




3D Pattern Design and Computer-Aided Diagnosis under the Background of the Internet of Things

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Abstract. As early as the 1990s, with the popularization and development of computer technology, many traditional industries applied computer technology to daily production, and both the products themselves and the production mode changed greatly. The transformation of the 3D patterns is the most striking, and the appearance of computer technology makes pattern design more diverse and production more large-scale. In other countries, computers have been widely used in all aspects of the design industry. Both 2D and 3D pattern design can't be separated from the application of computer technology, which makes the computer 3D technology constantly improved. As a branch of computer-aided design, computer pattern design is increasingly used in mural painting, carpet design, the textile industry, etc. At present, with the expansion of the work scope of pattern designers, the complexity of their work is getting higher and higher, and the division of labor is more precise. However, due to the limited knowledge and ability of individuals, complex patterns can't be completed by a single person. Generally, many people are needed to cooperate. In addition, due to the decentralization and internationalization of many companies and organizations, their designers are often scattered geographically, so it is urgent to support multi-user collaborative pattern design. Computer-supported multi-user collaborative pattern design system is a typical application of CSCW technology in the field of pattern design.

Keywords: Internet of things; Computer; 3D pattern; appurtenance.

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1 INTRODUCTION

With the increasing demand of consumers, retailers, and clothing companies for unique designs, innovative textile designs are becoming more and more important. Designers face these challenges every day: transforming visual concepts into innovative designs; Communicating these ideas with buyers to support decision-making, communicating with manufacturers for proofing; Absorbing new ideas and reacting quickly; Developing designs that can be made at a reasonable cost. With the popularization of the Internet and the development of communication facilities, fashion and fashion trends spread faster and faster, and the fashion cycle is shorter and shorter. Therefore, the frequently changing market and increasingly fierce competition put forward the problem of how to adapt to the rapidity and dynamic response, which is commonly called "rapid response", for the design, production, and marketing of textile clothing products.

To meet this demand, we need to obtain accurate visual effects before proofing design, communicate visual information and technical data effectively and have the ability to save time and cost. In the 1990s, people began to use computers for design work. After the computer entered the design industry, it was widely promoted. In the past, all the barriers that needed to build painting skills to enter the design industry were broken by computers, and it became a fact that people who only have ordinary painting skills can also engage in design work. Users tend to see "real" works gradually, and digital technology can easily deal with "real" problems, which makes the communication between designers and users more convenient and direct. Digital design works are always in the state of "to be edited", and can be repeatedly revised and edited regardless of the cost. It is completely different from the traditional work mode of repeated redrawing, which can make Tibetan culture more diversified. Designers can also use the technology of computer design to better grasp the direction of digital production, expand their knowledge of design from a single technical content to a wider range, and effectively enhance the use-value of design. Zhang et al proposed a new nonconvex optimization algorithm, which calculates holograms by minimizing the customization cost function [1]. Eybposh et al. [2] introduced a non-iterative algorithm, Deep CGH, which relies on convolutional neural networks with unsupervised learning to calculate accurate holograms with a fixed computational complexity. Otey et al. [3] designed the design intention by recognizing the multifaceted design intention and guiding users to convey every aspect of the design intention through more appropriate CAD resources. The purpose is to compare the actual wedding dresses made by 3D software and compare them with the actual dresses of real models by using collective tools for comparative analysis [4]. The three-dimensional color homography model can be applied to color transfer artifact restoration, complex color transfer acceleration, and color robust image stitching. Michelson's contrast formula is used to analyze HDR and non-HDR photos [5]. A proposed formula provided a metric to determine whether a better contrast can be obtained between the background and the print using the HDR function and whether the background color affects the image quality [6]. Digital graphics and images can develop synchronously with time and space.

Nowadays, many software has been developed to complete graphics. developed a comprehensive method of generating three-dimensional color based on the parameterized object model of conformal mesh and the technology of direct texture mapping from object images [7]. Kwon and shin [8] proposed a method that can segment important areas in the coronal plane, sagittal plane, and axial plane to generate 3D images. Creighton et al. [9] described a highly versatile in-situ strategy, which uses collectors with insulating surface layers and conductive recess patterns to pattern three-dimensional electrospun fibers. Xue [10] proposed a sub-graphic exchange method, whose main idea is to realize the overall aesthetic effect by exchanging the corresponding individual sub-graphics.

