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Computer-Aided Design AND APPLICATIONS

Application of Folk Art Modeling in Modern Art Design Based on Human-computer Interaction

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Abstract. In the folk-art system, folk art is a key component. Its bright colors and unique shapes can give people an impact from a visual perspective, make people feel the beauty in enjoying material conditions, and make their spiritual life more exciting. This text studies the use of folk-art modeling in modern art design, and puts forward the application of virtual reality (VR) and computer aided design (CAD) technology in digital modeling of art design, so as to improve the human-computer interaction (HCI) experience of art design through digital means. Finally, the influence of folk-art modeling on the interactive experience of modern art design is evaluated from two aspects: emotional experience and creative experience. The results show that the emotional experience and creative experience of modern art design under the conventional design concept are not relatively low, while the interactive experience of designers under the use of folk-art modeling has obvious advantages. Modern art designers should not only be fully familiar with the image processing technology, streaming media technology and animation technology related to digital art design, but also have good digital media production ability and artistic accomplishment, so as to solve practical problems such as digital media production and interactive art design with theoretical basic knowledge.

Keywords: Human-Computer Interaction; CAD; Art Design; Folk Art Modeling
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1 INTRODUCTION

In modern art design, the use of folk-art modeling can not only help the creator to find new ideas and inspiration, but also enable the creator to design a unique design scheme with China folk characteristics. Art is the greatest creation of human beings in the pursuit of beauty, which not

only makes human life richer and more elegant, but also promotes the rapid growth of human social civilization. Behl et al. [1] observed and analyzed the behavior patterns of users during interaction, discovered their reactions and behaviors when facing different situations, and thus understood the reasons for the appearance of the dark side. By collecting emotional data from users during the interaction process, such as facial expressions, voice emotions, etc., the relationship between user emotional changes and the interaction process can be analyzed, and the reasons for the appearance of the dark side can be discovered. Collecting feedback from users on the interaction process can help understand their views and needs on the system, and thus identify the reasons for the emergence of the dark side. The system model analyzes performance and reliability, allowing for an understanding of the system's performance in the face of different user behaviors, thereby identifying the reasons for the appearance of the dark side. In summary, through empirical research, it proposes a model based on user behavior, emotions, feedback, and system performance, in order to better understand the dark side of human-computer interaction and propose corresponding solutions. The task modeling of interactive system design is to investigate historical trends, gaps, and future needs, with the aim of understanding user needs and expectations, in order to design an interactive system that meets user needs. In ACM's paper on human-computer interaction, the importance of modeling interactive system design tasks has been emphasized. Bowen et al. [2] investigated the way users interact with computer systems and how design can improve interaction efficiency and user experience. Some of the content focuses on analyzing the shortcomings and problems of existing interactive systems, and exploring how to overcome these problems through improved design. Other content focuses on the future development trend of human-computer interaction, exploring how to apply new technologies and design methods to the design of interactive systems, in order to achieve a more intelligent, natural, and personalized interactive experience. Overall, interactive system design task modeling is one of the most important research directions in the field of human-computer interaction, aiming to improve the efficiency and user satisfaction of computer systems through optimization of design and user experience. Folk art forms show the unique charm of national culture and traditional art culture, and have high appreciation value and cultural value. Modern art designers should realize the artistic value of folk-art forms, enrich modern art design with folk art modeling, make modern art design glow with new brilliance, and create favorable conditions for the progress of modern art design in China. Due to the growth of the times, modern art design also presents a state of rapid development. People are no longer satisfied with a single use function, but also have higher requirements for design works, and expect more participatory and interactive experiences. Through AR technology, people can view real-time maps, building models, terrain, and other geographic data in a three-dimensional environment, and interact in a more intuitive way. For example, through the AR system, users can view the height, shape, and materials of buildings, and learn detailed information about terrain and landforms. Gardony et al. [3] developed a virtual visualization geospatial model application for the Microsoft HoloLens AR system. This program combines spatial cognition theory to track the user's navigation performance with the 3D city simulation, and changes the perspective query record for reverse tracking. Through personalized differences, user interaction and performance are tracked in reverse.

