

Retraction

Retracted: An Empirical Study on Application of Virtual Reality Animation Technology by Big Data Model

Mathematical Problems in Engineering

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] Q. Sun and S. Tsai, "An Empirical Study on Application of Virtual Reality Animation Technology by Big Data Model," *Mathematical Problems in Engineering*, vol. 2021, Article ID 1067954, 9 pages, 2021.

Research Article

An Empirical Study on Application of Virtual Reality Animation Technology by Big Data Model

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Regional cultural and creative products are paying more attention to the cultural core of their design and communication, while satisfying the basic design elements of appearance, function, and aesthetics; therefore, agricultural cultural and creative image (ACCI) also has its dual attributes of culture and commerce. Virtual reality (VR) animation technology can integrate video, text, and model into one, comprehensively display the three-dimensional digital content of regional cultural characteristics, bring users an immersive viewing experience, and enhance their interest in traditional culture, beneficial to the spreading and inheriting traditional culture. On the basis of summarizing and analyzing previous research works, this paper analyzed the development background, current status, and future challenges of VR animation technology and expounded the research situation and significance of design and dissemination of ACCI. Further, this paper proposed the design method, communication model, and approaches of ACCI based on VR animation technology, explored the reshaping of ACCI's digital elements, resolution of ACCI's artistic features, and discovery of ACCI's artistic values, constructed the platform architecture and implementation technology of VR animation, and finally discussed the issue of the integration and innovation of cultural products and VR animation technology. Excellent regional cultural and creative products can achieve the multiple goals of promoting product sales, improving design aesthetics, and spreading cultural characteristics by pursuing cultural and creative values. The ACCI based on VR animation technology not only makes customers pay attention to the agricultural brands and consuming their products but also promotes regional identity and disseminate regional culture, inspiring the potential awareness of tourism and shopping and driving the economic development.

1. Introduction

With the upgrading of national consumption and the improvement of cultural awareness, the cultural and creative industries have developed well and promoted the growth of the regional economy to a certain extent. Agricultural cultural and creative image (ACCI) also has the dual attributes of culture and commerce. While focusing on the agricultural brands, the consumers also promote regional identity and disseminate regional culture continuously. This trend inspires the potential awareness of tourism and shopping and drives the economic development [1]. With the development of computer technology and its graphic theory, computer graphics software is exploited to support

the design and dissemination of ACCI. In computer-aided agricultural cultural image design, the heavy work of design, drawing, data storage, and processing will be handled by the computer system. It is helpful of the designer to concentrate on the creation of the design and utilize the graphic devices for further work [2]. At the same time, the designer can make appropriate modifications or optimization choices by comparing the results. The original computer-aided ACCI's design and dissemination are mainly computer graphics instead of paper work. From the perspective of accuracy of drawing and design efficiency, the modifiability of the drawings will be improved significantly under the low level of the application [3]. However, with the further development of computer graphics theory and technology, virtual

reality (VR) technology has been widely used in industrial design, architectural design, and other fields. By achieving multichannel of new human-computer interaction interface, it provides immersive and intelligent virtual environment to allow users to interact with the surroundings [4].

Actually, the VR technology is equivalent to a computer system, which can create and experience virtual worlds. Through the integration of computer graphics, image processing and pattern recognition, multisensor, voice processing and impression, data communication, and other technologies, such a large-scale integrated environment has the basic characteristics of immersion, interaction, and imagination [5]. VR animation technology refers to the generation of a series of scene images by a drawing program, wherein the current frame picture is a partial modification of the previous frame picture. The various objects of the three-dimensional animation technology are originated and determined in the form of internal data of the system rather than from external devices [6]. As an art of motion, VR animation technology can establish a virtual world, in which the objects in the picture do not need to be built. Since the movement of objects and virtual cameras is not restricted, the animator can create an illusory world as it is wished [7]. Based on the VR animation technology, the three-dimensional visualization platform of ACCI can make up for the deficiencies of the current cultural and creative products to a certain extent. Through the combination of audio, text, and model, the three-dimensional digital content of the featured culture with VR animation technology also gives customers an immersive viewing experience and enhances their interest in traditional culture, beneficial to the spreading and inheriting of traditional culture [8].

Based on the summary and analysis of previous works, this paper investigates the development background, current status, and future challenges of VR animation technology and discusses the research situation and significance of design and dissemination of ACCI. Further, the design method and communication approaches of ACCI based on VR animation technology are presented, which explored the reshaping of ACCI's digital elements, resolution of ACCI's artistic features, and discovery of ACCI's artistic values. Also, the platform architecture and implementation technology of VR animation are constructed, and finally, the issue of the integration and innovation of cultural products and VR animation technology will be discussed. The study results of this paper provide a reference for further research on the application of VR animation technology in image communication of regional agricultural culture and creativity. The remainder of the paper is organized as follows: Section 2 introduces the regional ACCI's design method based on VR animation technology. In Section 3, the regional ACCI's communication model based on VR animation technology is analyzed. Section 4 presents the regional ACCI's communication approaches based on VR animation technology. The issue of the integration and innovation of cultural products and VR animation technology are discussed in Section 5, and finally, the paper is concluded in Section 6.