The rapid development of computer technology has also subverted the manufacturing methods and processes of traditional industries, and the birth of 3D printing technology has also changed people's fixed understanding of the traditional manufacturing industry. At present, computer technology has changed people's production and lifestyle, new knowledge has been generated in

many fields, and the original knowledge system of design discipline has been changed. Influenced by the industrial upgrading and transformation, the modern pattern design industry has the characteristics of both industrialization and informatization, that is to say, the modern textile industry is in a period of rapid transformation, transformation, and integration. Therefore, the current situation of computer graphics software used in pattern design is extremely unbalanced, and there are also great differences in the understanding and operation of computer graphics software at home and abroad. In theory, the related research on patterns includes: the combination of computer-aided design technology and digital printing technology has been widely used in product concepts, but there is little demand for developing designers' design innovation ability. Many leading researchers put too much emphasis on technology but ignore the effective use of this technology to develop designers' design ability. Many people who are concerned about this field try to learn professional software and consider themselves experts. Indeed, some of them have overcome the difficulties in the software, and are specialized in special functions, but most of them still copy, cut, paste, and repeat these simple and uncreative labors. They rely too much on the existing materials (gallery, photos), do not combine the characteristics of computer drawings for innovative design and neglect the excavation of their creativity. Therefore, the design works have a single form and lack appeal. Moreover, because computer-aided design technology is essentially procedural and regular, sometimes some creative ideas are limited by the technical program settings and cannot be fully expressed. Nevertheless, some famous pattern designers flexibly use the characteristics of computer software technology, develop their strengths and circumvent their weaknesses, and design many digital printing patterns with visual impact. Although these design works are different, they have two commonalities: diversity of design forms and originality of design means.

2 INTRODUCTION TO COMPUTER PATTERN DESIGN

The design includes many elements, such as visual elements, conceptual elements, relational elements, and visual elements, as shown in Figure 1.

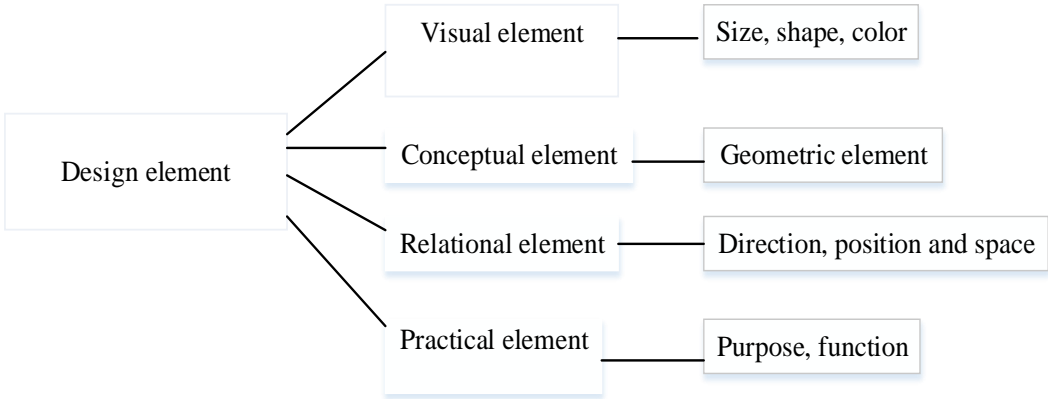


Figure 1: Components of a pattern.

Computer design refers to the use of computers for artistic creation. We usually carry out a series of numerical transformations of the pattern to make it into the corresponding code, and then run the corresponding program with the computer, making full use of the computer's super ability in operation, and further transforming the code to form the desired pattern. The application of computers in pattern design will have an epoch-making impact on the development of the design industry because it can help designers completely free their hands. From the earliest era of manual

labor to the period of mechanical copying for mass production, and then to today's information age, designers constantly emancipate their limbs effectively. More importantly, it is also a liberation of people's minds. Computers can assist designers to create efficiently and quickly, and make designers happy in the process of pattern design. The application of computers is a double-edged sword, which not only brings convenience to designers but also makes some designers rely on this technology. Especially in terms of technology, designers also have a certain distrust of the security of technology itself, which shows that everything has its disadvantages and advantages. We can imagine that designers will have some side effects when they rely on the convenience and rich resources of computers. Designers' interest in patterns is gradually weakened, and patterns will have the disadvantages of patterning in the design process. In addition, if the computer hardware or software fails, it will also hurt the design. Figure 2 shows the proportion of computer 3D design in different areas.