Han [4] designs the layout of human-computer interaction interface of electronic music products according to user needs and behavior analysis, including the location, size, color, etc. of interface elements. ERP technology is applied to the design of human-computer interface of electronic music products to realize the integration and sharing of information and improve the efficiency and reliability of products. And test and optimize the designed human-computer interaction interface. Through user usage testing, interface simulation, and other methods, identify problems and deficiencies in the interface design, and promptly improve and optimize it. Deploy and promote the optimized human-computer interface of electronic music products, and apply it to the actual scene, such as music player, music teaching, to verify its feasibility and effectiveness. Through the research on the layout optimization of human-computer interaction interface of electronic music products based on ERP technology, the user experience can be improved, the competitiveness and market share of the products can be improved, and the design and

development of other similar products can also be provided with reference. Human activity prediction based on a new structure of skeleton features and deep learning models is a new method for identifying and understanding human behavior in videos. Jaouedi et al. [5] collected video datasets containing human activities and converted them into formats suitable for deep learning models. This may include transforming Comparison of video converters into a series of image frames, extracting human skeleton features in each frame and other information. It has developed a new skeleton feature representation method that can effectively extract human action information from each frame. This may involve using deep learning models to learn feature representation, such as Convolutional neural network (CNN) or Recurrent neural network (RNN). Build a deep learning model using a deep learning framework such as TensorFlow or PyTorch, which can receive new skeletal features as input and output predicted results of human activities. Train deep learning models using a large number of annotated datasets and optimize model performance through techniques such as cross validation. From the customer's point of view, interactive or interactive design is a stage of how to make the practical meaning of design efficient and make people have convenient and pleasant use. The main purpose of this design is to understand all kinds of people's own psychological and behavioral patterns, understand different and effective ways of interaction, and improve and innovate them by understanding the needs and hopes of users and the ways of using them. Compared with other forms of art, folk art will have more unique shapes and bright colors, which can give people a greater visual impact and enable people to further feel the unique charm of folk art. This text studies the use of folk-art modeling in art design, and puts forward the application of VR and CAD to digital modeling of art design, so as to improve the HCI experience of art design through digital means.

Li and Li [6] perform feature extraction on data in virtual environments, analyzing the semantic and contextual information of the data to extract key features that reflect the main information and relationships of the data. By comprehensively analyzing the extracted features, high-level semantic information of the data can be obtained, such as emotions, themes, entities, etc. Through this method, the original data can be transformed into information with higher level semantics for the subsequent human-computer Interaction design. The research uses artificial intelligence technology, such as machine learning, Natural language processing, to process and analyze data, extract useful information from data, and use it to drive human-computer Interaction design in virtual environment. Based on the above analysis results, a human-computer interaction interface and interaction mode have been designed, allowing users to interact naturally and intuitively with the virtual environment. For example, users can interact with the virtual environment through voice, gestures, keyboards, and other means, and obtain corresponding responses through visual, auditory, and other feedback methods. Finally, through user experiments and user feedback, we evaluate and optimize human-computer Interaction design to improve user experience and interaction efficiency. Most of the inspiration of folk-art modeling comes from daily life, which is more in line with the aesthetics of most people and symbolizes the simplest artistic thought of China people for a long time. With the trend that computers and a series of high technologies are widely used in daily production and life, human society has entered the era of digital information. Rich and diverse folk art with profound connotation can not only bring more inspiration to modern art design, but also promote the innovation and growth of modern art design. This also requires that in modern art design, we should fully understand the important value of folk art, dig deeply and skillfully apply the modeling elements and color elements of folk art, and constantly improve the level and interactivity of modern art design. In order to further solve the application problem of folk-art modeling in art design, this text studies the application of VR digital modeling technology based on CAD in modern art design from the perspective of HCI:

(1) This text expounds the internal attribute characteristics of HCI, proposes to improve the HCI experience of art design through digital means, and analyzes the artistic expression of folk-art modeling in modern art design.

(2) By analyzing the unique advantages of computer art, this text will study the digital modeling method of art design based on VR and CAD, and explore the development path of modern art CAD.

(3) In the research, a virtual scene creation method based on 3D geometric modeling and dynamic display technology for VR is adopted, which provides an interactive optimization method for art design applications with high real-time and interactive requirements.

Firstly, this text introduces the significance of the use of folk-art modeling in modern art design; Then, the digital modeling method of modern art is put forward by combining VR and CAD. Finally, through the test, the influence of folk-art modeling on the interactivity of digital art works in modern art design is analyzed.