2. Design Method of ACCI Based on VR Animation Technology

2.1. Integration of Digital Elements in ACCI. Digital technology can play a big role in enriching artistic expressions and exploring exhibition ideas. The development of digital technology has provided new means and possibilities for the creation and dissemination of agricultural cultural image, which has brought about the development and change of traditional agricultural art forms and exhibition concepts. Meanwhile, artistic expression has also opened up the space for the development of digital technology, providing a broader platform. Digital content and digital technology are no longer limited to boring performance or simple functions, but make it more dynamic and transmissible, which will have a great impact on the expression of ACCI's creation and dissemination. The various objects involved in the agricultural cultural image can be modeled, and each object can be modeled at different time points. The relationship and influence between each object can also be controlled by programs and algorithms. Innovative design in appearance is in line with the needs of the times, and different cultures have different popular themes. Therefore, the use of the popular element in the design should be paid full attention, and it cannot only obtain a more powerful visual experience but also create works with the times by combining the popular elements in the background of the times (Figure 1).

The design of ACCI should not only consider the creation of artistic image but also the demand of cultural communication. At the same time, the design should be coordinated with the regional characteristics. The whole planning and design is a series of innovative processes, including planning, design, modification, and maintenance, which requires planning and design to have a clear solution to the results after completion, without excessive errors and budgetary discrepancies. The VR technology can create a virtual world of simulation by using computer systems, which can reduce the labor intensity of designers, shorten the design cycle, and improve design accuracy and engineering quality. The design of ACCI is highly demanding for the forward-looking nature of environmental change and the relevance of cultural traditions. Usually designers will display the design effects through three-dimensional renderings and roaming animations for decision makers, designers, engineers, and public to understand, feel, recognize, and evaluate. The traditional display method has a common shortcoming, that is, it cannot penetrate into the human point of view and obtain all-round observation and design effects. With the application of VR technology, decision makers, designers, engineers, and public can truly see the design effects from any angle and real-time interaction, immersively grasp the regional characteristics, and understand the designer's design intent [9].

2.2. Reconstruction of Digital Elements in ACCI. The design positioning of ACCI can reflect the regional attributes and the aesthetic taste of differentiation. The regional culture provides important inspiration for the design and

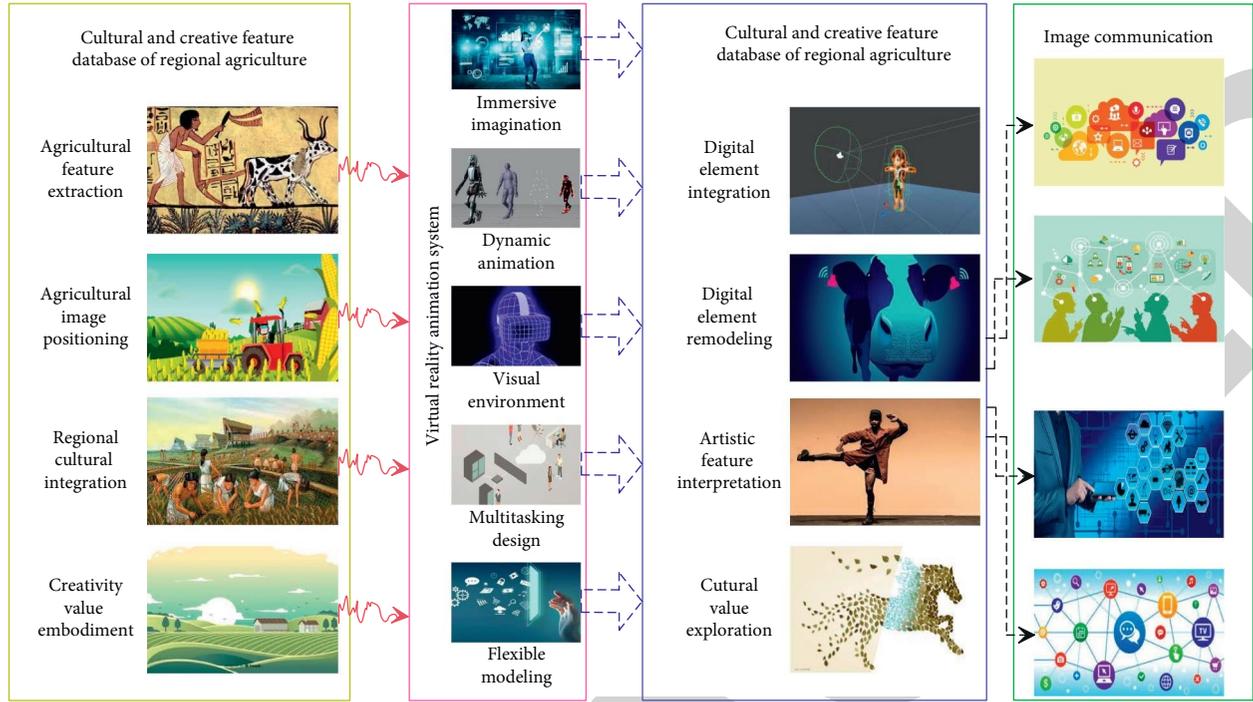


FIGURE 1: Design method and communication model of ACCI based on VR animation technology.

