

Retraction

Retracted: Application of Computational Digital Technology in the Improvement of Art Creation

Security and Communication Networks

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Security and Communication Networks has retracted the article titled “Application of Computational Digital Technology in the Improvement of Art Creation” [1] due to concerns that the peer review process has been compromised.

Following an investigation conducted by the Hindawi Research Integrity team [2], significant concerns were identified with the peer reviewers assigned to this article; the investigation has concluded that the peer review process was compromised. We therefore can no longer trust the peer review process, and the article is being retracted with the agreement of the Editorial Board.

References

- [1] J. Li, “Application of Computational Digital Technology in the Improvement of Art Creation,” *Security and Communication Networks*, vol. 2022, Article ID 7723251, 13 pages, 2022.
- [2] L. Ferguson, “Advancing Research Integrity Collaboratively and with Vigour,” 2022, <https://www.hindawi.com/post/advancing-research-integrity-collaboratively-and-vigour/>.

Research Article

Application of Computational Digital Technology in the Improvement of Art Creation

Juanli Li 

Baoji University of Arts and Sciences, Shaanxi, Baoji 721000, China

Correspondence should be addressed to Juanli Li; 2020210420@mail.chzu.edu.cn

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In order to promote the simultaneous development of art creation and modern information technology, this paper studies the application of digital technology in the improvement of art creation. Moreover, this paper combines image analysis technology and computer simulation technology to improve point cloud digital technology and build a human-computer interaction system for art creation based on digital technology. The system uses the visual computer to communicate, gives instructions through actions, and uses the computer's visual dynamic tracking technology to make the computer recognize the instructions and information sent by the user so as to provide visual feedback. In addition, this visual interactive art creation application uses the real-time nature of the camera to capture real images of interaction between the environment and the work and then interacts the captured images with virtual bubbles. Finally, this paper studies the method proposed in this paper through case analysis. The research results show that digital technology can effectively promote the development of art creation.

1. Introduction

With the rapid development of the information industry, human society has entered the digital age. Moreover, with the rapid popularization of digital tools based on personal PCs, the digital high-speed communication system has portrayed the coming digital living environment for us. Digitization refers to the process of using computer information processing technology to convert acoustic, optical, electrical, and magnetic signals into digital signals, or to convert information such as voice, text, and images into digital codes for transmission and processing. The so-called digital art design refers to a new art creation method based on digital technology, which uses related digital equipment to combine design art with digital technology [1]. Teachers and students apply current educational theories and legislation to thoroughly digest course material with digital multimedia information in a digital teaching environment. Furthermore, they incorporate into the course teaching process the high-density compressed education and teaching information resources saved on the optical disc or the digital education and teaching resources shared through the

network. Furthermore, through the digital teaching mode, teachers and students have complete control over information technology tools and can use a variety of modern digital information retrieval and acquisition methods to cultivate compound talents with innovative consciousness and the ability to meet the needs of the new century [2]. Learners no longer take course teaching material passively in the digital teaching process, but instead actively engage in it. The information is merged and recreated as the learner's learning outcome via the application of unique and competent digital processing technologies. This not only stimulates learners' creativity but also expands the opportunities for learners to express their creativity [3].

The content information that the computer develops via the changing of computation and blocks is referred to as digitised information. The data unit is the bit (bit). It is simple to propagate and has the ability to interact in several directions. Data and information are searched for like nerves via the Internet by digital design works of art. To acquire recurrent reshaping of designs, multi-directional feedback is employed. Design efforts compress and complement changes in interaction; sophisticated computers operate

variables in a flash. The updates are delivered in real-time to the multidirectional terminal receiver. We might envision that spiritual enjoyment would cause a two-way relationship when individuals can appreciate works on the other half of the planet from one side of the globe. Similarly, depending on the object's content and purposes, the freedom to use sensory channels to transmit sentiments might allow emotional symbols to be conveyed via the design across time and space, achieving the highest level of sublimation.

The premise of digital design artists is to have professional digital technology skills. While enhancing the expressiveness of their works, they constantly put forward higher requirements on technology. Only in this way can they use tools rationally in the process of artistic creation to enrich their own artistic expression methods, to achieve the transcendence of higher artistic conception of artistic works. But it needs to be pointed out that in the creation of digital design art, technology will not be the only criterion to determine the level. What we should pay more attention to is the combination of all aspects of artistic quality and the improvement of the ideological connotation of the work. As far as artistic creation is concerned, art is always the first. Science and art are the two necessary swords for mankind to get out of ignorance. Fortunately, in today's computer age, scientists and artists have come together. Today, the ever-changing information technology makes everyone stunned. With the advancement of technology in the digital world, people find that the world is becoming smaller and smaller. Perhaps today's artists are tomorrow's scientists, and artists are thinking about new technologies that will change the world on the edge of their imagination.

This paper studies the application of digital technology in the improvement of art creation and combines image analysis technology and computer simulation technology to change the traditional art creation mode so as to improve the diversity of art creation modes.

2. Related Work

The development of contemporary design and the future of design is determined by the degree of integration of art and science, which can be seen from the development trend of contemporary design [4]. Information design, for example, is a relatively recent professional philosophy in the design field. Initially, it mostly pertains to so-called interface design, which addresses the issue of human interaction with technological objects. In truth, the scope of information design is quite broad, and it is a topic that is covered in many design professions, including graphic design. In addition, information design, in its most basic form, depicts, transmits, collects, and processes data in the style and form of aesthetic design, or offers a product or tool for people to utilize, interpret, and receive data [5]. Art designers employ creative forms to express and process information, while software designers use digital code to process information. As the quantity of information disseminated in the information society develops, graphic design posters, for example, are necessary to transmit a higher amount of information. Computers are used by designers to represent and transmit a

large quantity of data in aesthetic ways. Without a doubt, this is the birth of a formal system of expression. This system also functions as a comprehensive language and symbol system, complete with its own internal structure and subsystems. As a result, the development of shape is dependent on the designer's overall concept and originality in terms of information presentation. Shape creation should be stated to be the same as natural growth when a suitable information expression structure or system is established with the use of computer design software [6]. This is not a haphazardly drawn shape, but a highly reasonable form that does not deny perceptuality, i.e., a symbol system with scientific and linguistic characteristics [7].