2 RELATED WORK

Li and Zhao [7] proposed a two-channel neural network Gesture recognition human-computer interaction image convolution model. The model uses regional Convolutional neural network to extract and recognize features. This network can automatically learn the feature representation of gestures, so as to effectively deal with Gesture recognition tasks under different postures, lighting and background conditions. This model has interpretability and can help users understand the learning process and recognition principles of the model by visualizing the network structure and workflow. This helps users understand the way the model works and increases their trust in the model. This model can be used for human-computer interaction understanding. For example, in the field of art, users can express their creative intentions through gestures, and the model can recognize these gestures and convert them into specific operations or instructions, thereby achieving user computer interaction. Liao et al. [8] constructed interaction behavior analysis strategies under the construction of artificial intelligence models. Such as Click-through rate, conversion rate, etc. Through data analysis and mining, understand user interaction behavior patterns and preferences, and provide a data foundation for subsequent model construction. Based on the collected data, construct an interaction behavior model. This model can include multiple aspects such as user characteristics, user behavior, and contextual environment to comprehensively describe user interaction behavior. Train and optimize the constructed interaction behavior model using machine learning and other algorithms. By constantly adjusting the model parameters and structure, the model can better fit the actual data and improve the accuracy and reliability of interaction behavior analysis. Liu and Yang [9] conducted a computer-aided server art creation network development and design learning model. ADC teaching also covers the learning of 3D modeling. Students can learn to use 3D software such as Blender, Maya, etc. to create 3D models. Through 3D modeling, students can explore different forms and spatial relationships, cultivate spatial imagination and creativity. ADC teaching also pays attention to the study of Interaction design. Students can learn how to use front-end development languages and tools such as HTML, CSS, JavaScript, etc. to create interactive artworks. Through Interaction design, students can explore different interaction modes and user experiences, and cultivate user-oriented design thinking. To sum up, the creativity centered teaching mode of contemporary art Computer-aided design focuses on the creative expression of students, the study of computer technology and the cultivation of team cooperation ability. Through the application of various teaching methods and tools, students can explore different ways of expressing themselves in art and design, cultivate problem-solving skills and innovative thinking, and contribute to the future field of art and design. The application of human-computer interaction technology in the archaeology and restoration of Tang tomb mural costumes is mainly reflected in the application of virtual reality. Through virtual reality technology, users can observe and interactively operate mural costumes in a virtual environment, obtaining an intuitive experience. The application of this technology can not only improve the efficiency and accuracy of research, but also provide users with a more vivid and intuitive research experience. Liu et al. [10] reconstructed and produced three-dimensional interactive patterns of clothing based on the cultural relic effects of Tang Dynasty tomb mural costumes. By analyzing the image structure curve of two-dimensional mural clothing, the style

characteristics of its three-dimensional spatial plane were unfolded in a virtual environment. To sum up, the application of Reverse engineering and human-computer interaction technology in the archaeology and restoration of Tang tomb mural costumes, as well as the role of sustainable development in this, is a very important field.

Liu et al. [11] analyzed the virtual simulation analysis of three-dimensional interactive silk gauze pattern technology for digital restoration. It captures simulated digital patterns under clothing restoration. The material of plain silk gauze robe in Mawangdui was analyzed in detail, including the material, density and texture of the yarn. By collecting samples and conducting microscopic analysis using equipment such as microscopes, detailed information about materials is obtained, providing basic data for digital restoration. The three-dimensional scanning technology is used to measure the appearance of plain silk gauze gowns in Mawangdui, and obtain its three-dimensional data model. By analyzing the data model, the specific size, texture, details, and other information of the robe can be obtained. Based on the Analytic Hierarchy Process, the repair process of robes is divided into multiple levels, such as material, texture, shape, etc. For each level, use human-machine interaction technology for repair, such as using graphical interfaces or virtual reality technology for repair operations. By continuously adjusting parameters, the repair results are closer to the original state. After the digital restoration is completed, the repaired robe is presented on a computer screen through simulation display technology, allowing users to perform interactive operations such as rotation, scaling, and movement. This allows users to observe and evaluate the repair effect more intuitively. Moencks et al. [12] conducted an automated human-machine interaction system organizational analysis application. The operator assistance system can improve the reliability and stability of industrial production. These systems can monitor the status and performance of equipment, predict potential problems, and take preventive measures. Through these functions, operators can discover and handle faults in a timely manner, reducing downtime and production losses. In addition, the operator assistance system can also improve the lifespan and reliability of the equipment, thereby improving the stability of the production process. Human machine interaction is an important component of operator assistance systems. Based on the interaction between humans and machines, operator assisted systems can provide a better user experience and productivity. In the future, human-computer interaction will continue to develop, providing users with a more intelligent, natural, and personalized interaction experience. Modern art and digital design are two independent but mutually influencing development directions. The development of modern art has driven the development of digital design, and the application of digital design has provided a broader space for the expression of modern art. Under the influence of modern art and digital design, the design of human-computer interaction interfaces has also undergone tremendous changes. During the evolution of human-computer interaction, many important technologies and interaction modes have emerged, such as graphical user interface, touch screen, voice recognition and Gesture recognition. These technologies make human-computer interaction more intuitive and natural. Mori and Kelkar [13] analyzed the artistry of interface design, the diversity of interaction methods, and the efficiency of visualization. These influences make the human-computer interaction interface more vivid, intuitive, and interesting. Niu et al. [14] conducted multimodal 3D model human-machine interaction interface analysis. By analyzing the multimodal naturalness of CAD patterns, key factors in the user experience of natural multimodal human-machine interfaces have been established. The CAD mode should be as natural and intuitive as possible, making it easy for users to understand and operate. This can be achieved by adopting design and interaction methods that align with human perception and cognition. The CAD mode should support multiple interaction methods, such as voice, gesture, touch, etc., to meet the needs and preferences of different users. Multimodality can improve the efficiency and accessibility of human-computer interaction. The CAD model should have fast responsiveness and high reliability to ensure that users can receive timely feedback and results. This can be achieved by optimizing algorithms and hardware. Customizable modes support user customizable interfaces and interaction methods to adapt to different tasks and environments. Users can adjust the interface and interaction methods according to their own needs and preferences.