conception and deep connotation construction of ACCI. The brand image design positioning of cultural and creative products mainly considers three aspects: the brand design concept, originality, and spiritual culture connotation. The brand image positioning of regional cultural and creative products is closely related to the aesthetic needs of the changing audience; the design is different from pure artistic creation, and it is an activity generated according to the needs of users. Through this reality, the designer extracts the design concept, design originality and design spirit of ACCI, then transforms it into design elements, and applies it according to the brand image design of regional cultural creation products [10]. Specific design practices such as brand image design, packaging design, display design, and design of ACCI are a series of innovative design concepts guided by thinking innovation, cultural creativity, and product renewal. The regional cultural and creative product design emphasizes the innovation of culture and art and integrates creativity, innovative design, and innovation culture into the product design context. Starting from the design principles of regional agricultural cultural and creative products, the design principles can further enhance the aesthetic feeling of the audience and the aesthetic connotation of visual culture.

The potential value of ACCI can be evaluated from five dimensions: cultural elements, creative elements, aesthetic elements, feature elements, and technological elements. The analytic hierarchy process is used to obtain the weight coefficients of each evaluation factor, and then, the hierarchical judgment matrix is constructed by the hierarchical result relationship. The maximum eigenvalues of each matrix and the eigenvectors are assumed as λ_m and H , respectively, and then, the consistency test equation is obtained:

$$CI = \frac{\lambda_{\max} - n}{n - 1}, \quad (1)$$

$$CR = \frac{CI}{RI}, \quad (2)$$

where n is the order of the matrix, CI is the coefficient of consistency, CR is the correlation factor, RI is the average random consistency indicator, and CR is the consistency coefficient. The consistency test results of the ACCI evaluation factors calculated by the analytic hierarchy process are shown in Table 1.

Incorporating the ACCI into cultural and creative products is to integrate the cultural and artistic connotation of agriculture into the creativity, not just the content of copying the appearance. The design of ACCI is to reconstruct and recreate the culture and art through the designer, and the excellent idea always stems from the historical accumulation behind the decorative image of the mask. The designer needs to express these artistic elements in a new art form through creativity and design a form that is acceptable and understandable to the public. Designers must not only study the connotation of ACCI but also study the human lifestyle and what people need in their lives. The combination of culture and function allows people to understand the culture and enjoy the art while using the product and achieves the purpose of cultural and artistic heritage. The development of cultural and creative products of ACCI first needs to clarify the cultural connotation and characteristics of these products and analyze the status quo and technical advantages of the same type of the products. The development of products should be based on the understanding of the regional agricultural culture because the degree of

TABLE 1: Consistency test results of ACCI evaluation factors calculated by analytic hierarchy process.

Evaluation dimensions	Culture value	Creativity value	Aesthetics value	Feature value	Technology value
Culture value	1.134	0.501	3.487	3.467	6.362
Creativity value	0.502	7.242	1.264	1.321	3.371
Aesthetics value	5.418	5.107	0.355	5.115	1.013
Feature value	2.305	1.513	6.462	2.594	0.524
Technology value	3.112	4.204	2.122	4.203	4.446
n	5	4	7	3	6
λ_{\max}	113.534	106.303	98.063	223.344	112.126
CI	23.152	11.206	34.310	17.029	32.431
RI	5.401	5.401	4.901	5.235	5.235
CR	0.427	0.113	0.143	0.625	0.834

awareness limits the degree of development of ACCI, and designers should actively explore the unique cultural genes of regional agriculture and form special artistic symbols.

3. Communication Model of ACCI Based on VR Animation Technology

3.1. Analysis of the Artistic Features of ACCI. All or part of the characteristics of regional agricultural culture should be selected, aiming at abstract symbols, usually using creative thinking methods such as borrowing, transplanting, or replacing to design the image. Because of its dexterity and harmonious history, the figurative design has cultural and organic life characteristics in the image design and is easily accepted. Abstract creative design is a higher level of thinking cognition beyond visual perception, which is the designer's ability to play the visual sensibility, selectivity, judgment, and other advantages in the design task and deal with it in an abstract and simplified way [11]. Regional agricultural culture applied to image design and abstract design is versatile and makes it easy to generate rich association and emotional resonance (Figure 2) by observing and analyzing the local beauty of a certain existence and drawing on the design that the designer considers to be aesthetically pleasing and suitable for the design of ACCI. Therefore, when designing the relevant agricultural cultural image, the two design ideas are combined to make the designed product unique and rich in life, integrating ornamental, practical, and fun.

