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Innovative Applications of Virtual Reality in Cultural and Creative Product Design

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Abstract. In the creative development model of cultural reality, the diversification of the market for cultural and creative products is gradually occupying more and more development markets. In response to the shortcomings of current 3D image conversion, this article uses CAD technology to analyze the aesthetic quality of matching methods. By hierarchical reconstruction of intelligent reality, the aesthetic feature matching of CAD images was constructed. This article combines cultural and creative products based on virtual reality with product interaction and solves the problems of difficult design and low presentation effects in most cultural and creative products. I am combining cultural creativity in image processing with various survey scenarios in the main development model of the product. I created a virtualization path for cultural and creative scenes. At the same time, the fusion of multiple elements has also demonstrated diversified, innovative applications in the intelligent display system of this article. In the display of product integration, it has been favoured by the majority of people.

Keywords: CAD Computer Aided Technology; Cultural and Creative Products; Innovative Application; Virtual Reality; Image Processing
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1 INTRODUCTION

As the main way to improve the competitive advantage of the industry and form a differentiated market, design is updated according to the interests and hobbies of the consumer audience. Digital images play a core role in diagnosing and recording the preservation status of cultural relics. They are not only carriers of history and cultural heritage but also important materials for the development of cultural and creative products. Amura et al. [1] are dedicated to researching a quantitative analysis method that can semi-automatically identify and polygonize regions in images that correspond to specific features. By accurately identifying and polygonizing key features in cultural relic images, they can provide designers, artists, and creative workers with rich materials and sources of inspiration. The research goal is not only to improve technical accuracy but also to promote the widespread application of this technology, where images often carry unique artistic value and intellectual

property. To protect these precious creative assets, Bai et al. [2] combined image information security with fractal image generation technology and proposed cultural and creative product images, they can flexibly choose and apply different fractal transformations to generate various unique and difficult-to-recognize fractal images. In addition, due to the inherent self-similarity and complexity of fractal images, the encrypted images of the VCMIE scheme also have good compression resistance and small data increments. This fractal image can be represented as various fractal scenery or fractal plants, thereby not only hiding the content of the original image but also adding a layer of artistic beauty to it.

3D printing technology, as a revolutionary breakthrough in modern manufacturing, has been applied far beyond the industrial sector and deeply penetrated multiple creative fields, including the fashion industry. In today's world where cultural and creative products are increasingly valued. Through 3D printing technology, Chan et al. [3] precisely controls texture, colour, and texture to create works with rich layers and delicate sensations, bringing consumers a brand new visual and tactile experience. By utilizing 3D printing technology, not only can various forms of clothing, fabrics, and fashion accessories be created, but these products can also be endowed with unique artistic and cultural connotations. It aims to develop a theoretical design process model specifically for 3D printing fashion prototypes with multi-colour surface textures. Provide a comprehensive and systematic guidance framework for designers to better utilize 3D printing technology to create fashion products with unique artistic styles and cultural connotations. In the field of cultural and creative products, artistic works with personal aesthetic pursuit and innovative spirit are crucial for shaping the uniqueness and attractiveness of products. This enables designers to more accurately grasp the aesthetic preferences and needs of users, thereby designing cultural and creative products that better meet market demands. Fractal Design, as a perfect combination of mathematical technology and traditional art design, brings new design concepts and possibilities to cultural and creative products. Through algorithmic operations and optimization, Chao [4] quickly generates a large number of fractal images that meet user needs, and selects the most creative and attractive works from them. This algorithm not only provides designers with more specific design directions but also effectively integrates user feedback through automated and parameterized design processes. In digital life, external factors such as finished products and modes have made it difficult to affect consumers' purchasing behaviour. Adding cultural and traditional elements to product design to form unique cultural and creative products has become the main commodity in tourist attractions, museums and other places. Some scholars believe that using design symbols and definitions to give the meaning of the products involved in the symbols can exceed the previous specifications and expand market competitiveness while meeting the needs of consumers. This higher standard needs to be supported by the knowledge of computer-aided design, graphics and image design, data processing, image processing and other industries.