The virtual display of intelligent human-machine interaction products based on attention matrix can help users gain a deeper understanding of the characteristics and functions of the product, improve its attractiveness and market competitiveness. At the same time, it can also help designers and developers more intuitively evaluate the effectiveness of product design and development, timely identify and solve problems, and improve product quality and user experience. Wang [15] constructs an attention matrix based on user needs and product data, including two dimensions: user concerns and product features. By analyzing the attention matrix, determine the matching degree between users' concerns about the product and its features, and identify product issues and improvement points. Based on the analysis results, design a virtual display interface, including product model, product features, user interaction interface, etc., so that users can have a more intuitive understanding of the characteristics and functions of the product. It adopts virtual reality technology to achieve interactive and dynamic display of virtual display interfaces, allowing users to freely rotate, zoom, view products, and operate and control through the interactive interface. Virtual reality and augmented reality technology provide new possibilities for visual communication and Interaction design. Researchers are exploring how to use these technologies to create more immersive interactive experiences, such as building 3D scenes, models, and animations through virtual reality and augmented reality technologies, allowing users to interact with virtual environments. Wang [16] explored how to apply artificial intelligence technology and Natural language processing technology to Interaction design to achieve a more intelligent user interface and interaction mode. Visualization and Data and information visualization technology is one of the important directions in computer aided interaction. To sum up, computer-aided interaction research has a wide range of research directions and trends in the new media scene, including virtual reality and augmented reality, human-computer interaction and intelligent assistance, visualization and Data and information visualization, multimodal interaction and cross-cultural interaction. These research directions and trends will provide more innovations and possibilities for future visual communication and Interaction design. HoloLens based real-time Data modeling and visualization of holographic 3D geographic scenes is an important research direction in ISPRS International Geographic Information Journal. This technology can use holographic technology to transform geographic information data into 3D models, and update and present these models in real time, so as to achieve more realistic and accurate geographic Information visualization. Wang et al. [17] visualized the established holographic 3D geographic scene and presented the characteristics and patterns of geographic information through technologies such as color, texture, and light and shadow. Through HoloLens interactive methods such as gestures, voice, etc., users can freely explore and interact with holographic 3D geographic scenes. At the same time, they can also adjust the perspective, size, position, and other parameters of the scene by controlling the device. The research and application of real-time Data modeling and visualized holographic 3D geographic scene based on HoloLens can improve the visualization effect and practicability of geographic information data, and provide more real and accurate decision support for urban planning, disaster relief, environmental protection and other fields. Zhang and Zhao [18] analyzed that Folk art can be displayed and spread digitally through virtual reality technology. Traditional handicraft works can be presented to a wider audience in digital form through virtual reality technology. In addition, the form and style of Folk art can provide unique design elements for visual communication, and add unique aesthetic feeling and cultural connotation to modern communication design. Virtual reality technology can realize automation and intelligence in the digital process of Folk art. Through the use of algorithms and machine learning technology, Folk art works can be automatically identified, analyzed and processed to achieve automatic production. This application of intelligent automation can greatly improve production efficiency while maintaining the uniqueness and quality of Folk art.

3 FEATURE EXTRACTION AND MODELING OF ART DESIGN IMAGES

3.1 Modern Art Design Image Feature Extraction

This text designs a two-channel network art image analysis structure, as shown in Figure 1. For a pair of image blocks 1 and 2, the image block 1 is clear and the image block 2 is fuzzy, which are sent to the same dual-channel network respectively. After the feature learning and final classification of the Convolutional Neural Network (CNN), the matching degree of the two image blocks is preliminarily predicted, that is, which one is clearly focused and which one is fuzzy and unfocused is judged by the output probability value. A new fused image can be obtained by combining many image blocks after network classification.