Computational geometry is the computer representation, analysis, and synthesis of geometric shape information. The emergence of computational geometry laid the foundation for subsequent auxiliary art design [8]. However, the drawing of graphics based on computational geometry seems to be limited to objects that are generally regarded as "rules," such as the shape of buildings, the appearance of cars, etc. [9]. In the 1970s, with the progress of nonlinear scientific theories, another new geometry was gradually formed, which is the "fractal" geometry named by Mandelbrot. Fractals are called the geometry of nature, mainly because they can describe irregular objects in nature, such as mountains, fire, clouds, and smoke. Just as computational geometry makes the description of regular figures possible, fractal geometry gives the description of irregular figures a number of successful theoretical foundations. This deepening of the understanding of graphics makes the discussion of the mathematical structure of artworks in a regular and followable situation [10]. The establishment of fractal geometry has had a profound effect on the fields of science and art [11]. The mathematical transformation method of graphics is another form of the connection between mathematical methods and computer art. Through graphic transformation, a simple graphic can generate a complex graphic, which makes the graphic style richer. In addition, through graphic transformation, two-dimensional graphics can also be used to represent three-dimensional shapes. Because the subject of this paper is plane composition, the transformation method of plane graphics is discussed here. There are two types of graphics transformation methods. One is the common geometric transformation, also called a coordinate transformation, which is a linear transformation realized by a matrix method. The other is nonlinear transformation and local linear transformation, which are realized by analytical methods [12].

Computers have reduced people's physical labor time, simplified certain difficult design processes, and can create effects that are impossible to do by hand. However, it is simple for individuals to become confused and believe that current design is just conventional art composition expertise combined with computer operation [13]. This level of comprehension is just the tip of the iceberg. Theoretical knowledge will come to a standstill if manual training and design thinking tasks are abandoned. As a consequence, many people's design conceptions, ideas, and expressive styles are similar or identical. The art design community as a

whole has taken the same direction [14]. This sort of skill will soon be left behind in the global market flow. The computer is nothing more than a tool. More crucially, it integrates scientific ideas and procedures into conventional art design, resulting in a new way of life and form for contemporary art composition design. This new manner of being and shape is not intended to be a substitute for current creative approaches and forms, but rather to create a new living space and field in addition to them [15]. This not only enhances current art forms but also alters the structure of art by introducing new creative processes. Although art designers use computers and programs to create images and design works, they are unaware of the significant differences between the generation and acquisition of images in the information space and traditional hand-drawing, but the creation and acquisition of images in the information space are, in fact, the creation and acquisition of images in the information space. Humans are profoundly impacted by the advent and presence of the intermediate technique, sometimes known as a virtual method [16]. The use of computer-aided art to create design should not only treat the computer as a sophisticated instrument but also comprehend and investigate the meaning of art design via surface phenomena [17].

3. Digital Algorithms in Art Creation

The space plane can be represented by the plane unit normal vector $\vec{n} = (\mu, \nu, \omega)$ and any point $o = (a, b, c)$ on the plane. The point normal vector equation is used to represent the plane. The geometric meaning is very intuitive and it is expressed as follows:

$$u(x - a) + v(y - b) + \omega(z - c) = 0. \quad (1)$$

Another common way of expressing a plane is a general equation [18] is as follows:

$$ux + vy + oz + d = 0. \quad (2)$$

In point cloud data, a plane is a frequent structure. Random sample consistency, least-square technique, eigenvalue method, and principal component analysis fitting method are all common fitting approaches. Noise data is resilient to random sampling consistency and principal component analysis fitting techniques, and they may successfully limit the effects of noise data. The random sampling consistent fitting findings, on the other hand, are random, and the principal component analysis fitting results cannot be high-precision. To get plane parameters with high fitting accuracy, the least-square approach minimizes the sum of squares of the point and plane errors. To assure the correctness of the fitting plane, the least-square approach is employed in this study to fit the plane features.

The point set $P_{\text{plane}} = \{(x_i, y_i, z_i)\}_{i=1}^m$ is the plane point cloud data containing m points. According to the general equation of the space plane, the distance error between any point in the point cloud and the plane can be calculated [19] as

$$d_i = |\mu x_i + \nu y_i + \omega z_i - d|. \quad (3)$$

Fitting the best plane means that the sum of squared distances between all points and the plane is required to be the smallest, and the following error optimization model can be obtained as

$$(\mu, \nu, \omega, d)^* = \operatorname{argmin}_{\mu, \nu, \omega, d} \sum_{i=1}^m d_i^2. \quad (4)$$

In order to solve the error optimization model, the Lagrangian function is first constructed, the partial derivative of the function is obtained, the matrix equation is established to solve the eigenvalues and eigenvectors, and the optimal parameters of the plane are obtained. The specific solving steps are as follows:

$$f = \sum_{i=1}^m d_i^2 - \lambda(\mu^2 + \nu^2 + \omega^2 - 1). \quad (5)$$

Formula (5) is the Lagrangian function. Taking the partial derivative of the parameter μ, ν, ω, d , we can get

$$\frac{\partial f}{\partial \mu} = 2x_i \sum_{i=1}^m (\mu x_i + \nu y_i + \omega z_i - d) - 2\lambda\mu, \quad (6)$$

$$\frac{\partial f}{\partial \nu} = 2y_i \sum_{i=1}^m (\mu x_i + \nu y_i + \omega z_i - d) - 2\lambda\nu, \quad (7)$$

$$\frac{\partial f}{\partial \omega} = 2z_i \sum_{i=1}^m (\mu x_i + \nu y_i + \omega z_i - d) - 2\lambda\omega, \quad (8)$$

$$\frac{\partial f}{\partial d} = -2x_i \sum_{i=1}^m (\mu x_i + \nu y_i + \omega z_i - d). \quad (9)$$

When formulas (6)–(9) are set to zero, we can get

$$2 \sum (a\Delta x_i + b\Delta y_i + c\Delta z_i)\Delta x_i - 2\lambda a = 0, \quad (10)$$

$$2 \sum (a\Delta x_i + b\Delta y_i + c\Delta z_i)\Delta y_i - 2\lambda b = 0, \quad (11)$$

$$2 \sum (a\Delta x_i + b\Delta y_i + c\Delta z_i)\Delta z_i - 2\lambda c = 0. \quad (12)$$