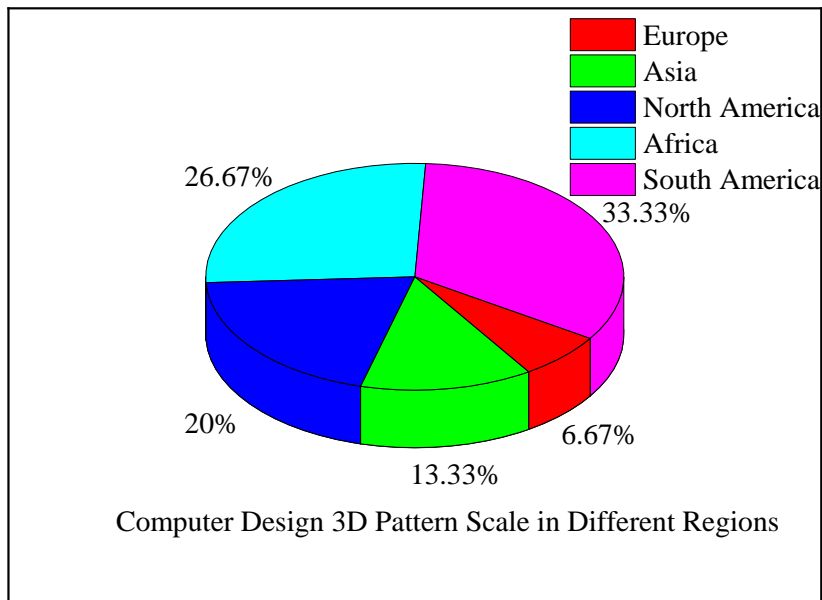


Figure 2: The proportion of 3D design used by computers in different regions.

3 COMPUTER DESIGN PATTERNS

3.1 Principles and Methods of Computer Design Patterns

Art pattern is the arrangement and combination of design elements in a certain form. Design elements refer to the units that make up the combined pattern, as shown in Figure 3. Including conceptual elements (geometric elements such as points, lines, and surfaces), visual elements (image size, shape, color, texture, etc.), relational elements (direction, position, space, the center of gravity, etc.), and practical elements (meaning, content, purpose, and function of design, etc.). Form is the external image and style of pattern organization, and there are abstract forms (geometric The pattern modeling is embodied in the design of basic patterns and the arrangement and combination of multiple basic patterns, which is commonly referred to as the pattern modeling and the composition of combined patterns. At present, the principle and method of artistic patterns are mainly geometric methods. By applying aesthetic principles and composition rules, patterns

are systematically repeated, changed or cross-combined, arranged, symmetrically laid out, and changed in color, etc. Thus, all kinds of modeling patterns composed of patterns are produced. Among them, the distribution patterns of patterns on the painting surface mainly include scattered patterns arranged under a regular framework and scattered patterns distributed freely based on various modeling or composition algorithms. The former is suitable for traditional arts and crafts design, while the latter has achieved great success in art pattern design based on fractal methods.

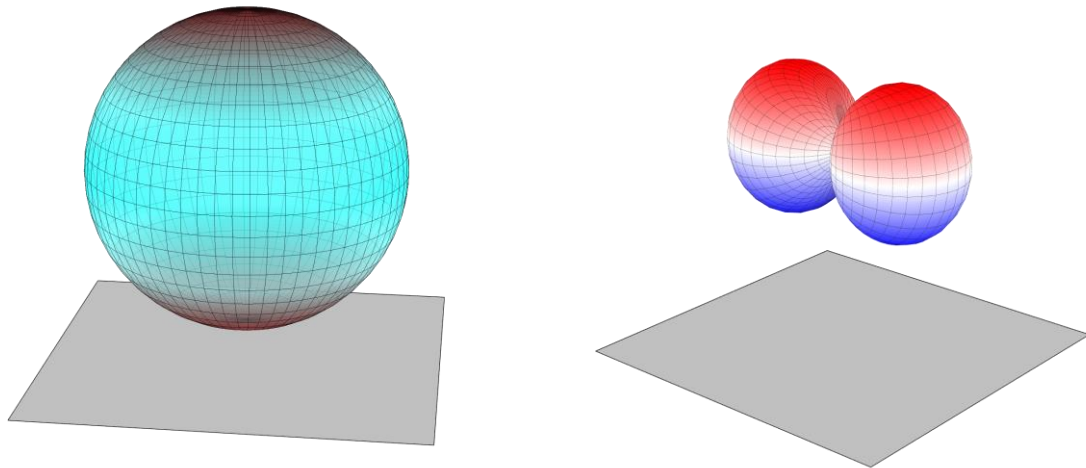


Figure 3: Schematic diagram of elements.