The main task of VR animation modeling is to complete the production of animated character models and animated scenes. VR technology can be used in animation modeling, but in the actual application process, a lot of human-computer interaction and animated character imitation technology have been added, which makes the animated characters more flexible. The designer should organize the materials related to the animated scene and the animated characters. If the animated scene model is related to the related buildings and natural landscapes, the animator should collect and organize the aerial data related to it, which can also provide more effective data for the application of VR simulation technology, further improving the production level of VR animation. During the modeling process, the deformation process of the object is generally preserved, which helps to observe the physical dynamics.

Therefore, it is necessary to use a computer to construct the same model as the real thing and to improve the modeling speed by simulating the real scene, thereby ensuring that the model remains highly consistent with reality. In order to further improve the flexibility and fidelity of the model, it is necessary to scan the object with a three-dimensional scanner and store the data in coordinates.

3.2. Exploration of Artistic Values of ACCI. The ACCI is the carrier of culture, and using cultural strategy to win consumers' awareness and recognition of products or culture can form a deep, high-level, and intelligent brand competition mode. From the perspective of consumer demand, the development of cultural and creative agriculture is the internal driving force of consumer demand, giving the agricultural products rich cultural connotations and ideas, which can effectively refine and excavate the connotations contained in the deep layers of agriculture and create culturally generated values. Regional agricultural culture is the material heritage of a geographical area, representing the cultural connotation in a specific space, and has a heritage. It not only includes production tools, folk customs, topography and other production methods, material, and cultural aspects of material forms but also includes spiritual cultures such as folk songs, proverbs, and literature. The regional culture system can provide a rich source of materials and ideas for the design of ACCI, which is one of the key elements of the differences in agricultural products brands. For example, the cultural and creative image of Zhang Wulang, a famous mythological element of Meishan culture in Southern China, was designed and reconstructed by digital animation technology (Figure 3) [12]. In the shaping of agricultural product brand culture, the brand personality and depth can be highlighted and the humanity of the brand can be enhanced. Cultural and creative development around the geographical characteristics and core values of brands or products must not only stay at the material level but also reflect the connotation of its spiritual level.

The VR art works usually use computer technology and equipment to assemble various types of images, sounds, text information, and other materials into a single file and then perform subsequent operations on this file. In this way, the integration of different forms into a new form of expression by means of integration can be called integration. Through integration, it can continuously integrate important sensing

