangle surrounding the node is used to calculate the error of the graphic picture caused by the observer's movement, and then to determine whether the image stored in the node is valid or not. In Figure 6, the interactive scoring results of the constructed virtual vision system are displayed.

Compared with other systems, the system designed in this article has strong interactive ability and better user experience. The interactive scene in the real world is the real environment, which is used as a reference condition for design. The scene in VR interaction is the interactive environment and object, and it is also the result of design. The virtual environment and other elements together constitute the appearance of the work.

By limiting the overall time of scene rendering, the model selectively loads the detailed models at all levels, thus achieving the real-time and immersive effect of the scene and improving the

model quality in the scene. Different methods are used to compare and analyze the time spent in enhancing the image processing effect, as shown in Figure 7.

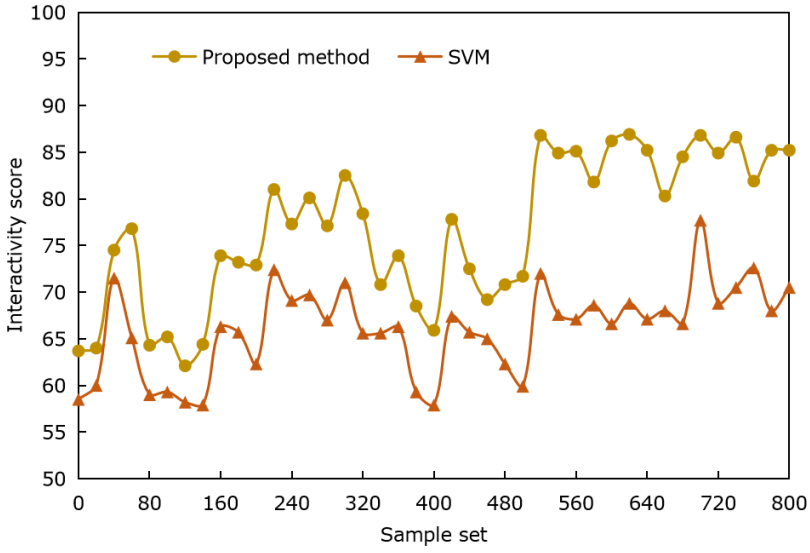

Figure 6: System interactivity score.

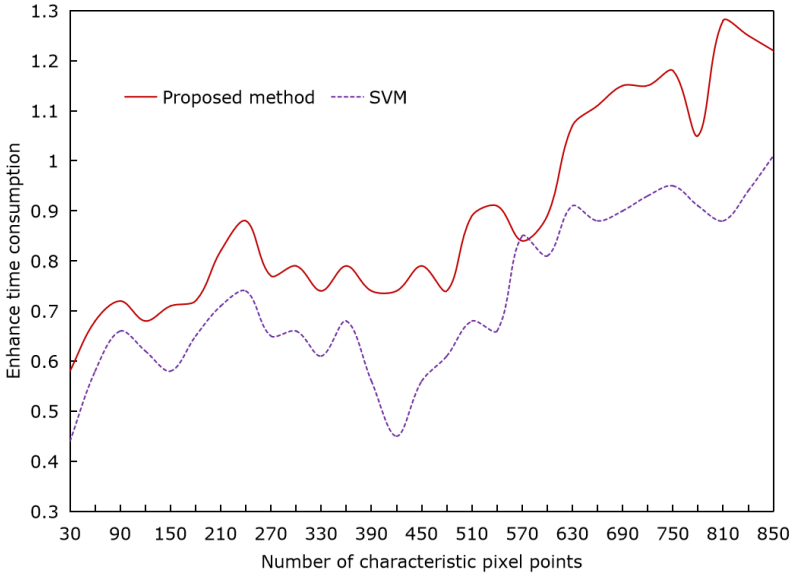

Figure 7: Enhanced image processing with different methods is time-consuming.

As can be seen from the figure, in the conventional method, when the number of pixel points of feature information is more, it takes longer. The VR image processing time mentioned in this article has also increased, but it still has significant advantages compared with support vector machine. VR is a typical application of modern digital media technology. It is combined with traditional art and based on digital programs, which makes the reproduction and secondary processing of traditional art simpler and more effective. The results show that this method has a

strong sense of substitution, 3D sense and the effect of combining reality with reality, and the accuracy of visual modeling of pre-scene design is significantly higher than that of contrast method. At present, VR art is still in its infancy, with poor popularity and many development bottlenecks. Designers should take the user experience as the center, and constantly innovate the design mode from multiple dimensions such as environment, generation, story plot and interaction mode, so as to present more excellent works to the public.

5 CONCLUSIONS

VR is a typical application of modern digital media technology. It is combined with traditional art and based on digital programs, which makes the reproduction and secondary processing of traditional art simpler and more effective. Image-based virtual scene generation method is to synthesize the sequence images of the same scene directly taken by camera or video camera into a panoramic view, thus constructing a virtual scene. In order to improve the immersive interactive experience of digital media art, this article studies the application of CAD in VR scene modeling, and combines the image feature fusion model based on DL into the VR digital modeling process. The results show that this method can provide a strong sense of substitution, 3D sense and human-computer interaction experience, create a sense of participation and immersion of the experiencer in the virtual world, and show the comprehensive creativity in artistic creation, which plays a key role in improving the quality of digital media works of art. The triangular mesh model simplification algorithm based on quadratic error measure in this article does not consider the relevant surface attributes of the model. In the future research, we should consider adding the surface attributes of the model, such as color, texture and other attributes.

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Kunjian Li, https://orcid.org/0009-0005-2996-1010
Jian Zhu, https://orcid.org/0009-0006-0919-9038

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