

# Research on the creative methods of visual works in the context of generative art

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**Abstract:** *In the current era of rapid technological development, the connection between technology and art is becoming increasingly close. The increasing application of generative art in image creation has become one of the important means of utilizing technology for artistic creation. This article adopts bibliometric analysis and case analysis methods to elaborate on the current research status of the combination of the two, and analyzes the positive and negative effects of generating artistic features on image creation. Based on this, the creative methods of generating visual works in the artistic context are sorted and summarized, seeking inspiration for choosing visual carriers: using biological factors as creative carriers, using geometric factors as creative carriers, and using physical factors as creative carriers. The aim is to broaden new ideas and methods for utilizing generative art for image creation in the future through research on current creative methods.*

**Keywords:** *Generative art; Image works; Mode of Artistic Creation*

## 1. Introduction

The interdisciplinary and inclusive nature of the art field is increasing, and as an important component of digital media art creation, image works' creative methods closely follow the development trend of science and technology. At present, research on the field of generative art in China is relatively scattered, and there is relatively little literature on using it for image creation. Therefore, analyzing and summarizing the creative methods of image works in the context of generative art is of great significance for broadening future creative ideas.

## 2. Research status of combining generative art with imaging

In recent years, many art works with unique visual effects have been created through algorithms and models for generating art, injecting new possibilities into image creation. Artists have extensively discussed and practiced how to apply generative art to image creation, which provides artists with a broader space for expression. However, this field still faces many challenges.

### 2.1 Generating Art

In 2003, Professor Philip Garentel of New York University published an article titled "What is' Automatically Generated Art'?" which provided the first clear definition of generative art. He believes that generative art is the process by which an artist uses computer programs to produce a complete artwork with a certain degree of self-control. Generative art is a "derivative product" born from the creative process of a work, and in today's visual design, it can also be seen as a means of assisting design creation.<sup>[1]</sup>

In a 2012 article, six artists used a question and answer format to provide multiple perspectives on generative art. They sparked a productive and critical discussion through 10 sets of questions and answers. It discusses what makes generative art as an artistic practice interesting, how we can distinguish it from other practices, and how future technological developments will affect it. This article also inspires people to have a deeper philosophical exploration, understanding, and practice in the field of generative art.

## **2.2 Domestic research status**

Use HowNet database to obtain and screen domestic generated art related literature as data resources, and use bibliometric analysis methods combined with CiteSpace software to draw a visual Knowledge graph, which more intuitively shows the analysis results of literature keywords, and obtains the distribution of hot topics of articles in the art field. It reflects the domestic research status of this field in the past 15 years, and summarizes that: the research content is relatively scattered, and it crosses many fields such as interaction, artificial intelligence, Digital art, and so on. At present, there is less literature research focusing on using generative art to create image works. Generative art, as a means of creation, can complete various forms of works or be combined with different media for creation. The presentation of works can be either static images, dynamic images, interactive devices, etc. Image, as one of the most important forms of expression in digital media art, has rich creative potential. Combining generative art with image creation not only presents stunning visual effects, but also expands the boundaries of image creation.

## **3. The impact of generating artistic features on the creation of visual works**

Galantel summarized the four major characteristics of generative art: using "randomization" to create combinations; Utilizing the 'genetic system' to bring about formal evolution; Continuously changing over time; Created by code running on a computer [1]. With the updating and iteration of generative art methods brought about by technological development, we can summarize the two main characteristics reflected in visual aspects of artistic works, namely randomness and logicity. Randomness brings infinite derivative and brilliant visual effects to the presentation of the work, but at the same time, logic also brings negative effects on the solidification of the creative mode of the work.

### **3.1 Infinite derivation brought by randomness**

Randomness can also be called contingency. In previous image creations, the author had absolute control over the work, and any subjective operation would lead to a certain visual effect. The intervention of generative art breaks the boundaries of creators, and after transferring some of their creative rights to computers, artists are unable to accurately determine the visual presentation of the work that is about to appear. Based on the same input item, when an artist executes a set program, the visual presentation results have inherent characteristics.<sup>[2]</sup> We can infer the approximate motion pattern of the image based on instructions, but cannot accurately predict its rapidly changing dynamic effects. It can be seen that the infinite derivative brought about by the randomness of generative art enriches the means of image creation and adds more possibilities to its visual presentation. The emergence of new media data has brought new development opportunities to the Video art industry, brought Video art to the public, and made Video art deeply loved by people. This is not only an opportunity for the development of Video art, but also an opportunity for the spread of human wisdom. Video art spreads advanced human culture and civilization through the form of video. The impact of art replacing paper media also effectively saves Earth's resources, in line with the concept of sustainable development for all human society.

### **3.2 Pattern solidification brought by logic**

Due to the inherent logical nature of computer operations, there must be laws in their operating results. When given different input sources and facing the same algorithm and parameters, similar content will be obtained. On the contrary, the rules we abstract from similar content are fixed processes and algorithms. This is the reason why some unrelated works, although with different visual effects on the surface, are filled with a deep sense of familiarity, which comes from the algorithms and processes used to generate art. The convergence caused by technology worship is becoming increasingly serious, and a large number of patterned works are also reminding designers to reflect on how to use technological means to express personal creative ideas and have their own style characteristics, rather than simply showing off their skills, when using generative art in the future.