Cultural heritage is closely linked to individual historical figures, not only the focus of cultural tourism but also the source of inspiration for cultural and creative products. Fan et al. [5] proposed a digital document framework for historical figures based on the metaverse, aiming to digitize the cultural heritage of historical figures such as Zhu Xi in the form of multimodal data and present it in the metaverse environment. This framework not only solves the problem of digitalization of cultural heritage but also adapts to the needs of metaverse display, providing tourists with a brand-new and immersive cultural experience. This not only enriches the cultural experience of tourists but also enhances their awareness of respecting and protecting cultural heritage. These cultural products not only have collectible value but also convey cultural information in people's daily lives, allowing cultural heritage to truly integrate into modern life. When exploring the infinite possibilities of artistic creation, we have discovered various methods for generating unique artistic patterns. Among them, the orbital trap method, as a unique and fascinating technology, has opened the door to innovative design for us. Gdawiec and Adewinbi [6] extend parameters from traditional scalars to vectors, which makes pattern generation more flexible and variable, injecting more personality and vitality into cultural and creative products. This change enriches the way patterns are generated. This change breaks the traditional aesthetic framework and creates unique visual effects in the generated patterns. In addition, we also propose three novel orbital trap methods. These methods not only

enrich the theoretical system of the orbital trap method but also provide designers with more creative inspiration. Not only has in-depth research been conducted on the orbital trap method, but various innovative modifications have also been proposed for its application in generating symmetrical wallpaper patterns. Cultural and creative products are finished products created by integrating experience and skills through historical accumulation. It can retain traditional cultural resources to a certain extent, extract and create cultural characteristics, and form a special commodity with artistic and fashionable characteristics [7].

With the strong support of the state, the inherent image spread in the field of cultural and creative product design has gradually formed its own brand culture from simple souvenirs and joint names around museums. However, in its development, it still lacks innovation and novelty, and the homogenization phenomenon is serious. Most of the cultural and creative design products only carry out simple handling of the regional cultural symbols and do not excavate and recreate the in-depth cultural heritage. There is a lack of intelligent technology support in product material processing and design. And it is impossible to form a highly differentiated culture-oriented commodity. Finally, the main factor affecting the design innovation of cultural and creative products is that the level of intelligent means involved is not high, which is also the key problem restricting the innovative application with virtual reality technology and CAD computer-aided technology as the core has greatly promoted product design in the past, the involvement of computer-aided technology has greatly improved and differed in terms of manufacturing and aesthetics. The design concept of the product is not imagined out of thin air, but drawn with the help of computer programs. After the integration of virtual reality technology, this auxiliary technology based on intelligent means such as networks and computer big data has completely entered the digital information age for cultural and creative product design. Moreover, it reduces the technical difficulties encountered by product designers in production design and manufacturing. In addition, CAD computer-aided technology can also help cultural and creative design products complete automatic scheme comparison and design retrieval, greatly reducing working time and improving the efficiency of cultural and creative product design in image generation, review and other links.

2 RELATED WORKS

Wax printing, a brilliant treasure of ethnic minorities in southwestern Guizhou Province, China, is not only a traditional handicraft but also a cultural symbol that carries rich ethnic culture and artistic value. Against the backdrop of the increasing popularity of cultural and creative products, the innovative design of batik patterns is particularly important. Hu et al. [8] used a genetic algorithm to optimize the three-layer neural network model, ensuring that the generated batik patterns maintain ethnic characteristics while also meeting the diverse needs of the market. Through ANN, we can establish a nonlinear mapping model between design parameters and consumer visual cognitive image (VCI) values, thereby more accurately capturing consumer visual needs and aesthetic preferences. This means that we can quickly generate batik patterns that meet the aesthetic preferences of consumers based on their visual cognitive needs. Jin and Yang [9] analyzed the construction of professional developer inspiration methods for consumer visual environment art. It has compiled models for pattern construction in environmental design. In the art construction model of an innovative environment, the visual art design of cultural and creative products is elucidated. They have explored how to introduce more courses related to cultural and creative product design to cultivate students' innovative thinking and design abilities. In the research, special attention was paid to how information technology promotes the integration of environmental art and design capabilities with cultural and creative product design. This is not limited to technological improvements but also includes the understanding and application of creativity, innovation, and cultural elements integrated into design.

Liu and Yang [10] have designed an innovative contemporary art computer-aided design (CAD) teaching model. It has built an information service-oriented teaching model based on the IIS (Internet Information Services) server, making the acquisition and sharing of learning resources more convenient. This model not only focuses on technology teaching but also devotes itself to

exploring a new path of open learning based on the Internet by combining development and practice. In the practice of teaching mode, they particularly emphasize the design and development of cultural and creative products. In terms of technology selection, we utilize Microsoft's ASP NET framework as a development language. This technology provides us with solid technical support due to its powerful functionality and ease of use. Traditional computer rendering methods often take too long to process Kleinian group images, which limits their application. Nakamura [11] proposed an innovative Iterative Inversion System (IIS) algorithm. The real-time rendering of the IIS algorithm has broad application prospects. This algorithm is also suitable for drawing two-dimensional and three-dimensional fractals, bringing more design elements and inspiration sources to cultural and creative products. It can efficiently render Kleinian group images composed of inversion into circles or spheres in a real-time environment. Secondly, the IIS algorithm also provides strong technical support for the creation of mathematical art, allowing designers to utilize the fractal structure of Kleinian groups to create unique and meaningful works of art. Designers can apply these fractal structures to various aspects such as pattern design, texture production, animation effects, etc., adding unique visual effects and artistic value to products.