3.2 Software Technology and Hardware Technology of Computer Graphic Design

The application of software in architectural design is very early, and Autocad is one of them. This software is widely used because the environment it needs to run is relatively simple. With the further upgrade of Autocad software, its application area has become more and more extensive. For example, the commonly used visual design now mainly includes computer games, advertising design, film and television production, multimedia broadcast, and some virtual play. Even the simulation of military campaigns and traffic accidents, the display of scientific and technological products and multimedia teaching, weather forecast and simulation of celestial movement, etc., should use this software. The graphics processing software was run in a relatively high-end workstation earlier. At present, the PhotoShop software we often use can only run on Apple computers at the beginning, mainly because Apple computers at that time were much more advanced than personal computers, and most of the 3D mapping software at that time could only run on specialized workstations. But 3DStudio software (referred to as 3DS software for short) can already be conveniently used on our commonly used DOS operating system or IBM486 personal computer. Although the three-dimensional graphics designed by this software have not reached the highest level, it is still excellent. Now many people are using this software. In addition, this software can be used in the design of architectural graphics, computer games, TV commercials, and animation production. Of course, it is 3DSMAX that brings a qualitative leap to personal computer 3D drawing. Max software is developed based on 3DS. This software inherits many advantages of 3DS in design. For example, this software has low requirements for hardware configuration, and it can work normally when the main frequency is only 100 Hz and the memory is only 32 MB. In a slightly higher CPU configuration and larger memory environment, the operation will be smoother. This is also unmatched by other three-dimensional mapping software. In addition, the 3DSMAX software has the function of seeing the effect only when it is completed,

which is more advanced than 3DS, and even the graphics accelerator card does not need to be configured. This technology enables us to not only see the black wireframe but also see the real three-dimensional image when designing patterns. When the computer software technology is upgraded, the matching hardware technology must also be upgraded. In terms of hardware, the C G(Computer Graphic) technology used in film and television is the most noteworthy. The highlight of CG technology is that it can reproduce the scenes in modern society realistically. Nowadays, many computer game designs use this technology to make the characters in the game carry out various activities in simulated scenes, so that we can have associations in front of the computer screen and naturally connect with the real society. This is also the key point that attracts us to computer games. Figure 4 and Figure 5 show the directional elements and practical elements, respectively.

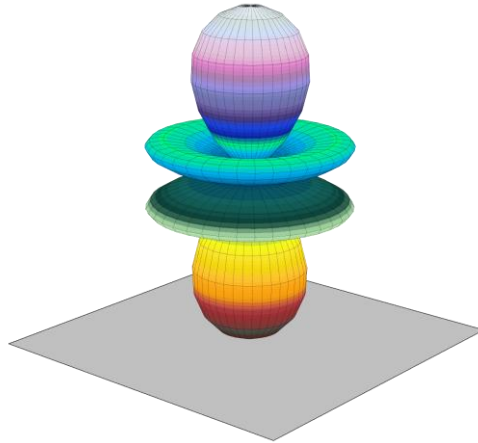


Figure 4: 3D pattern direction element.

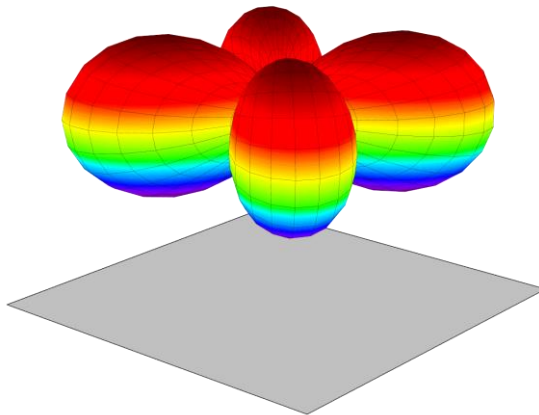


Figure 5: 3D pattern using element.