In the formula, $\Delta x_i = x_i - \sum_{i=1}^m x_i/m$, $\Delta y_i = y_i - \sum_{i=1}^m y_i/m$, and $\Delta z_i = z_i - \sum_{i=1}^m z_i/m$. Formulas (10)–(12) are jointly converted into matrix equation form as follows:

$$\begin{bmatrix} \sum_{i=1}^m \Delta x_i \Delta x_i & \sum_{i=1}^m \Delta x_i \Delta y_i & \sum_{i=1}^m \Delta x_i \Delta z_i \\ \sum_{i=1}^m \Delta x_i \Delta y_i & \sum_{i=1}^m \Delta x_i \Delta x_i & \sum_{i=1}^m \Delta y_i \Delta z_i \\ \sum_{i=1}^m \Delta x_i \Delta z_i & \sum_{i=1}^m \Delta y_i \Delta z_i & \sum_{i=1}^m \Delta x_i \Delta x_i \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \lambda \begin{bmatrix} a \\ b \\ c \end{bmatrix}. \quad (13)$$

The matrix on the left side of formula (13) is a 3×3 real symmetric matrix. The minimum eigenvalue of the matrix is the minimum solution of the error equation, and the corresponding eigenvector is: μ, ν, ω , which can be solved to

obtain d and obtain the general equation of the space plane. The general equation is converted to the plane point normal vector equation, and the unit normal vector $\vec{n} = (\mu, \nu, \omega)$ and a point $o = (a, b, c)$ on the plane are obtained to realize the plane feature fitting.

3.1. Cylindrical Surface Fitting. The main geometric characteristic of the cylindrical surface is that the distance from any point on the cylindrical surface of the space to the axis of the cylindrical surface is the radius length R . The cylinder axis can be determined by the unit direction vector $\vec{n} = (\mu, \nu, \omega)$ and any point $p_0 = (a, b, c)$ across the axis. This article uses these seven parameters to determine the cylinder equation. As shown in Figure 1, $p_i = (x_i, y_i, z_i)$ is any point in the cylindrical point cloud, the vertical distance from p_i to the axis is D , and the angle between the axis and $\overline{p_i p_0}$ is α . The following equation can be established [20]:

$$D = |\overline{p_i p_0}| \sin \alpha$$

$$\cos \alpha = \frac{\mu(x_i - a) + \nu(y_i - b) + \omega(z_i - c)}{\sqrt{(x_i - a)^2 + (y_i - b)^2 + (z_i - c)^2}} \quad (14)$$

Therefore, the available space cylinder equation is

$$(x - a)^2 + (y - b)^2 + (z - c)^2 - u(x - a) + \nu(y - b) + \omega(z - c) = R^2. \quad (15)$$

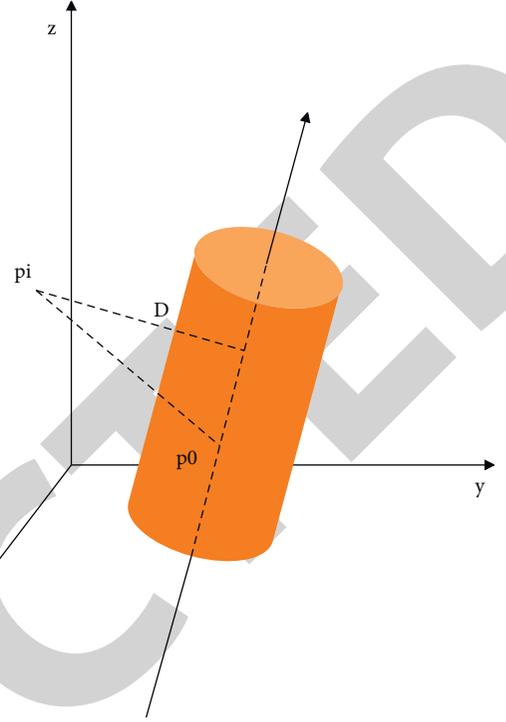


FIGURE 1: Schematic diagram of space cylindrical surface.

The error from any point in the point cloud data to the cylindrical surface is

$$\text{Error}_i = \sqrt{(x_i - a)^2 + (y_i - b)^2 + (z_i - c)^2} - \mu(x_i - a) + \nu(y_i - b) + \omega(z_i - c) - R. \quad (16)$$

The error optimization model of the cylindrical surface is

$$\theta^* = \operatorname{argmin}_{\theta} \sum_{i=1}^m (\text{Error}_i)^2. \quad (17)$$

It can be shown from formula (15) that the cylindrical surface's space equation is a nonlinear model that can only be solved by nonlinear optimization. The radical term, which directly optimizes the model, is included in the error optimization model produced based on the geometric properties of the cylindrical surface, but the calculation procedure is extensive and the efficiency is poor. We may get the cylindrical surface equation by deforming it as follows:

$$f(\theta, p) = [\mu x + \nu y + \omega z - (\mu a + \nu b + \omega c)]^2 + 2(ax + by + \omega z) + R^2 - a^2 - b^2 - c^2. \quad (18)$$

Among them, $\theta = (a, b, c, \mu, \nu, \omega, R)$ is the parameter vector of the cylindrical surface, $p = (x, y, z)$ is expressed as the point coordinates, the data used for fitting (x, y, z) is expanded to $(x, y, z, x^2 + y^2 + z^2)$, and a new error optimization model is established as follows:

$$\theta^* = \operatorname{argmin}_{\theta} \sum_{i=1}^m [f(\theta, p_i) - (x_i^2 + y_i^2 + z_i^2)]^2. \quad (19)$$

The Levenberg–Marquardt algorithm (LM algorithm) is used for nonlinear optimization. The LM algorithm is a commonly used optimization method for solving nonlinear problems, and the optimal solution is obtained through iteration. $f(\theta + \delta, p)$ is used to approximate $f(\theta, p)$, and the approximate equation is obtained by Taylor expansion [21] as follows:

$$f(\theta + \delta, p) \approx f(\theta, p) + J\delta. \quad (20)$$

Among them, J is the Jacobian matrix, and the fitting error of the cylindrical surface can be converted into

$$\text{Error} \approx \sum_{i=1}^m [f(\theta, p) + J\delta - (x_i^2 + y_i^2 + z_i^2)]^2. \quad (21)$$

By taking the partial derivative of δ and making it zero, we can get

$$(J^T J + \lambda I)\delta = J^T [f(\theta, p) - (x_i^2 + y_i^2 + z_i^2)]. \quad (22)$$

In the formula, λ is the damping factor, which is a very important parameter in the LM algorithm. If it is larger, it is similar to the gradient descent method; otherwise, it is close to the Gauss–Newton method. Through iterative solutions, δ can be obtained. The iteration stop condition is set as if the

error is less than the set threshold, and the change of δ after iteration is less than the given value, or the number of iterations is reached.