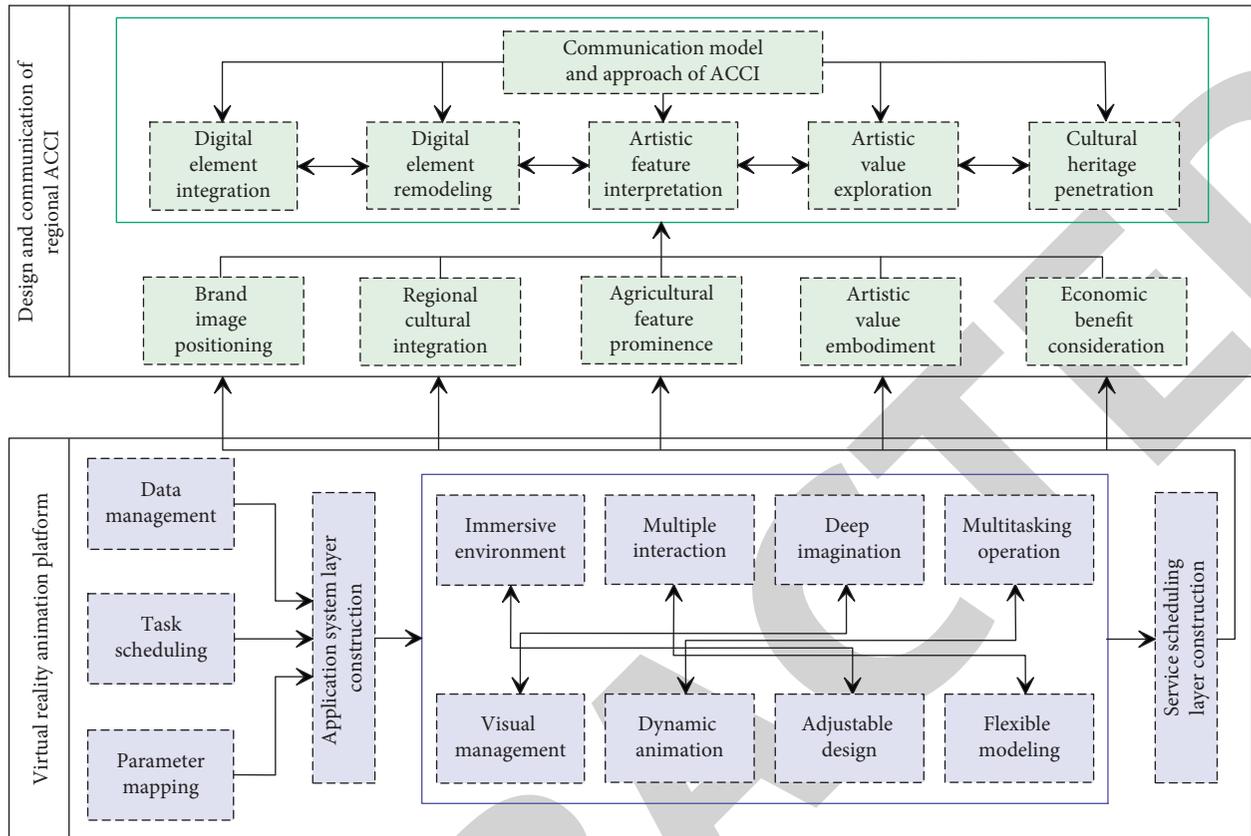


FIGURE 2: Design and communication model of ACCI based on VR animation technology.

elements such as sight, hearing, touch, smell, and taste in the VR environment. At the same time, it can also capture different forms of artistic expressions or design fields to provide users with an integrated virtual world. The realistic art is a new art form, which is a virtual environment simulated by computer operation, so it can bring people a new visual experience. The use of VR art can make film and television animation design have more forms of expression, which can bring greater impact to people in visual and auditory sense. The ability to incorporate VR art into presentation animation design can break ideas about traditional film and television animation design so that people can receive a very innovative culture so that film and television animation design be better accepted [13].

4. Communication Approaches of ACCI Based on VR Animation Technology

4.1. Architecture Implementation of VR Animation Platform. Integrating VR and augmented reality technology into regional agricultural cultural and creative products, this new cultural presentation will once again draw people’s attention to traditional culture. The three-dimensional visualization platform presents the agricultural cultural products to the users in a three-dimensional visualization mode and is equipped with professional cultural knowledge to explain all-round dynamic operation, and users can observe any place of ACCI without any dead ends. Relying on the three-

dimensional visualization platform of the Internet, users can observe agricultural cultural and creative products, learn culture, expand the cultural communication channels, enhance the culture attraction, promote the development of regional agricultural cultural and creative industries, and carry forward the tradition culture [14]. In order to solve the problem of data integration and unified service scheduling of each independent system at the high-level planning and overall architecture level, the architecture enables each independent system or the new system that is continuously added in the later stage to be zero-oriented and coordinated (Figure 4). Therefore, the overall system construction is divided into three levels: one is the construction of each independent professional application system layer; the second is the data integration and service scheduling layer construction; the third is the characteristic service and business customization layer construction.

In a broad sense, as long as the propagating subject is through a certain simulation and simulation means, a complex world of reality is created. Anything satisfying the above conditions can be referred to as a VR medium. In order to achieve real-time interaction and more advanced immersion, the sensing system relies on auxiliary tools for abstract instruction input and primary sensory output. The VR technology as a medium of communication can also realize the emotional substitution of users through domestication of time and space. The realization of this goal is directly linked to the degree of immersion, and responsive