4 AESTHETIC CHARACTERISTICS OF COMPUTER PATTERN DESIGN

In addition to the traditional aesthetic characteristics, the computer pattern design also has the characteristics of technical aesthetics. Technology aesthetics is a new science, which is suitable for the new era of the combination of technology and AutoCAD software interface. Applying aesthetics

to production technology can make technology and aesthetics organically unified. Its research field mainly involves the aesthetic form of production and technology, aesthetic creation and aesthetic appreciation, etc. With the development of modern science and technology, people in production are increasingly developing towards mechanization and informatization, which makes works more in line with the law of beauty. Computer graphic design software can easily copy and paste patterns, and can also cut image fragments casually. Finally, it is recombined by designers to produce a perfect artistic expression effect. Computer design has a great influence on the development of art, and the works of art show the characteristics of post-modern aesthetics. For example, PhotoShop software is widely used in the flat design of the digital language, and there are many innovative design elements in this software. Using Photoshop software can produce a variety of artistic effects, such as coating, twisting, gradient, deformation, turning, and so on. The use of computers for artistic creativity means that different beautiful elements are brought together in space using cutting and copying, and modern technical means are used to arrange these elements and images to produce certain effects. When we appreciate these works of art, we often feel some absurdity, which is permeated with some funny elements. The virtual reality created by artistic means can often surpass the real world. This kind of technical aesthetics can be used not only in the field of three-dimensional image design but also in the field of multi-dimensional images. This virtual design method of computers is dominated by designers themselves, and this communication method is brand-new. This design method makes us feel a more vivid and charming image of art. Many modern designers have imagined that sound and moving images should be processed. When images are used, they will no longer be limited to linearity but will produce many plots, which are often continuous. Expanding computer technology into the art field not only expands the scope of art but also produces multi-dimensional artistic effects in image design, which requires an all-around combination of sound and movement. As shown in Figure 6, the three-dimensional pattern designed by computer technology can show different lines, colors, sizes, and other information, reflecting the aesthetic characteristics.

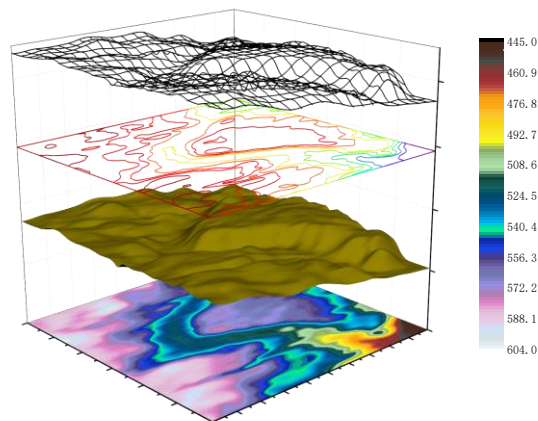


Figure 6: Different stages of 3D pattern design.

5 MANAGEMENT AND CONTROL MODEL OF THE COLLABORATIVE PATTERN DESIGN SYSTEM

5.1 Principles and Methods of Computer Design Patterns

The management model of collaborative design engineering in the collaborative pattern design sister to support asynchronous and synchronous editing modes, a design engineering management model combining local and centralized control is adopted, as shown in Figure 7.

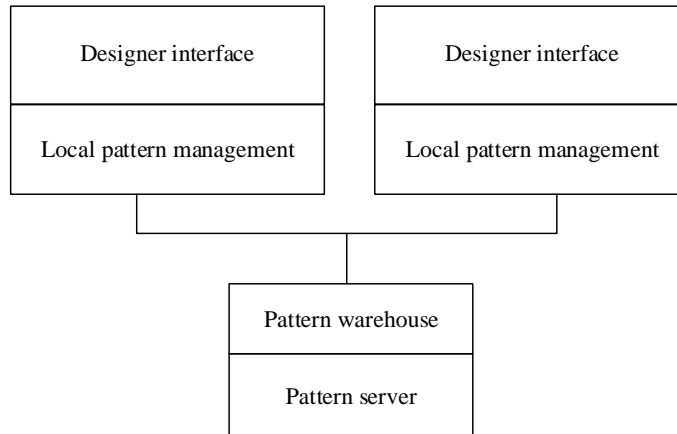


Figure 7: Collaborative pattern management model.

Shared design engineering is a task jointly designed by a collaborative design working group, that is, in the process of asynchronous collaborative design, each designer is only responsible for a part of it. Local design engineering management should facilitate designers' access to patterns. When the asynchronous design task is finished, the design results will be submitted to the server for centralized management. In this way, the data access and update mechanism are simple, and the consistency is easy to ensure.