By deriving the LM algorithm formula, it is necessary to provide the initial value of the parameter θ^0 and the Jacobian matrix J . The similarity between the initial value θ^0 and the true value has a greater impact on optimization efficiency and convergence. By taking the partial derivative of formula (18), the Jacobian matrix is calculated as follows:

$$\begin{cases} \frac{\varphi f}{\varphi a} = 2[\mu x + \nu y + \omega z - (\mu a + \nu b + \omega c)](-\mu) + 2x - 2a, \\ \frac{\varphi f}{\varphi b} = 2[\mu x + \nu y + \omega z - (\mu a + \nu b + \omega c)](-\nu) + 2y - 2b, \\ \frac{\varphi f}{\varphi c} = 2[\mu x + \nu y + \omega z - (\mu a + \nu b + \omega c)](-\omega) + 2z - 2c, \\ \frac{\varphi f}{\varphi \mu} = 2[\mu x + \nu y + \omega z - (\mu a + \nu b + \omega c)](x - a), \\ \frac{\varphi f}{\varphi \nu} = 2[\mu x + \nu y + \omega z - (\mu a + \nu b + \omega c)](y - b), \\ \frac{\varphi f}{\varphi \omega} = 2[\mu x + \nu y + \omega z - (\mu a + \nu b + \omega c)](z - c), \\ \frac{\varphi f}{\varphi R} = 2R. \end{cases} \quad (23)$$

The Jacobian matrix is

$$J = [\nabla \varphi_1(\theta), \dots, \nabla \varphi_i(\theta), \dots, \nabla \varphi_m(\theta)]^T. \quad (24)$$

Among them,

$$\nabla \varphi_i(\theta) = \left[\frac{\varphi f(p_i)}{\varphi a}, \frac{\varphi f(p_i)}{\varphi b}, \frac{\varphi f(p_i)}{\varphi c}, \frac{\varphi f(p_i)}{\varphi \mu}, \frac{\varphi f(p_i)}{\varphi \nu}, \frac{\varphi f(p_i)}{\varphi \omega}, \frac{\varphi f(p_i)}{\varphi R} \right]^T. \quad (25)$$

In this section, the cylindrical error model is improved, and the LM optimization algorithm is used to solve the error model. The CAD model information is used as the initial parameter value of the optimization algorithm, which simplifies the calculation process and improves the convergence and efficiency of the fitting algorithm.

4. Art Creation Platform Based on Digital Technology

The ultimate purpose of the still life placement virtual system is to give art speciality instructors and students with accessible and practical teaching and learning resources. Teachers can conduct teaching demonstrations in conjunction with corresponding theories in the virtual system of still life placement, and students can intuitively learn theoretical knowledge, appreciate and copy the placement form of famous still life paintings, and engage in independent

practice based on creative needs. The general design of the system incorporates three aspects in order to accomplish this goal: theoretical direction, appreciation and imitation of still life painting, and practice, as illustrated in Figure 2. This paper will go through each of these three aspects in depth in the following sections.

The system adopts a pyramid design mode, and users must pass the login verification authority before they can access the corresponding information and functional modules, as shown in Figure 3. After the login is successful, the system will verify the user's identity and display the corresponding function modules according to that identity. Among them, ordinary users can access personal settings, review checks, work reviews, release management, and discussion areas. Expert users can access their personal settings, work management, task management, scale management, and discussion areas, and they have the authority of group management and class management permissions. The system administrator can access the work management, general settings, and user management, and they have the authority to use the course management function.

The model needed in the system is preferably a low-resolution model from the standpoint of operational performance. Simple models may be developed straight into low-resolution models, but complex models need post-processing and a more involved manufacturing procedure. To demonstrate the precise implementation, we'll use peach as an example. The UV is imported into PhotoShop in tga format, and the UV lines are normally selected and deleted while sketching to assure the realism of the texture and to be closer to the still life in the still life or the genuine thing in reality, and the hardness, flow, transparency, and other characteristics of the brush are freely adjusted. The technology automatically adjusts the picture size when the drawing is finished. The picture size should not exceed 10241024, and it should be exported in png format for optimal operating efficiency. Figure 4 depicts the peach realization effect.

It should be noted here that the cloth model has a special realization method. In order to make the cloth model more natural, the Maya core dynamics simulation system nDynamics is generally used. First, the system creates a plane and appropriately adds subdivisions, then edits the vertices to form a certain bump on the surface to be the basic prototype of the cloth model, and then creates a plane to be placed directly under the cloth as the collision object. The system then chooses nMesh to produce fabric for the cloth model, makes a passive collision object for the collision object, and adjusts the friction and viscosity in the collision object's parameters to keep the cloth from sliding as it falls. The algorithm then chooses the proper playing speed, extends the playback time to about 200 frames, and plays them in order. The movement of the cloth model in the observation scene is suspended and finished when it morphs into an appropriate shape. Because the UVs of Maya's built-in plane model have already been enlarged, it is recommended to export straight rather than re-expand. Figure 4 depicts the interlining effect in action (Figure 5).

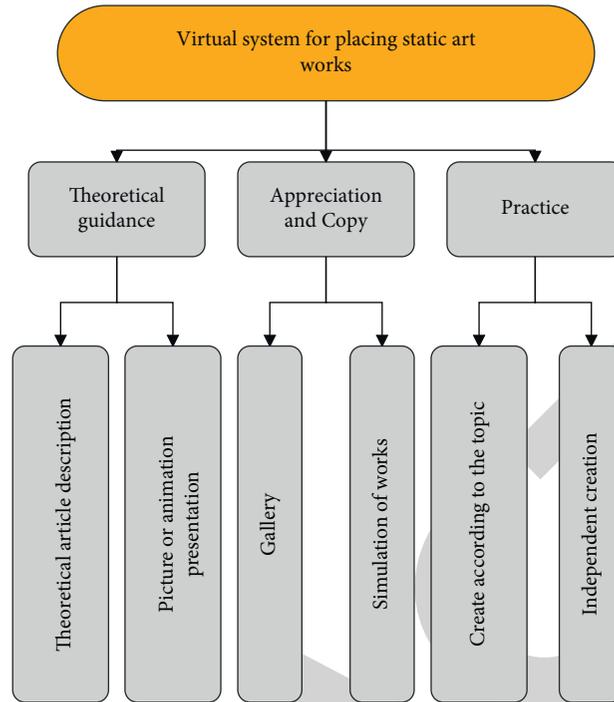


FIGURE 2: Frame diagram of the virtual system for still life placement.