Wenjing and Cai [12] constructed an information language for painting sketches by using intelligent interactive art emotion classification. It uses a classification structure of digital vision to express technical viewpoints. The proposed study provides a comprehensive overview of various artificial intelligence-based intelligence and intelligent applications for improving and developing art and design. The art developed using these methods can accurately and correctly convey human emotions and emotions. With the rapid development of digital media and technology, fractal, as a generator of natural object multimedia content, its unique self-similarity characteristics bring infinite possibilities for cultural and creative products. To overcome this challenge, Xiang et al. [13] explored a new method of using Generative Adversarial Networks (GANs) to guide fractal generators in this work. Assuming that fractal patterns of the same category are generated by a set of parameters, we often pursue unique, novel, and artistic visual effects. This method greatly reduces the number of evaluations for iterative function systems and improves generation efficiency. More importantly, since the entire process is automated, designers do not need to have deep mathematical expertise to easily create high-quality fractal artworks. In these experiments, it successfully generated high-resolution visual objects and demonstrated the effectiveness of artificial intelligence guidance in fractal generation through user research [14].

Based on the integration of meaning construction theory and design disciplines, they have established a model that matches the project promotion process. In the process, these patterns not only help designers more accurately convey the cultural connotations and artistic beauty of the product, but also enhance the emotional connection between users and the product. The basic pattern emphasizes the fundamental elements and principles of design, which is crucial for maintaining the overall style unity. Especially in the design and development stage, it emphasizes in-depth research based on user needs and market trends, as well as designers' keen capture and innovative application of cultural elements. With the advent of the digital age, computer graphics-assisted art and design has become an important driving force. Based on summarizing traditional art product design methods, Zhang and Rui [15] proposed the method of modular decomposition to implement the innovative process of art design on a computer. By introducing the latest digital technologies and design tools, we provide students with a richer and more diverse learning experience.

3 METHODS

3.1 Image Processing in Cultural and Creative Product Design

With the development of the era of computers and intelligence, computer graphics, virtual reality, CAD and other technologies have also been improved. The application of CAD technology involves methodology, artificial intelligence, and other aspects. This design technology based on comprehensive disciplines has a broader space in various fields. First of all, in essence, CAD

technology is the main method to optimize solid modelling products. The designer can automatically select CAD technology auxiliary tools according to the modelling requirements and entity pictures of the product, complete 3D modelling in the design software, and finally analyze the structure of the product through the virtual space. From this point of view, CAD technology in three-dimensional space generally uses parametric processing methods. It has an obvious advantage that during the modelling process, the parameter changes of the internal and external dimensions of the product will be dynamically and automatically updated, which can directly affect the generation of the final product. Therefore, the application of CAD technology greatly simplifies the workload of the staff in the design field and also improves the work efficiency of the staff and the quality of product generation. Some European countries have applied CAD technology to clothing design and production. They use this computer-aided tool to directly observe all aspects of clothing production, which is impossible for traditional clothing design. In the production process, CAD can also automatically simulate the industrial operation process and modify inappropriate design parts before they are put into production in a timely manner to ensure the quality of clothing products and reduce the number of modifications in the design generation.

The division of labour between virtual reality technology and CAD technology is different. It pays more attention to letting users feel the real environment in the virtual space. It is also the core content of this technology to use virtual reality technology to enable the masses to obtain a good application experience. In the process of building a virtual environment, it is necessary to simulate the corresponding physical properties based on real space, such as texture, shape, etc. Add the obtained feature points and sample data to the computer system for analysis and serve the audience through the computer's rapid processing function. Japan has added algorithms such as real-time rendering in the exploration of virtual reality technology to improve the authenticity of virtual reality space, and they have integrated animation products and game design into the virtual space so that users can truly participate in the interaction and experience the feeling of immersive. The United States has a lot of time to study virtual reality technology. They are the first to introduce virtual reality technology in the field of medical treatment to help medical rehabilitation complete innovative design. According to the treatment needs of different patients, virtual reality technology is used to simulate and improve the success rate of rehabilitation treatment. In addition, they applied virtual reality technology in the military field to guide the maintenance of ordnance equipment. This is conducive to the upgrading and rapid production of military equipment and greatly improves the comprehensive national strength. To sum up, the development of CAD technology and virtual reality technology in various fields is relatively mature, so we explore the innovative application and design development process of the two in-depth.