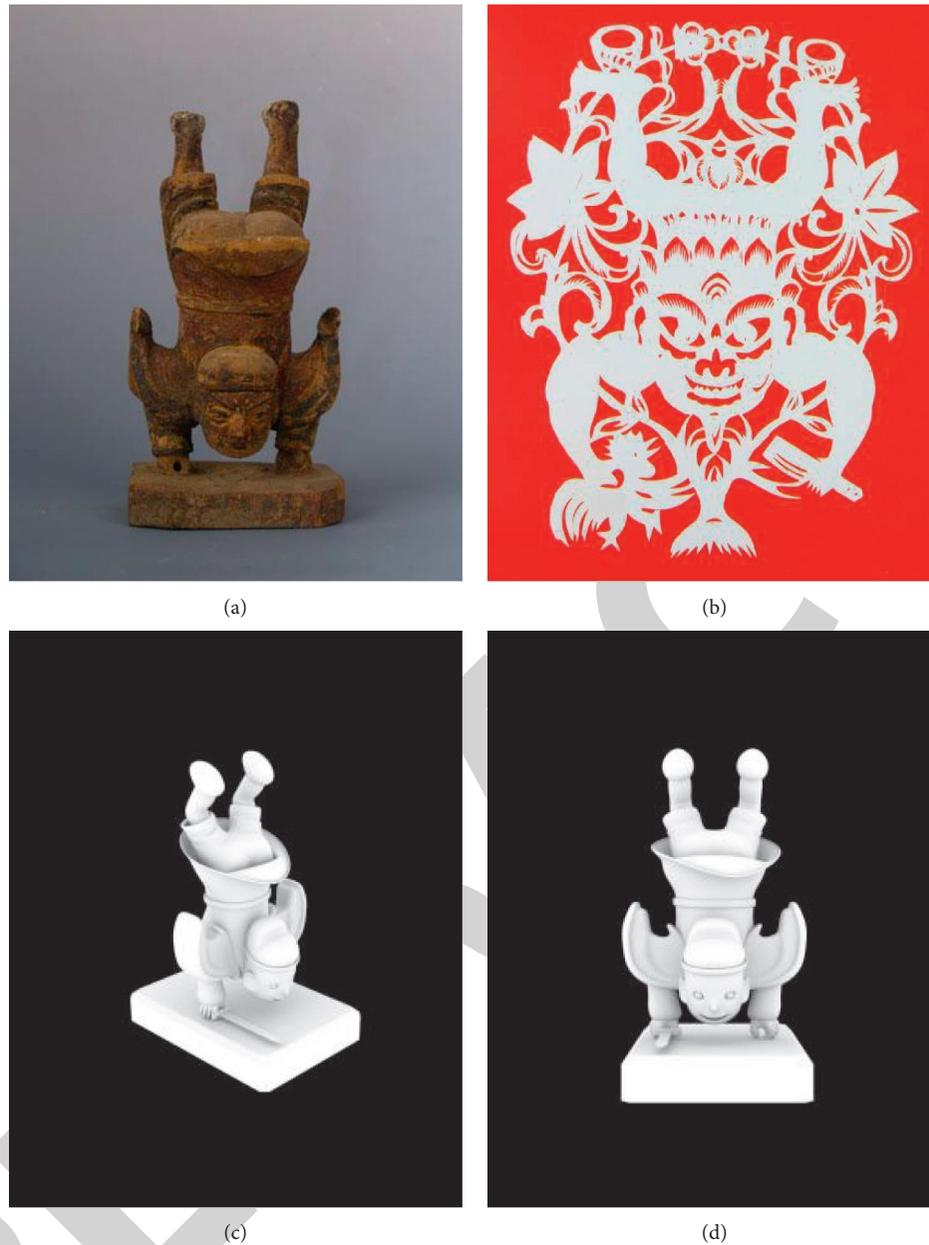


FIGURE 3: Digital three-dimensional reshaping and cultural creation of Zhang Wulang image in Meishan culture [12]. (a) Inverted statue of Zhang Wulang. (b) Paper-cut art of Zhang Wulang. (c) 3D modeling side view of Zhang Wulang. (d) 3D modeling front view of Zhang Wulang.

sensing system comfort is also an important aspect of constructing fidelity. Generally speaking, the design of the VR media response sensing system is more in line with human biological instinct, and the user's immersion and presence are stronger. The rationality of the event is the various dynamic events that occur in the virtual situation and the result should be consistent with the common sense of the truth. Otherwise, the audience will have a great sense of violation and weaken the communication effect. All the purposes mentioned above are to achieve the humanization goal and finally reach empathy in the highest level of interaction.

4.2. Technology Implementation of VR Animation Platform.

The surface map of the model is indeed a photo that is shot with a high-resolution image device, and the order is to build the model first, then the real prototype is taken, and finally the model map. It should be understood here that the photo map is a two-dimensional plan, but when the texture is mapped in the modeling environment, the two-dimensional map is attached to the model according to the surface shape of the three-dimensional model, producing a realistic VR effect. The rendering engine of the three-dimensional virtual engine is implemented, and the passive model is generated by the object provided by the application model library and