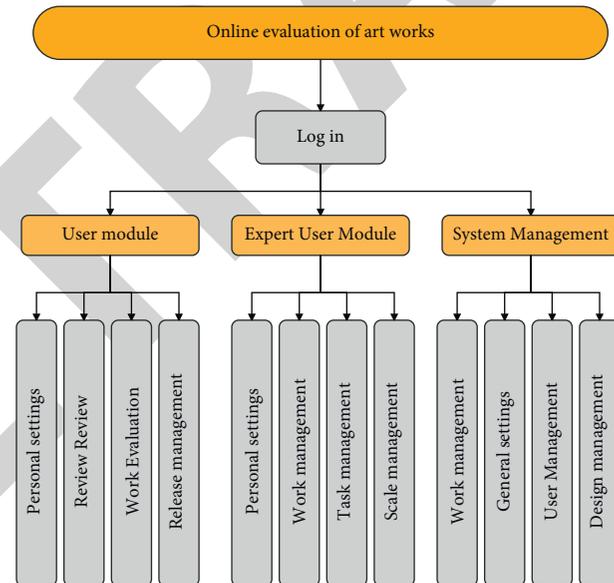


FIGURE 3: The functional structure of the online evaluation system for works.

Next, this paper uses the system proposed in this paper to study and analyze the art animation, and the results are shown in Figure 6.

5. Human-Computer Interaction System of Digital Art Creation System

The creation of visual interactive art greatly affects the works created with computers. It allows creators and other developers to experience the interactive effects brought by

computer applications and can convey what the creator really narrates through technology. “Visual interactive design” integrates aesthetics, humanities, and technology. Visual interactive art creation and design is the use of vision to define the relationship between objects. That is, it discusses how people use their senses, body movements, etc. to interact with the environment. Moreover, more importantly, the focus of “visual interactive art creation and design” is the quality and rationality of interactive art creation.

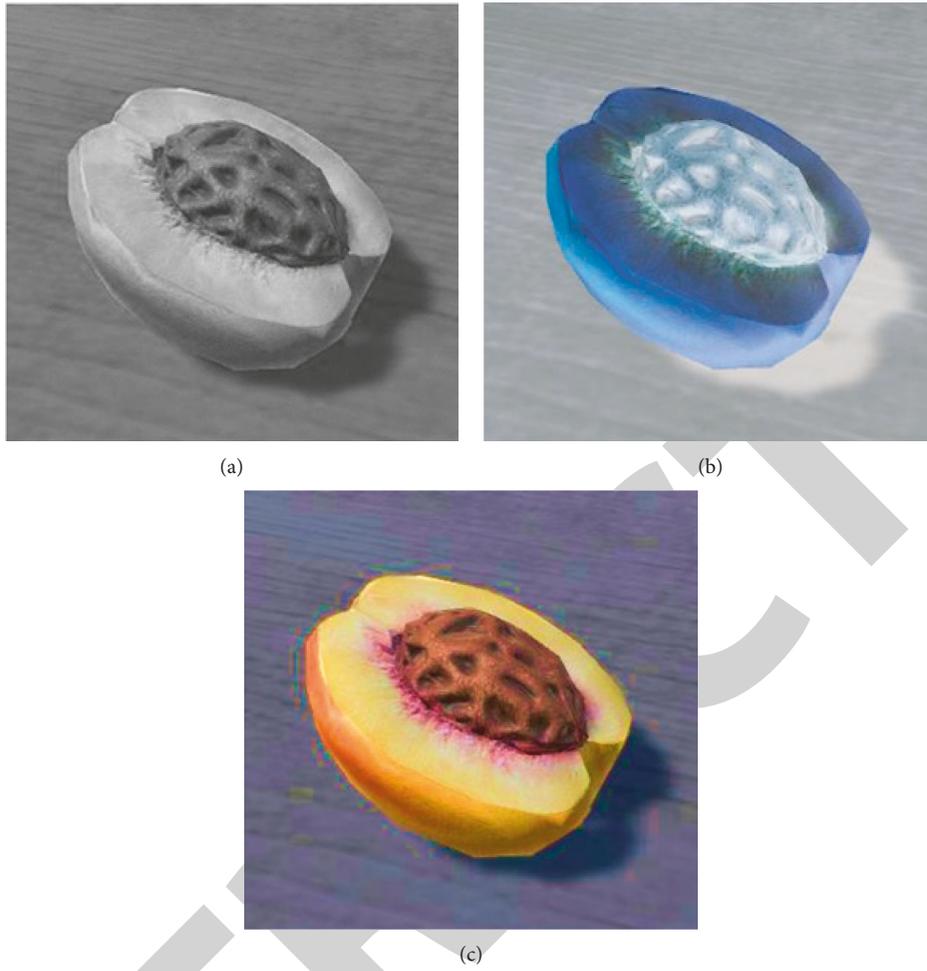


FIGURE 4: Digital case 1 of art creation: (a) primary drawing, (b) Progressive coloring, and (c) coloring finish.