The appearance of products plays a very important role in consumers' emotions and purchase interest. It is the first contact point between cultural and creative design products and customer groups. Even if cultural and creative products have the same function and value, changing the appearance of the design can bring new purchasing desires to customers. Graphics and images can also be activated with perception and stimulation and recognized by users. Most of the aesthetic attractiveness of the appearance contains some subjective elements. Although there are some common elements that affect it, such as the golden ratio, color matching, etc., the design and thinking of the image are still the main reasons that affect the competitiveness of cultural and creative products. We use data analysis and statistics to explore the regional distribution of cultural, creative, and design products in recent years, as shown in Figure 1.

From Figure 1, we can see that the region is divided into four directions: Northeast, North China, northwest, and Southeast. North China and Southeast China are densely populated tourist areas. According to the distribution of data points, cultural and creative design products are more competitive in tourist areas. This also shows that the design of cultural and creative products can affect regional economic benefits and tourism benefits to a certain extent. In our research, we focus on computer-aided design CAD technology. Firstly, according to the literature statistics over the years, CAD technology as a computer-aided software, its modeling function, and 3D virtual effect can affect the structure, shape, color, and other contents of image design in the model system.

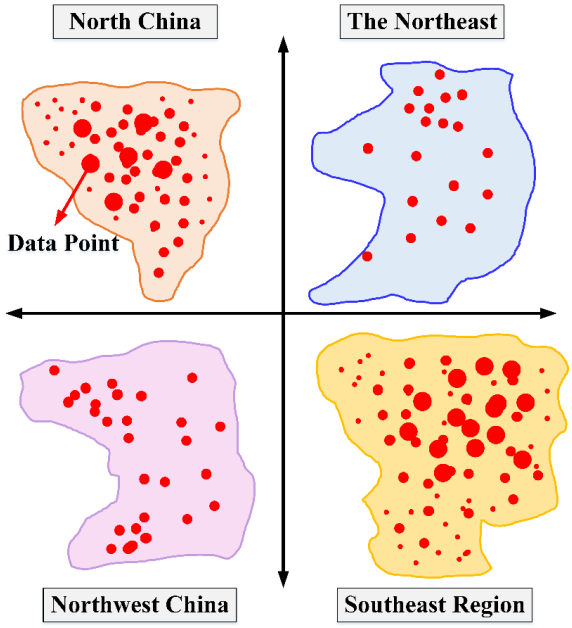

Figure 1: Distribution of cultural and creative design products in different regions.

This technology runs through the production process of cultural and creative design products. Through repeated verification and rapid formation of technology, designers optimize the appearance of products and select the scheme that best meets the design requirements. Secondly, traditional cultural and creative product design technology can not dynamically correct the design details when it involves the processing of physical attributes, resulting in a large number of repeated operations and waste of production materials. In view of various problems, we convert two-dimensional images into three-dimensional images and, with the help of CAD technology, let the computer assist the designer in image processing so as to realize the reconstruction of graphic image design. Two-dimensional digital images include the appearance and internal structure of cultural and creative design products, so data acquisition should be carried out from many aspects. The appearance image of the designed product is captured and acquired from different angles using information acquisition equipment, cameras, cameras, and other tools. The internal structure uses scanning and slice imaging to upload the data information to the computer network database. At the physical level, the distance between the collected object and the acquisition equipment can affect the time of image reconstruction, and these data relationships can also reflect the corresponding acquisition calculation formula:

$$1/f = a/d_0 + 1/d_t \tag{1}$$

$$d_0 >> d_i/(1+t)^2 \tag{2}$$

We use the dynamic change of the focus position of the plane to affect the image acquisition process and use the imaging principle to flip the graphics on the plane. All objects in front of the camera can be uploaded to the computer, and almost the same image as the original image can be obtained. Using the similarity calculation formula, the corresponding relationship between the scene and the image is obtained

$$h_i = f\frac{h_0}{d_0} \tag{3}$$

In the formula, it represents the projection position of the image in three-dimensional coordinates. The plane coordinates are mapped in three-dimensional space according to different attribute relationships. After projection, the coordinate points change as follows: h_i

$$(x,y)=(fX/Z,fY/Z) \tag{4}$$

The matrix coefficient on the direction vector is introduced, and the formula is expressed by matrix:

$$s\begin{bmatrix}x\\y\\z\end{bmatrix}=\begin{bmatrix}f,0,0,0\\0,f,0,0\\0,0,1,0\end{bmatrix} \tag{5}$$