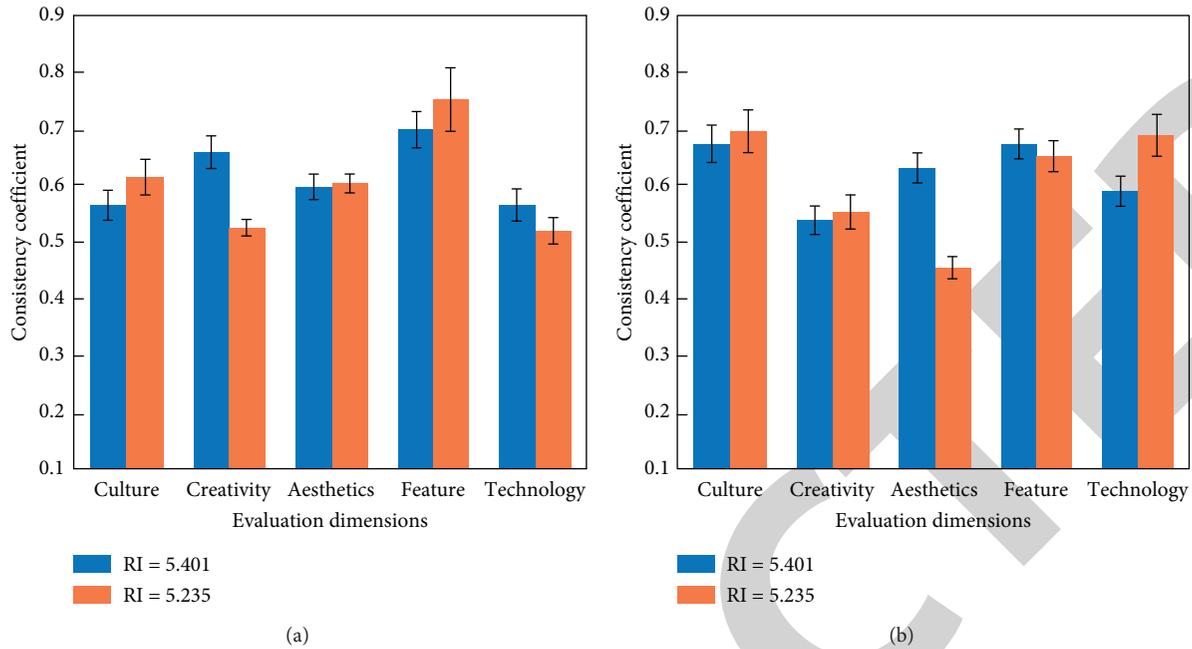


FIGURE 4: Consistency coefficient of five evaluation dimensions of ACCI with different RI values under the VR animation platform (a) and platform (b).

can only partially reflect or not reflect the real situation. In agricultural research, an active real and realistic model is needed, and the model can truly reflect reality, which has a better support for reasoning and decision-making. Relying on complex algorithms to draw a model is the research direction and results of many researchers, but the development of the three-dimensional engine is not exactly the same; more is based on the support of the previous layer of software [15–19].

Augmented reality technology cross connects the real world and the virtual world by superimposing the virtual information collected by the computer so that the user can obtain the entity information that is difficult to obtain in the original environment, in the virtual world of computer simulation. The computer-generated environment is presented to the user, but the computer-built environment is generally a three-dimensional environment, and the two-dimensional graphics are generally presented to the user. The principle of the display is generally to convert the image in the enhanced environment into a multilevel image, combined with the user; the required parameters are continuously superimposed on the existing layer, and finally, a picture is displayed for the user. One method is to obtain the general characteristics of the same type of object through an algorithm and to simulate the data model in the computer for identification. This method cannot guarantee the accuracy of individual identification and can only be used as an auxiliary tool for category identification. Another method is to retrieve the feature information of the existing image from the computer database, compare the images in the captured image library in the actual environment, and obtain the most accurate identification information in the approximation

matching, which is applied to occasions where environmental factors need to be reduced.

5. Integration and Innovation of Cultural and Creative Products and VR Animation Technology

From a technical perspective, VR animation technology is an advanced experience of human-computer interaction. By simulating the sensory functions of human vision, hearing, touch, and even taste in this process, the immersive experience is used to realize a realistic virtual experience. The reality in the virtual, through the transformation of language, movement, instruction, position, etc., in the process of interaction not only can reconstruct the ancient agricultural buildings, ancient relics, and ancient artifacts but also the formation process of these contents (Figure 5). The development of digital art has provided the foundation of art and technology for the fusion of VR animation technology. The essence of the integration and innovation of cultural products and VR technology is to visualize and interactively express real-time cultural content in digital form [20–24]. The continuous development of VR technology provides a new medium for the dissemination of cultural products and is an innovative practice, and digitalization is the mainstream of cultural product design. The combination of cultural products and digital media technology is the basis of VR technology application. As a form of culture, cultural products combine digital, image, text, animation, sound, and even taste and body tones through digital transformation, enriching art communication and expression and improving