5.2 Principles and Methods of Computer Design Patterns

(1) Collaborative pattern design conference management Collaborative pattern design conference is used to describe the process of online design by multiple collaborative designers. The collaborative pattern design conference management module is responsible for general operations such as the creation, modification, and deletion of collaborative pattern design conferences, and manages the basic information of all collaborative pattern design conferences. The main functions of the conference management module are login management of designers; The status management of the conference (mainly managing the status information of each designer in the conference); Conference floor management (the transfer of floor in the main management system); Process management (meeting preparation, starting, ending and exiting).

(2) Collaborative synchronization model In the synchronous pattern design conference, multiple designers can perceive each other's design actions through sharing editors, and by sharing communication tools such as an electronic whiteboard, designers can experience a face-to-face feeling in a conference space of the model of the 743 8th Shimin et al: computer-supported multi-user collaborative pattern design system, to achieve the effect that what you see is what I see. But to ensure synchronization, All the collaborative designers in the system must share the same view, so that the designers can perceive what others are doing, to realize the natural collaborative design, like a group of people working on a piece of paper.

5.3 Structure Model of the Collaborative Pattern Design System

The above logic model, management, and control model provide the foundation for the design of the collaborative system structure model. Taking the Internet as the network support environment and adopting the client/server model, the hierarchical architecture of a collaborative pattern design system is designed, as shown in Figure 8.

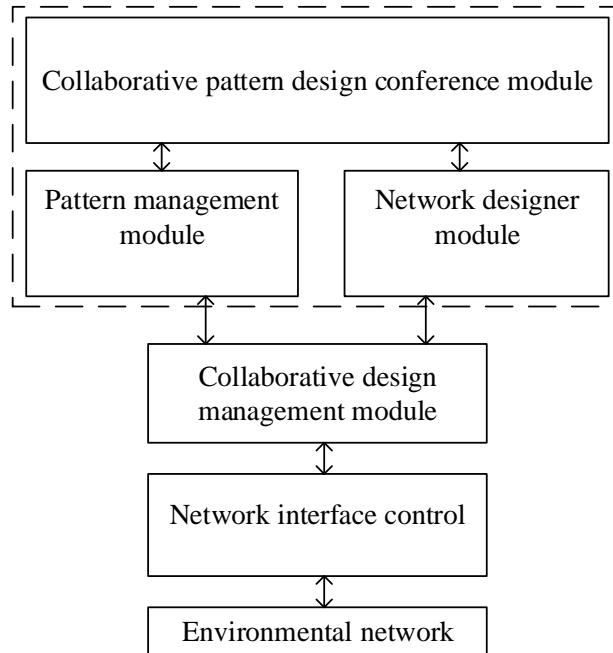


Figure 8: Hierarchical architecture of collaborative pattern design system.

6 CONCLUSION

The application of computer graphics software in the design of square towel patterns is helpful to break the dilemma that traditional pattern design is limited by drawing tools, materials, and expression techniques, and to explore a more convenient and effective design method for square towel patterns. The application of computer software in pattern design can integrate modern aesthetic taste and design concepts into pattern design, constantly broaden design ideas, improve design patterns, develop new design forms, and present new visual effects of patterns, which is to meet the needs of consumers and meet the needs of the development of the square towel industry and the times. The development of a computer-aided design system can effectively save, transfer and update design materials for a long time, which is convenient for users to look foreferencesce and find design inspiration at any time. It can greatly save the creation time, save the production cost and increase the added value of products. Creative thinking simulation is a frontier subject in the research of computer art theory and application, and its research plays an important role in promoting the development of thinking science, artistic creation, and computer simulation technology. (1) Further research the theory of artistic creation thinking simulation, establish a complete methodology system of creative thinking, and lay a good theoretical and methodological foundation for artistic creation thinking simulation. From this point of view, it is very important to deeply study the principles and methods of artistic creation, the formula of creative thinking, and the rules of aesthetic thinking. (2) Further study the application of artificial intelligence in artistic creation thinking simulation. Including the representation of art creation knowledge, the establishment of knowledge base, reasoning in images and the development of art creation expert system, etc. (3) Further promote the application of computer art, develop creative thinking in the application, and promote the further development of thinking simulation in application thinking.

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