The formula represents the pixel factor that can be arbitrarily scaled, and the calculation of rotation and offset is added to express the central coordinate: s

$$s\begin{bmatrix}x\\y\\1\end{bmatrix}=\begin{bmatrix}f,0,0\\0,f,0\\0,0,1\end{bmatrix}\begin{bmatrix}rX\\rY\\rZ\end{bmatrix} \tag{6}$$

Within the scope of the matrix, the acquisition process of each image data passes through the same amount of parameters, that is, the influence of the internal and external environment. The target can be obtained using the corresponding imaging along the central area drawn by computer-aided technology. Linking and searching 2D planar imaging and 3D mapping imaging can meet the simple constraints of automatic image processing:

$$\begin{bmatrix}l_1\\l_2\\l_3\end{bmatrix}=F\begin{bmatrix}x\\y\\1\end{bmatrix} \tag{7}$$

$$l_1x+l_2y+l_3=0 \tag{8}$$

In order to process 3D images in depth, we also need to use CAD technology to smooth them in 3D mapping space to reduce interference and noise after image generation. Considering the continuity and coupling of each smooth point in the synthesis, first, convert the depth value of the two-dimensional image and then add it to the actual depth value of the three-dimensional image. Among them, the variables representing the mapping relationship and the calculation formula are as follows:

$$Z=Z_f+Z\bullet\frac{Z_n-Z_f}{255} \tag{9}$$

In the formula it represents the mapping tangent after projection processing, and the inverse proportion formula of the far and near mapping tangent is expressed as: Z_f .

$$\frac{1}{Z}=\frac{1}{Z_f}+\frac{z}{255} \tag{10}$$

$$\frac{1}{Z}=m\bullet\left(\frac{1}{Z_n}-\frac{1}{Z_f}\right) \tag{11}$$

It is difficult to calculate the linear depth of pixels after 3D image processing, so we can only use the representation method of restoration depth to predict the adjacent range:

$$\sigma=\sqrt{\frac{\sum_{j=-y}^{y}I(u+i,v+j)}{(2n+1)(2y+1)}} \tag{12}$$

The Gaussian two-dimensional filtering function is used to obtain the smoothing coefficient of the image, and the expression is:

$$g(x,y,\sigma)=\frac{1}{2\pi\sigma^2}e(\frac{(x+y)}{\sigma^2}) \tag{13}$$

The formula represents the pixel features after Gaussian calculation, and the change law of image feature points can also refer to the actual effect and determine the specific value of the parameter. Assuming that each two-dimensional image will generate corresponding coordinates before processing, the feature judgment formula after Gaussian two-dimensional filtering calculation is: σ^2

$$s=\sum_{o}^{w}\frac{1}{2}(x-a)(y-b)(z+n^2) \tag{14}$$

$$s(x,y)=\frac{\frac{w}{2}\sum_{g=0}^{u}(x,y,\sigma)}{(2n+1)(2y+1)\sqrt{\sigma^2}} \tag{15}$$

The comparison of image mapping processing results for graphic cultural and creative products is shown in Figure 2.

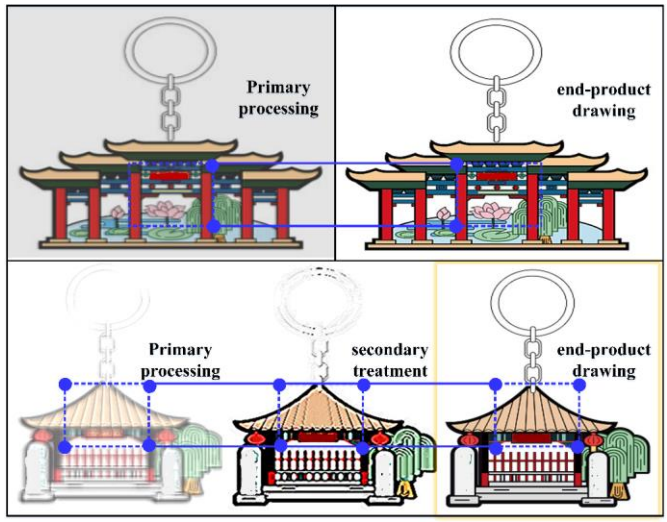

Figure 2: Design drawings of cultural and creative products after CAD innovation.

It can be seen from Figure 2 that there are obvious pixel changes in the design drawing before and after optimization. The optimized design picture is clearer, and some design effects can be automatically added to the computer-aided software.