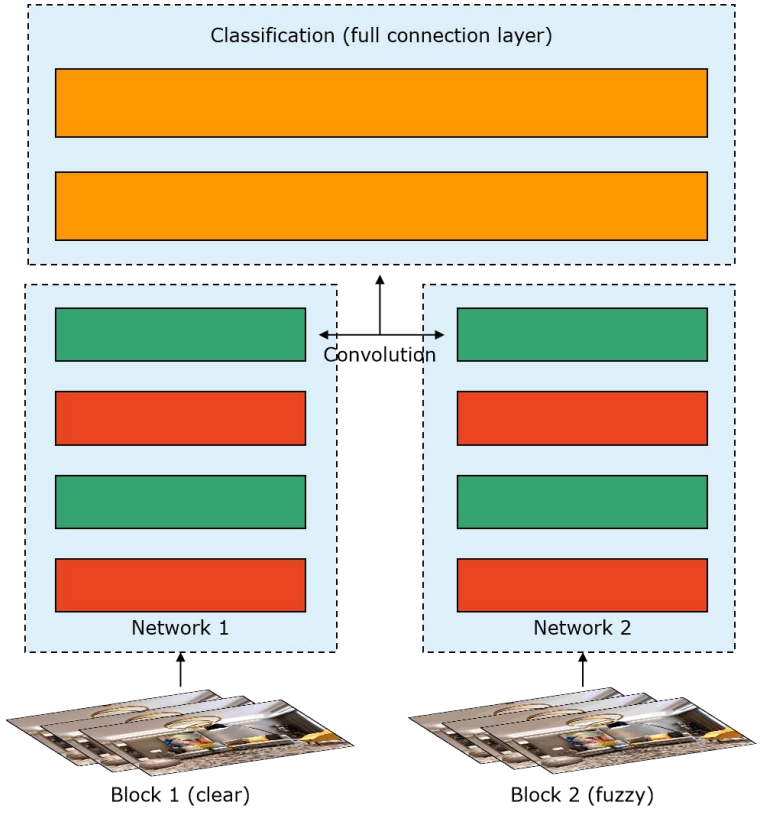

Figure 1: Dual-channel network structure.

The use of conformal modeling method in folk art is the reconstruction of graphics, and the visual motion of the picture is repeated under certain modeling and composition rules. Give full play to the regular beauty of graphics, and deeply combine the creative ideology of specific conditions. Multi-focus image fusion can be regarded as a binary classification problem, that is, to classify clear images and unclear images. In the multi-likelihood fusion algorithm in this text, the classifier of the network adopts Softmax, and the loss function adopts Softmax loss:

$$L = -\sum_{k} y_k \log a_k \tag{1}$$

Among them, a_k is the output of the Softmax classifier, which is the estimated probability value of class k, and y_k is the corresponding true probability value. The output a_k of Softmax is defined as follows:

$$a_k = \frac{e^{z_j^L}}{\sum_k e^{z_k^L}} \tag{2}$$

Where z_j^L pair represents the input of the j th neuron in the last layer of the network, and $\sum_k e^{z_k^L}$ represents the input weight of all neurons in the last layer.

When the voxel enumeration representation is used to realize the volume intersection technology, the outer voxels surrounding the object are obtained, and the size of each voxel is quite small; Taking the center of each voxel, the discrete point set surrounding the entity is obtained. In this text, single-channel image data is obtained by image channel decomposition, and then edge detection is carried out. Data preprocessing will seriously affect the network's feature extraction. The commonly used data preprocessing methods include data set redundancy, that is, calculating the average of the training data set, and then subtracting the average from each data set to get a new data set as the input of the network. In the calculation process, if the input signal is $x \in R^{n \times m}$, the size of the convolution kernel is $w \in R^{s \times k}$. The resulting output signal:

$$y = x * w \in R^{u \times v} \tag{3}$$

The size of the extracted features:

$$u = \left[\frac{n - s + 2 \cdot Zeropadding}{Stride} \right] + 1 \tag{4}$$

$$v = \left[\frac{m - k + 2 \cdot Zeropadding}{Stride} \right] + 1 \tag{5}$$

In the stage of establishing the model, the improvement of details can truly and effectively show the effect of the product. In the stage of shape reconstruction, for each collected image, the outline of the art work is segmented according to the brightness difference and tone difference between the foreground and the background.

3.2 CAD Based VR Modeling and Interaction Design for Modern Art Design

By changing the brightness and color of the picture, the whole work can be adjusted, which is very convenient in the modification of the work. Because of the cancellation function of computer software, the fault tolerance rate of art design is high, and there is no need to rework because of small defects or mistakes. Only the cancellation function can be used to realize the rapid modification of works, which reduces the workload of designers. The existing 3D scene construction can be divided into two categories: panoramic image mosaic and 3D virtual modeling. The targets in the 3D virtual modeling construction scene can interact with users as virtual targets. Due to the rapid growth of CAD, it has greatly promoted the rapid growth of computer art. The improvement of permeability and performance and intelligence are the main trends of CAD development, and computer art should also rely on the development advantages of CAD to realize continuous innovation.