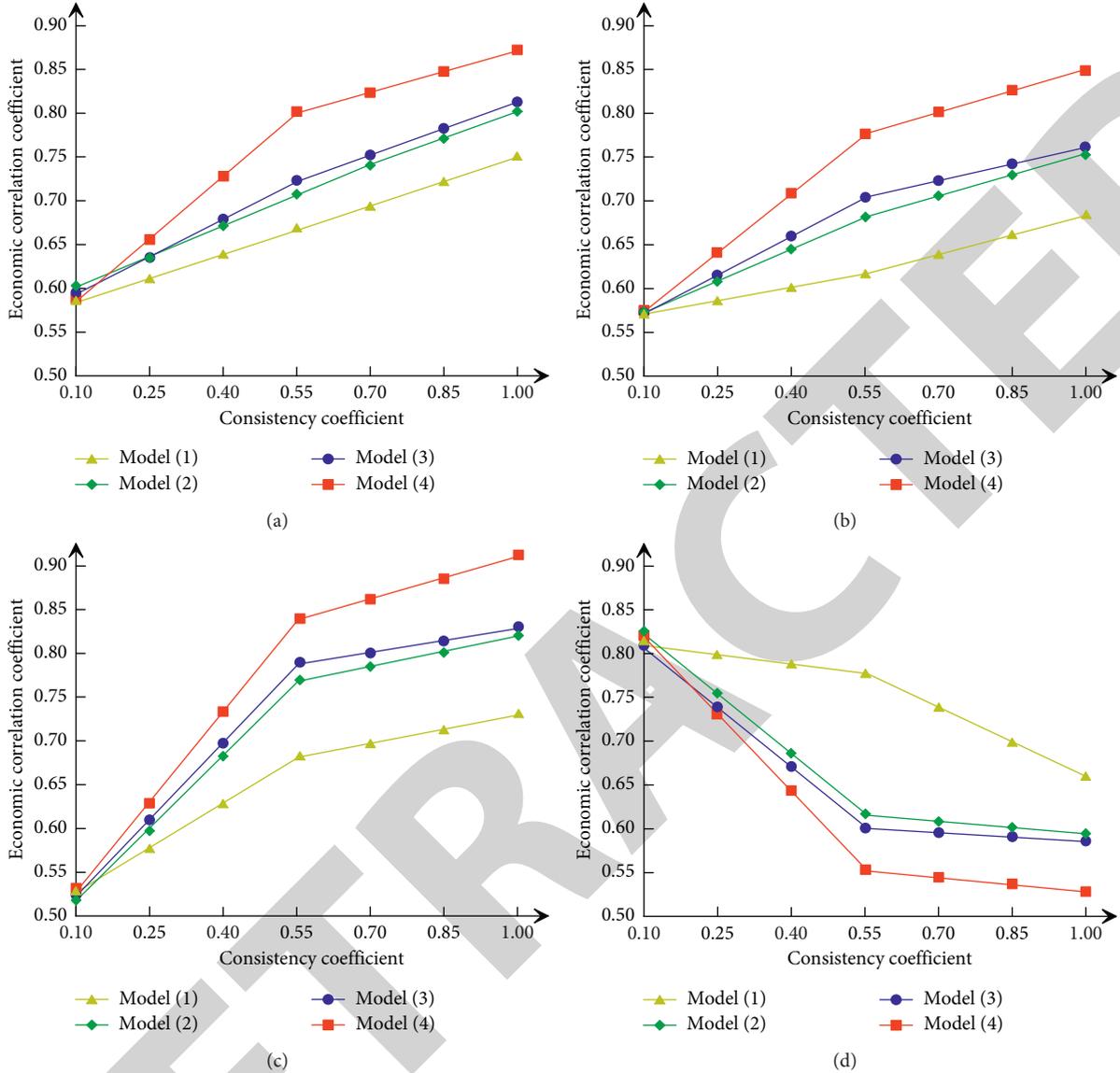


FIGURE 5: Relationship between the economic correlation coefficient and consistency coefficient of evaluation dimensions under four different VR animation technology models. (a) Culture. (b) Creativity. (c) Aesthetics. (d) Technology.

culture. The artistic appeal of the product has increased the introduction of its historical sense.

The role of VR animation technology in knowledge representation may be more focused on creating a scenario to promote learner's knowledge construction. The method of three-dimensional formalization of the concept of macroscopic and microscopic abstraction in the real space, which is difficult to describe in language and text, is constructed with computer graphics modeling tools to deepen the impression and understanding of the knowledge. VR animation technology has played a role in fueling the era of cultural image and broadening the research content of visual culture. Relevant research on visual culture has been concerned with the problems related

to traditional visual styles and sensitive images, but less on the related problems of virtual images. Exploring the symbolic features of the images presented by VR technology and the theoretical issues related to visual culture brought by VR technology should also become the research content of visual culture. As a bridge to bear the history and reality of connection, it helps to promote the inheritance of traditional culture. For example, through digital techniques such as copying and simulation, ancient and unfamiliar life scenes can be spread across time and space and quickly, conveniently, and vividly projected onto the video in front of users. In order to vividly express traditional culture, modern people can appreciate the charm and the essence of insight.

6. Conclusions

In this paper, the state-of-the-art and future challenges of VR animation technology are investigated, and the significance of design and dissemination of ACCI are discussed. Further, the design method and communication approaches of ACCI based on VR animation technology are presented, which explored the reshaping of ACCI's digital elements, resolution of ACCI's artistic features, and discovery of ACCI's artistic values. Also, the platform architecture and implementation technology of VR animation are constructed, and finally, the issue of the integration and innovation of cultural products and VR animation technology will be discussed. Excellent regional cultural and creative products can achieve the multiple goals of promoting product sales, improving design aesthetics, and spreading cultural characteristics by pursuing cultural and creative values.

Data Availability

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

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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