3.2 Intelligent Display and Collocation

The design process is the main way to inherit traditional culture and carry forward the national spirit. This is not only reflected in the respect and inheritance of cultural protection but also in the process of combining cultural elements with modern design technology. The traditional product display mode is relatively simple. In our research, we use CAD technology to match with virtual reality scenes to realize the intelligent presentation mode, so that this display method has the characteristics of more diversification and diversity. At the same time, data processing and information collection are used to make the identification function more stable, fast, and accurate, and they play a role in the

three-dimensional model of cultural and creative design products. This not only saves the cost of product design but also has more important significance in production and sales. To realize the intelligent display of cultural and creative product design, it is necessary to optimize the interactive device with the help of computer-aided technology. The interactive device is composed of a number of sensors and sensing devices. It mainly provides customers with virtual three-dimensional scenes. We will show the internal structure of the interactive device and the intelligent display framework, as shown in Figure 3:

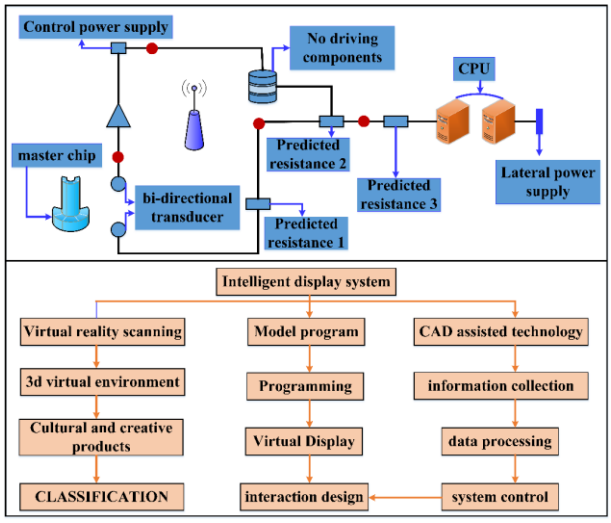

Figure 3: Internal structure of interactive devices and intelligent display framework diagram.

It can be seen from Figure 3 that the interactive device includes bidirectional sensors, a main control power supply, etc. According to the preset resistance, select the central processing unit and the direction of current transmission. Cooperate with the driverless display to build a hardware environment with somatosensory interaction. The framework of an intelligent display system mainly plans three modules: virtual reality scanning, model program construction and CAD auxiliary technology. In computer-aided design, it is necessary to complete the processing of information data and the collection of image feature points and upload the processed data to the interactive design system. The construction and classification of 3D virtual cultural and creative products are completed in the virtual reality model. In the innovative application of cultural and creative product design, the colour matching of design patterns can minimize the generation time of design schemes. We take the porcelain in cultural and creative products as an example to illustrate that blue and white porcelain are composed of white and blue, which respectively symbolize different cultural connotations. Once there is a problem with colour matching, the coordination of white and cyan will be lost. Mixing and matching different colours will easily affect the beauty of the original cultural and creative design products. The application of CAD technology and virtual reality technology in the automatic generation of colour matching can help designers quickly process colour elements with the help of a computer, and timely adjust the design scheme to achieve the desired goal. In the framework design, we need to design with the help of a three-tier model, including data access, business processing, and results display modules. Data access requires direct operation of the database to add and delete the resources of colour elements, which stores a large number of cultural and creative product styles and colour-matching schemes. The business logic layer is the operation and control of the data layer, and it is also the core of the whole system. The results display layer is the interface presented to the audience, and the matched design scheme is generated for the user for the experience. In this mode, it is necessary to combine virtual reality technology to generate three-dimensional space display

works, so that customers can feel immersive. We show the internal structure of the colour-matching process after the integration of CAD technology and virtual reality, as shown in Figure 4:

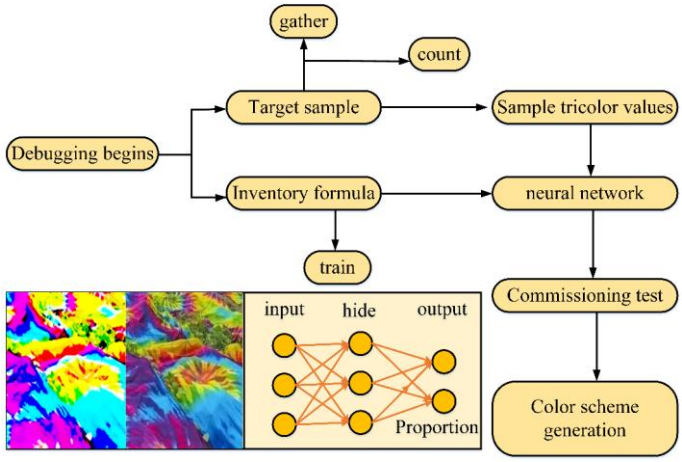

Figure 4: Internal structure diagram of the colour-matching process.