The area where the visual information of the regional 3D image is reconstructed is $S^{'}$, and the edge feature point $\left(x^{'}, y^{'}\right)$ 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:

$$w(i,j)=\frac{1}{Z(i)}\exp\left(-\frac{d(i,j)}{h^2}\right) \tag{6}$$

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:

$$W^{'}=\frac{1}{2}f\left(x^{'}, y^{'}, z^{'}\right)+E \tag{7}$$

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. The visual interaction process of virtual images is shown in Figure 2.

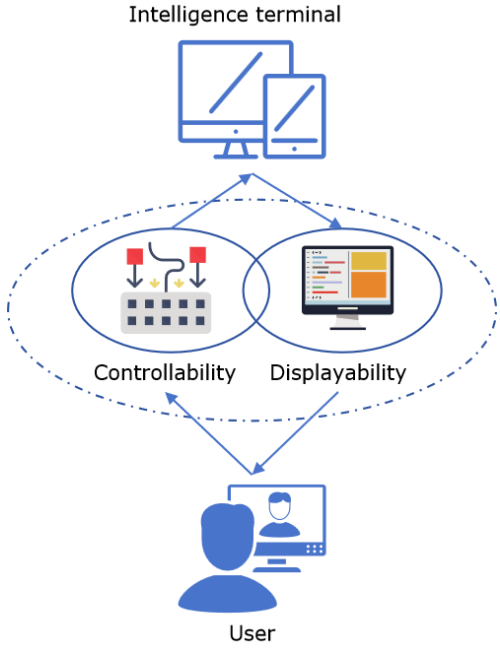

Figure 2: Virtual image visual interaction process.

The converted entity is a 3D model. Although the model entities are spliced at the feature points, they still cannot be completely overlapped. It is necessary to further adjust the spliced entities and rotate the spliced parts around the spliced feature points to realize the perfect splicing of the parts. Local modeling adjustment gives full play to the advantages of parameterization, and transforms modeling requirements into parameter requirements, which is convenient for users to

adjust the model quickly. Local parameter adjustment realizes modeling adjustment through parameter change. If there are vectors $a_1,\cdots,a_n$, connecting them together can get $\left(a_1^T,\cdots,a_1^T\right)$, and the optimization problem for 3D reconstruction can be written as the following formula:

$$\min \sum_{k=1}^{m}\sum_{i=1}^{n} D\left(m_{ki}, P_k M_i\right)^2 \tag{8}$$

In this formula, k represents the quantity of photos taken at different positions, with a total of m images; i represents the serial quantity of 3D points, with n 3D coordinate points in total; P_k represents the projection matrix of the k-th image, M_i represents the coordinates of the i-th 3D point, $P_k M_i$ represents the calculated 3D coordinates multiplied by the projection matrix and projected back into the image coordinate system, and m_{ki} represents the two-dimensional coordinates of the i-th 3D point on the k images.

This description uses the difference of two kinds of Gaussian distributions to describe their proximity, and accurately describes the merging rules:

$$J_{merge}\left(i, j;\Theta^*\right)=\left(P_i\left(\Theta^*\right)-P_j\left(\Theta^*\right)\right)^T * \left(P_i\left(\Theta^*\right)-P_j\left(\Theta^*\right)\right) \tag{9}$$

Here, the smaller $J_{merge}\left(i, j;\Theta^*\right)$ is, the closer the two Gaussian distributions are, and they can be merged.

4 ALGORITHM TESTING AND ANALYSIS

4.1 Modeling Performance Test

CNN is composed of multi-layer small computing units, which processes image visual information in layers by forward propagation. A plurality of computing units in each layer can be regarded as a collection of image filters, and each filter extracts an image feature, and the output is a feature map. The test results of the first layer self-encoder are shown in Table 1. The test results of the second layer self-encoder are shown in Table 2. The test results of the third layer self-encoder are shown in Table 3.

Number of hidden layer nodes	***Average accuracy rate***	***Average recall rate***
25	72.3%	55.2%
50	76.4%	49.4%
100	78.9%	59.1%
150	80.5%	58.9%
200	83.2%	62.9%
250	82.9%	55.8%
300	81.1%	51.4%

Table 1: The results of feature extraction of art images by the first layer self-encoder.

Number of hidden layer nodes	***Average accuracy rate***	***Average recall rate***
25	78.8%	80.5%
50	80.2%	72.4%

100	81.8%	82.7%
150	85.3%	83.5%
200	84.1%	74.6%
250	83.7%	79.7%
300	79.6%	78.1%

Table 2: The results of feature extraction of art images by the second layer self-encoder.

Number of hidden layer nodes	***Average accuracy rate***	***Average recall rate***
25	79.2%	80.5%
50	80.3%	73.3%
100	81.8%	81.7%
150	86.5%	84.5%
200	85.1%	84.3%
250	84.5%	80.7%
300	82.1%	79.6%

Table 3: The results of feature extraction of art images by the third layer self-encoder.