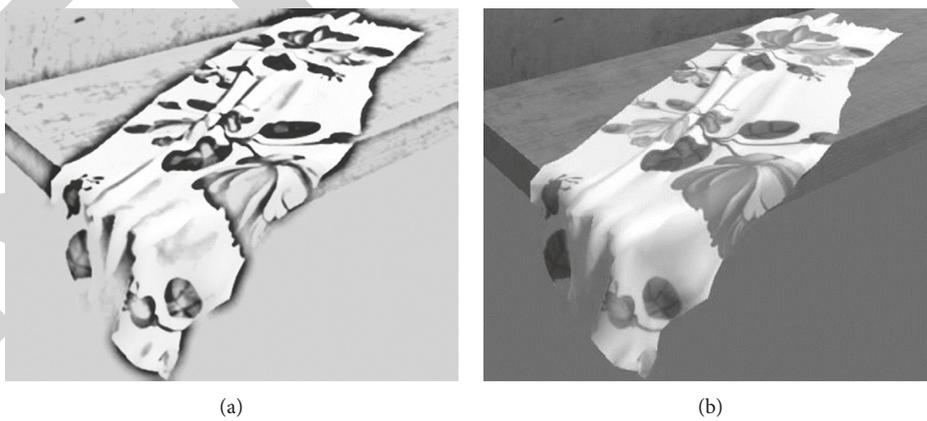


FIGURE 5: Continued.

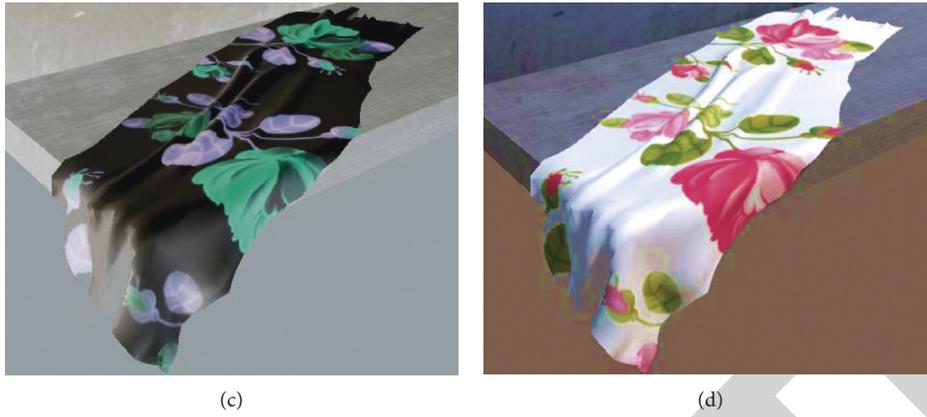


FIGURE 5: Digital case 2 of art creation: (a) outline drawing, (b) noise cancellation, (c) preliminary coloring, and (d) coloring finish.

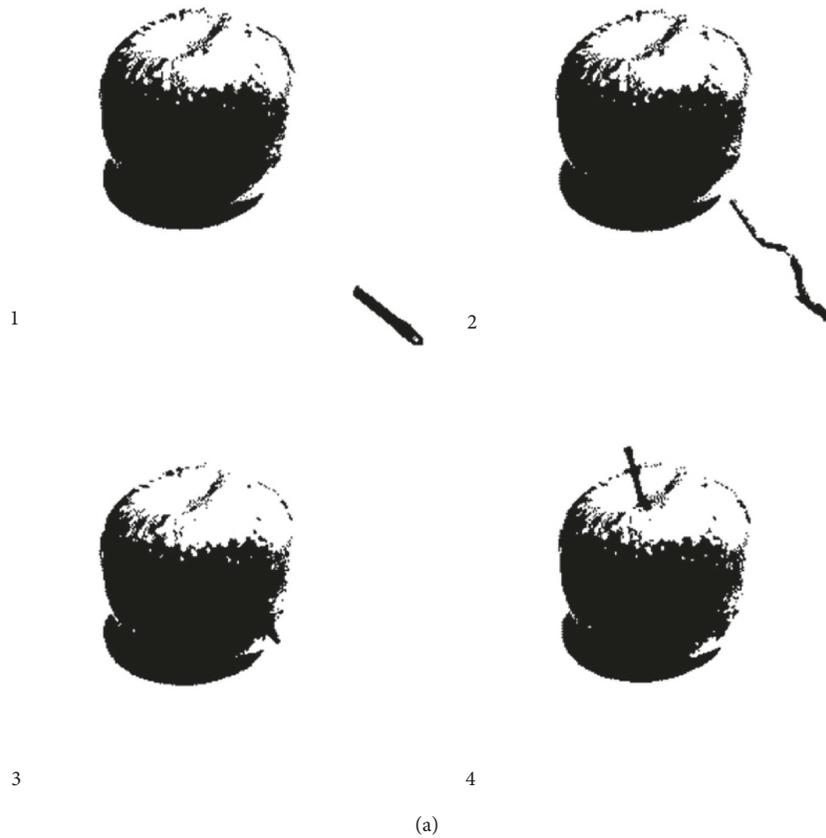
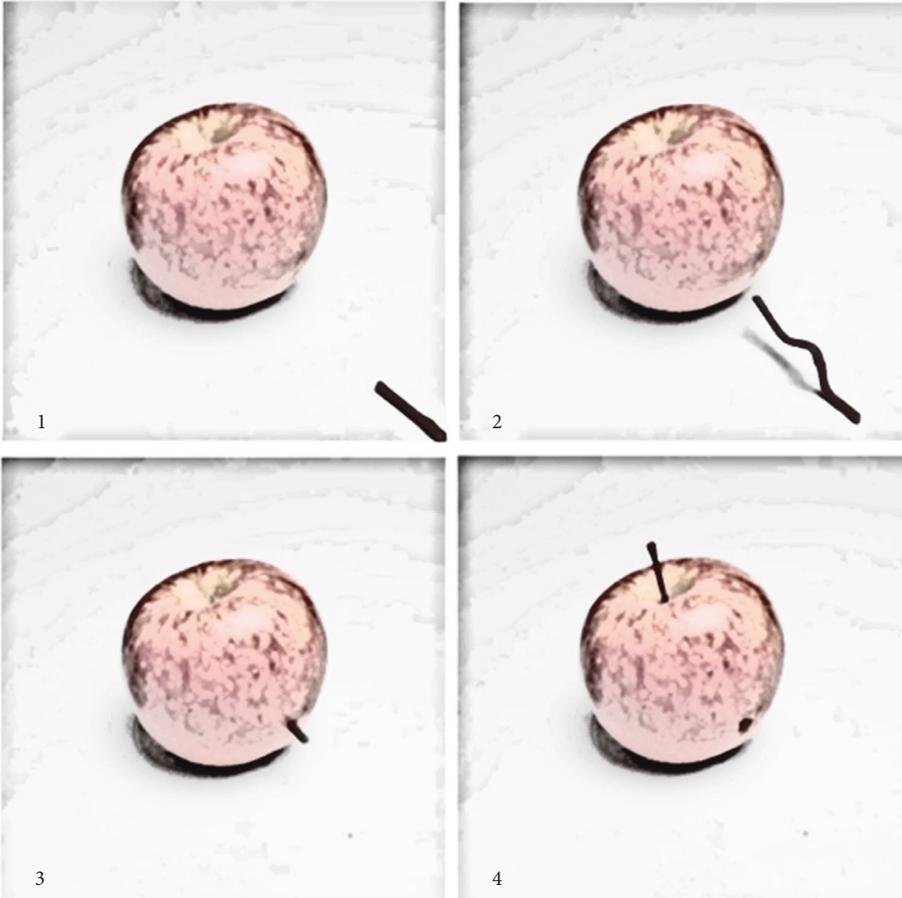
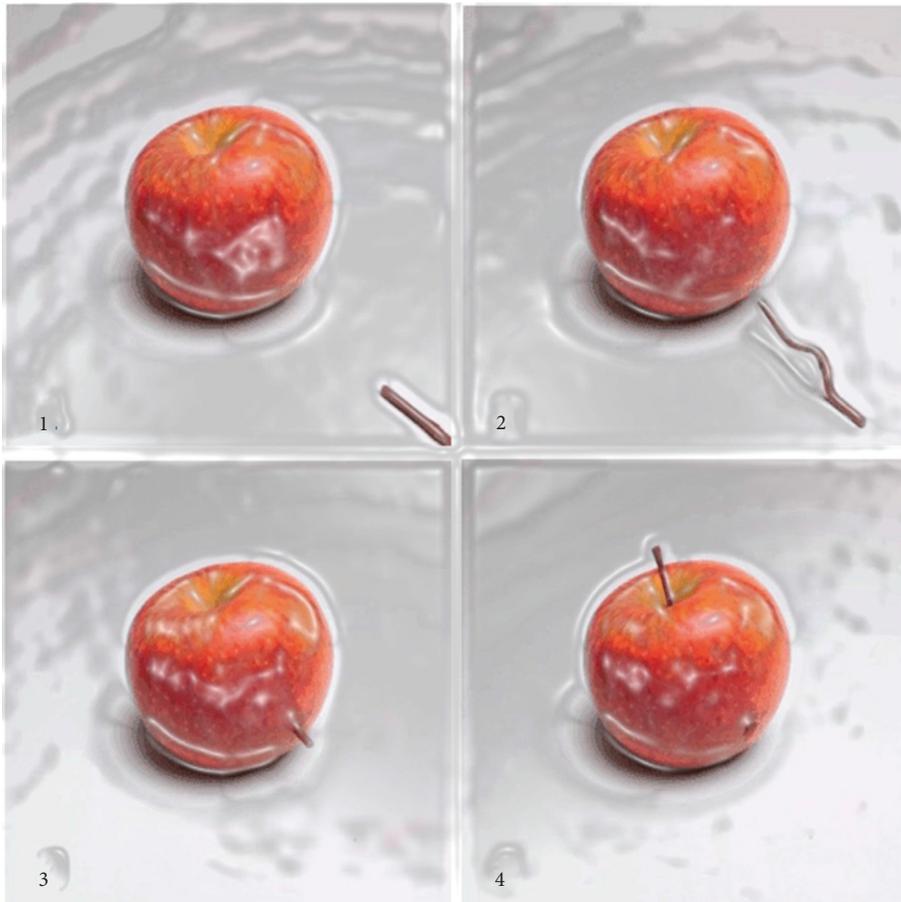