It can be seen from Figure 4 that the colour-matching process mainly includes the collection and processing of target samples, which are divided into three colour values and input into the neural network. Adjust the proportion of colours through the stock formula and training. Then add the trained data to the virtual reality space, complete the system composition, and finally display the finished products with different colours.

4 ANALYSIS OF RESEARCH RESULTS

4.1 Results of Innovative Application of Image Processing

Computer-aided design technology can manage and control the design style in the process of product design, provide effective and reliable parameters, and help the design scheme to change and modify dynamically. It reduces some problems such as low quality caused by unclear images and interference of acquired data in the generation of cultural and creative design products. In our research, we used CAD-aided technology and related software to analyze the characteristics of different products according to their unique needs. According to the analysis results, most cultural and creative product designs have obvious common characteristics, that is, noise and other interference factors are prone to appear in image processing. The process of converting a two-dimensional plane into a three-dimensional image also affects the final result. We use CAD computer-aided technology to reconstruct two-dimensional digital images. In order to verify the effectiveness of the algorithm, quantitative sample data are randomly added to the design system of cultural and creative products before and after optimization, and the effect of the algorithm is compared. First, the edge detection effect of CAD technology in the 3D reconstruction of 2D image is analyzed, as shown in Figure 5.

It can be seen from Figure 5 that with the continuous increase of feature point samples, the edge features of the ordinary cultural and creative product design system are relatively fuzzy when processing two-dimensional images, and the information collection is prone to fracture. By using CAD computer-aided technology to reconstruct the three-dimensional image, the sample style of cultural and creative design products can be clearly obtained, the effect of edge detection is obvious, and the number of feature points contained in it is more complete. Next, the matching performance of feature points after 3D image reconstruction is compared, as shown in Figure 6.

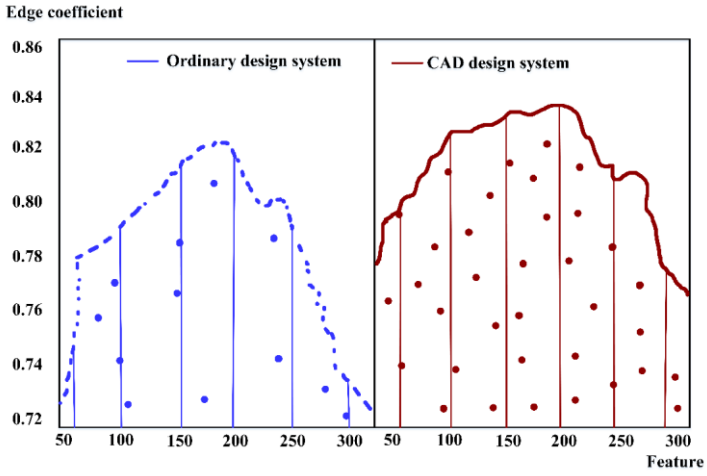

Figure 5: Edge detection effects of two design methods.

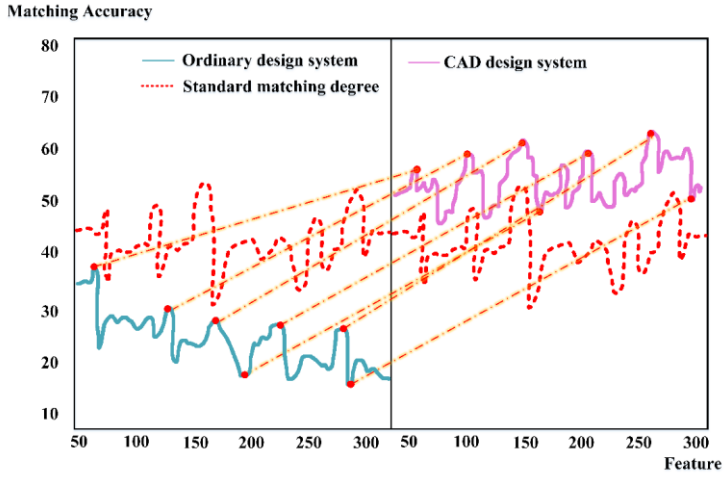

Figure 6: Comparison of matching performance between two design feature points.