If linear transformation processing is used, a linear single-valued function is used to linearly expand the gray values of all pixel squares in the image, so as to effectively enhance the contrast of the image, thus changing the image quality and making the image more visually artistic. Combined with the overall data volume of the training model and the performance of the model after image optimization. As shown in Figure 3, the comparison results of running time calculated by the algorithm in this text.

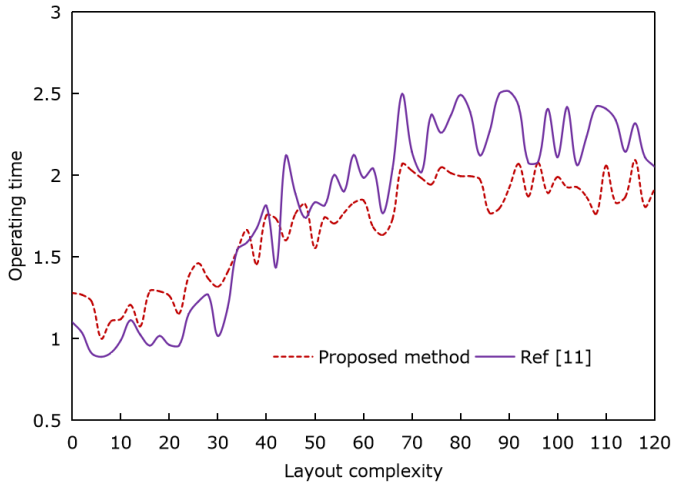

Figure 3: Calculation time comparison of algorithm.

Because different images have different image features, this becomes the main basis of image extraction. To extract images successfully, it is necessary to strengthen the characteristics of image influence to improve the accuracy of interpretation. The convergence comparison between the method and CNN is shown in Figure 4.

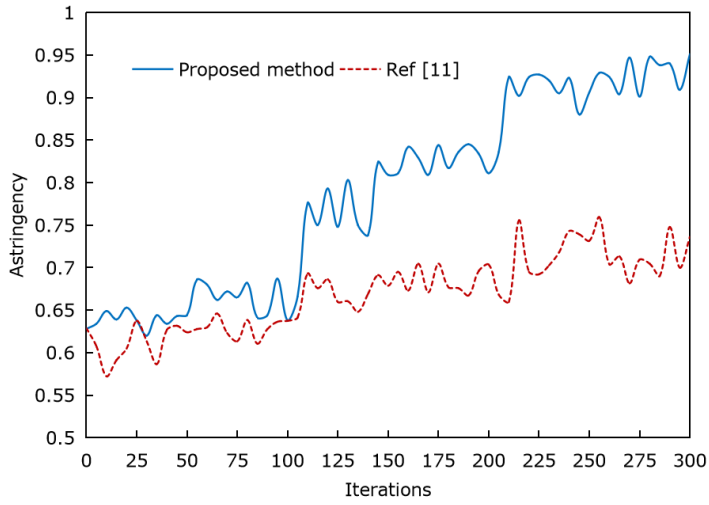

Figure 4: Comparison results of convergence.

The detection results show that this algorithm is more accurate for feature recognition of art images, which is 26.25% higher than the traditional algorithm, and can locate the edge contour of art images more accurately. Figure 5 shows the variation curve of CNN optimal solution.

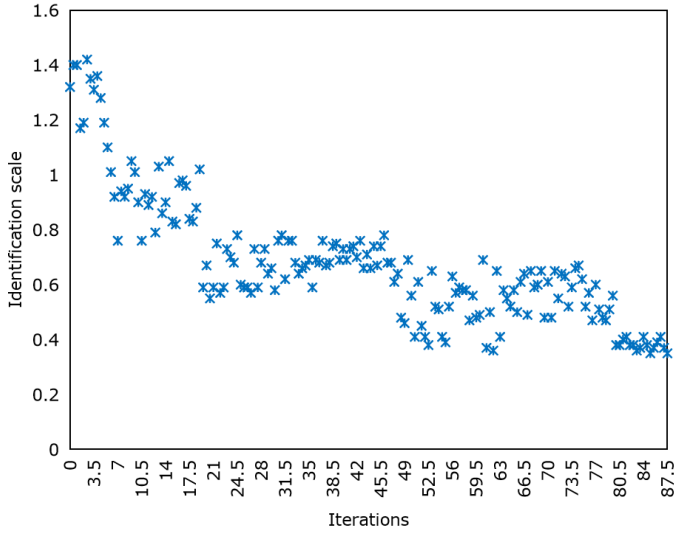

Figure 5: Variation curve of CNN optimal solution.