FIGURE 6: Continued.



(b)

FIGURE 6: Continued.



(c)

FIGURE 6: Continued.

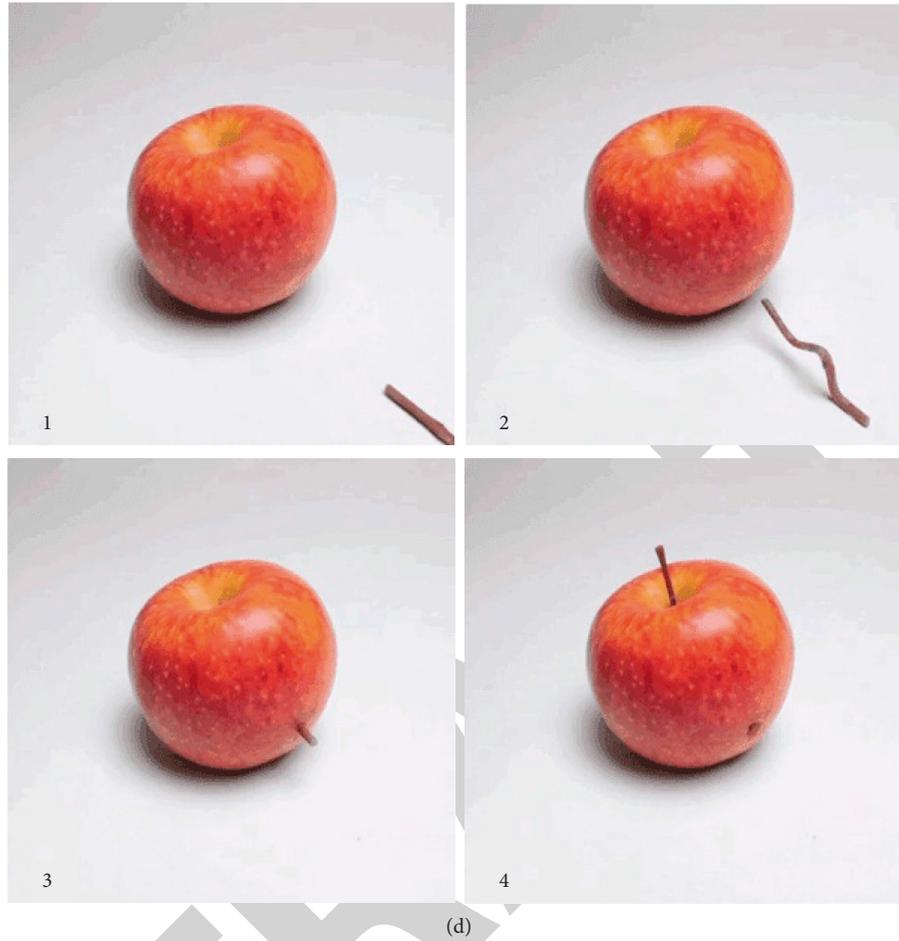


FIGURE 6: The digital creation process of moving pictures: (a) sketch drawing, (b) preliminary beautification, (c) preliminary coloring, and (d) coloring finish.