It can be seen from Figure 6 that the matching effect of image feature points in the design of ordinary cultural and creative products is poor and the accuracy is low. The cultural and creative design products assisted by CAD technology have high accuracy in image feature point matching processing and can meet the task requirements of cultural and creative design products.

4.2 Results on Intelligent Display and Matching

The main feature of cultural creative design products is that they are rich in cultural elements and creativity, which makes them very different from the market competition. In the design, designers skillfully use traditional cultural patterns, colours and materials to enhance the cultural and artistic value of products. For example, in the product design stage, we should integrate ancient philosophy or folk culture to make the product have a higher level of cultural connotation, so as to attract the attention of consumers and audience groups. In order to better let cultural and creative design products show their unique style, we have realized the intelligent display with the help of technology

and virtual reality technology. In order to verify the practical application effect of the intelligent display system, it is tested in the real environment, and the execution data and information of the intelligent display system are obtained from multiple angles. Because the system needs to process a large amount of data in daily life, we choose interactive sensing devices to provide users with better virtual scenes. The satisfaction of different user groups with the intelligent display of cultural and creative product design is counted, as shown in Figure 7.

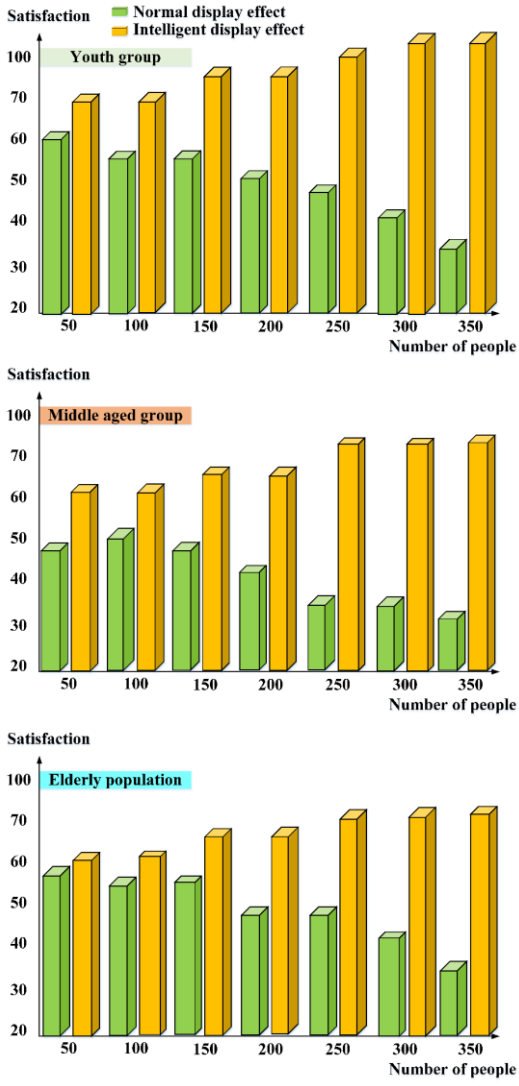

Figure 7: Satisfaction survey of different groups.

Figure 7 shows the satisfaction survey of different groups. Although the satisfaction of the youth group and the elderly group increases slowly, the actual evaluation fluctuation also meets the standard of test effect. Next, we explore the performance of automatic colour matching. We mainly study the colour matching of a cultural and creative product design and take the colour difference of colour matching as the detection standard. According to the actual test, in the sample library, most of the colour-matching schemes meet the standard proportion. This shows that the colour of the

matched sample is basically free of colour difference, achieving the expected effect, and can be used in the design of cultural and creative products.

5 CONCLUSIONS

The current intelligent cultural and creative products of computers have fundamentally changed the previous product design mode. Both the peripheral revenue creation of cultural and creative products and their own development have already had high value. It not only shortens the design and production time of products but also provides designers with more open design ideas. In the design of cultural and creative products, traditional cultural elements and artistic aesthetic characteristics can be displayed in CAD technology and virtual reality. These two technologies not only give the product a unique cultural connotation but also provide new ideas for the inheritance of national culture. Firstly, the application status of CAD technology and virtual reality technology in different fields is counted. Through the simulation experiment on the design process of cultural and creative products, it is known that the combination of image processing and CAD technology, which affects the final results of cultural and creative products, has an obvious effect. We use CAD technology to analyze and reconstruct two-dimensional images to form an image processing model of three-dimensional virtual space so that the image effect can meet the characteristics of cultural and creative design and pixel requirements. Finally, CAD technology and virtual reality technology are integrated to form the intelligent display system and color-matching function of cultural and creative product design.

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