It can be seen from Figure 5 that the whole image feature extraction process is smooth and rapid, and it can quickly approach the optimal solution. This shows that CNN optimization algorithm can solve the feature extraction of art images well. The test results show that CNN training is successful because all features are activated in different places.

4.2 The Influence of Folk Art Modeling on the Interactive Experience of Modern Art Design

CAD and HCI technology are the important development directions of art design industry at present, which can innovate the forms and works of art design and conform to the current efficient

and fast-paced production and lifestyle. Score the designer's emotional experience and creative experience. Interact the internal attribute characteristics, improve the HCI experience of art design through digital means, and analyze the artistic expression of folk art modeling in modern art design. Figure 6 shows the changes of designers' emotional experience and creative experience scores under the conventional design concept. As shown in Figure 7, the score of emotional experience and creative experience changes after the use of folk art modeling.

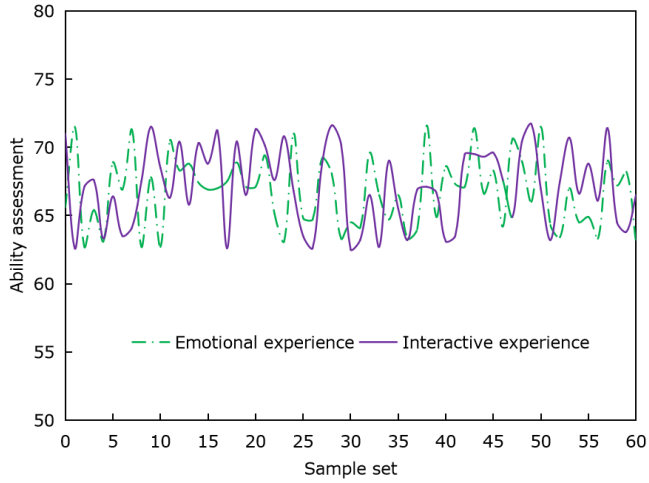

Figure 6: Designers' interactive experience score under the conventional design concept.

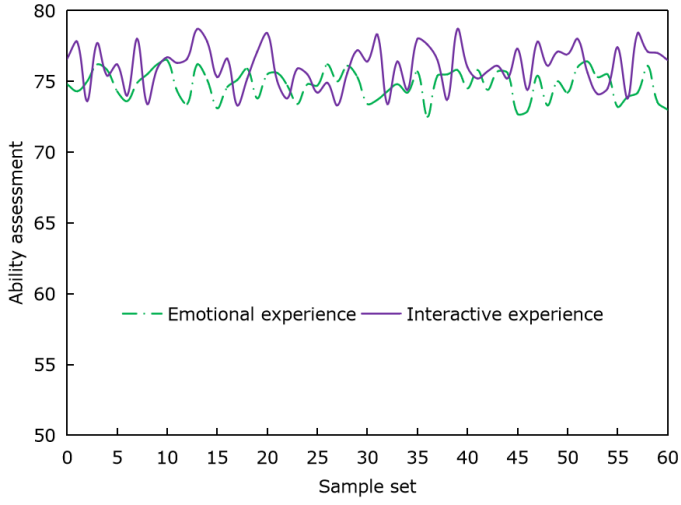

Figure 7: Designer's interactive experience score under the use of folk-art modeling.

The emotional experience and creative experience of modern art design under the conventional design concept are not relatively low, while the interactive experience of designers under the use of folk-art modeling has obvious advantages. On the one hand, it is transformed into non-uniform spline description as modeling data after data fitting; On the other hand, the grid model described by VRML can be directly output, which can be further modified and improved in other CAD software. Folk art shows a unique visual charm with the reasonable application of modeling and

specific creative graphics. Under the color of emotional contagion, it is the sublimation of the value of works of art, and the maximization of the theme of expression causes the high concentration of national spirit.

5 CONCLUSIONS

CAD and HCI technology are the important development directions of art design industry at present, which can innovate the forms and works of art design and conform to the current efficient and fast-paced production and lifestyle. In modern art design, due to the acceleration of social process, many design works only pay attention to function and aesthetic degree, and often do not put themselves in the audience's shoes, while interactive design works solve this problem well. This text expounds that man-machine folk art has a strong implication in image modeling, and shows the craftsman spirit of folk art through the theoretical basis of graphic design, color composition and thinking expression. Interact the internal attribute characteristics, improve the HCI experience of art design through digital means, and analyze the artistic expression of folk art modeling in modern art design. The results show that the emotional experience and creative experience of modern art design under the conventional design concept are not relatively low, while the interactive experience of designers under the use of folk art modeling has obvious advantages. In practical applications, some complex 3D virtual scenes will reduce the quality of the scene model to some extent in order to meet the requirements of real-time scene rendering. Therefore, in the next work, we should further improve the quality of the scene on the basis of ensuring the rendering speed of the scene.

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