It is suggested in the research category of human-computer interaction art creation that HCI is a design for enjoyment and pleasure, and that all interfaces should be as close to human nature, naturalness, and direct experience as feasible. The most natural interactive art production approach should be carried out in the form of direct manipulation and direct interaction when considering design in terms of direct, natural, and real-time interactive art creation characteristics. The visual human-computer interaction art production method is proposed in this article (Figure 7). This flow chart demonstrates how to make interactive art using visual sense organs and the body in a more natural manner. The user may utilize actions to communicate with the visual computer and the computer’s visual dynamic tracking technology to make the computer understand the commands and information supplied by the user, allowing for visual feedback and real-time visual engagement.

The design and development of visual interactive art creation must be based on the most basic characteristics of human psychology and physiology. Providing effective feedback is critical in the creation and design of visual interactive art. Feedback refers to any information delivered to

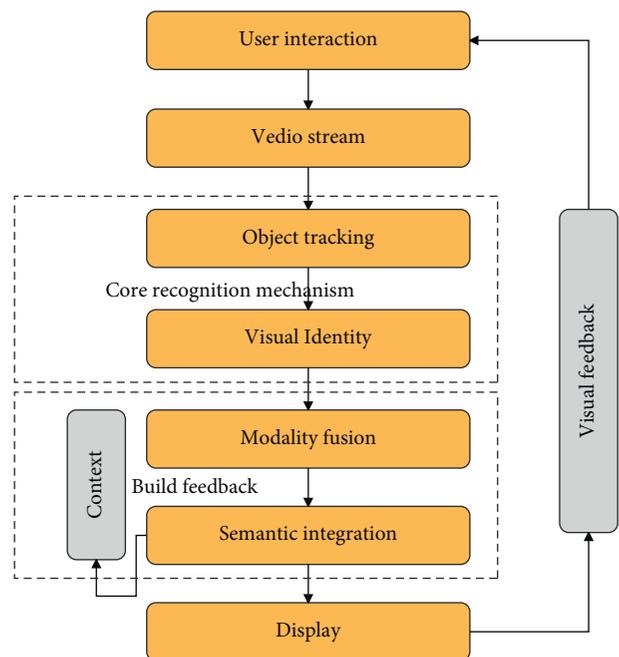


FIGURE 7: The process of visual interactive art creation.

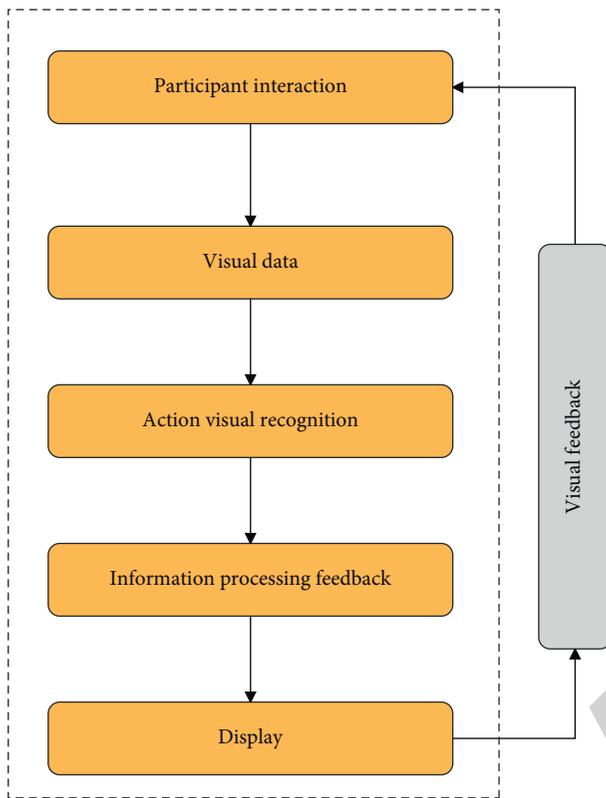


FIGURE 8: Schematic diagram of interactive control flow using visual devices.

users to help users understand the state of the system, operation results, or task status. The data might originate from the system, the environment, or even the user. The user's physical input is taken by a camera and turned into visual feedback, which is then exhibited to the user through a display device in a visual interactive art production. Simultaneously, users produce input, such as motor sensations and self-feeling feedback, allowing them to sense their own location and movement. As a result, the purpose of visual interactive art creation and design is to establish an interactive art creation system that provides users with enough feedback levels to guarantee that various feedback levels and feedback kinds are compatible.

This visual interactive art creation application uses the real-time nature of the camera to capture real images of the environment and the work interaction and then interacts the captured images with virtual bubbles. The control flow diagram is shown in Figure 8. First of all, this work will create the image of blowing many bubbles in the physical public space and use the camera to project the participants into the virtual environment so that the participants can see themselves immersed in the environment, and the interaction between the participants and the work directly blows the bubbles. Bubble, and finally burst the bubble under the blow of the participants. Through a series of interactive behaviors with the work, you can directly participate in the experience of the work and feel the real scene.

6. Conclusion

The traditional means of presentation of art creations can no longer express the designer's design intent very well. The nature of art creation work determines that it has vitality only in a complete performance. However, the emergence of digital art creation technology perfectly previews art creation intentions through three-dimensional animation scenes and can personalize settings and adjustments, including scenes, props, lights, characters, and perspectives, in real-time during the presentation.

Aiming at a series of practical problems in digital art creation, this paper combines the practical nature of virtual reality with the notion of "substituting virtuality for reality" to propose a design concept for a digital art creation virtual system. First of all, this paper explains the necessity of design from two aspects: the value of cultivating aesthetic ability and the cause of the dilemma. Secondly, this paper combines relevant learning theories to obtain feasible countermeasures to solve many problems in traditional digital art creation with virtual reality technology, and then guides the design and realization of digital art creation virtual systems. Finally, this paper measures the usability of the system and summarizes its role in promoting art creation.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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