Randomness and logicity do not conflict, as randomness refers to the randomness of each frame presented in each image work. But pattern solidification is precisely because the work can be changed through a set of settings or parameters, and as long as input parameters are needed, the work can be imitated. This characteristic makes the generated art have a certain degree of predictability and repeatability. This generates a uniform yet distinct effect. Generative art can only passively perform

mechanical operations according to the artist's instructions, and cannot actively understand and transform the external world through practical activities, let alone replace the artist's emotional expression in creation.

#### 4. Methods and Inspiration for Creating Image Works by Combining Generative Art

In the process of creating visual works, the author's creative concept of starting from the inside will guide visual conception and express subjective consciousness by finding appropriate visual presentation carriers. When there is no very intuitive and clear semantic expression in the form, it is often based on cultural connotations or psychological research to explore its external form, create image graphics, or use metaphor and synesthesia techniques. Therefore, based on the creative mode of using Computer code for generative art, the inspiration for the choice of visual carrier is often derived from biological factors, geometric factors, and physical factors.

##### 4.1 Utilizing Biological Factors as a Creative Carrier

Biology is a fundamental discipline in natural sciences that studies the structure, function, occurrence, and development of organisms, including plants, animals, and microorganisms. The biological model is a visual depiction of the relationships between research objects or concepts within the scope.<sup>[3]</sup> Such as the DNA map of double helix structure, the process of cell Mitosis, etc. It is easy for viewers to associate visual feedback with aesthetic experience, resulting in extended associations. Therefore, biological factors often become the source of inspiration for generating image expression in art, interpreting organic and natural realism. The video work "Sinus Rhythm" explores the close relationship between human thinking and body in the Metaverse era. When the spirit enters the Metaverse and gradually migrates to the virtual world, the physical functions of human beings in the real world still keep running. Based on the Sinus rhythm of normal human body, the work uses biological factors as the carrier of visual presentation to express the process of heart rate fluctuation, blood flow and cell metabolism with the change of thinking perception. Use generative art to complete the Visualization expression of body function migration under the stimulation of thinking, as shown in Figure 1.

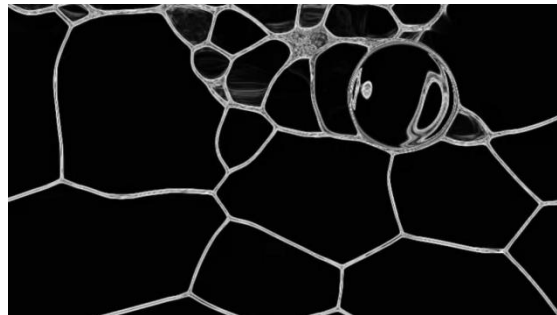


Figure 1: Key frames of the image of "Sinus Rhythm" by Liu Yuting and Tao Yiran, 2021

##### 4.2 Utilizing Geometric Factors as a Creative Carrier

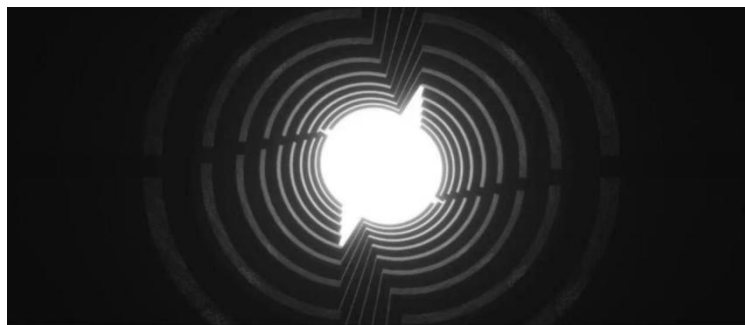


Figure 2: Key frames of the "Space Paradox" video, Youquan, 2020

Geometry has a series of models such as plane geometry, Solid geometry, non-Euclidean geometry, fractal geometry, Algebraic geometry, Topology, etc. Generative art can utilize software to follow the

principles of plane and spatial composition, and generate complex formal beauty through instructions such as repetition, displacement, rotation, and scaling of geometric shapes. You Quan's graduation project work "Space Paradox" is set against the backdrop of the actual spatial world, the multidimensional world composed of fractals, and the three "world" forms of human consciousness. It explains the transformation and overlap between different forms, using several academic factors as visual presentation carriers, and utilizing internal vacuum, branching space, Euclidean space, topology, and dimensionality. The graphic creativity of the six types of spatial problems is used to achieve a dialectical expression of space and consciousness, as shown in Figure 2.

#### 4.3 Utilizing Physical Factors as a Creative Carrier

Physics includes Newtonian mechanics, Electromagnetism, thermodynamics, Astrophysics and other categories.<sup>[4]</sup> When generating art to participate in the creation of image works, the dynamic model in the program is often used to combine abstract forms such as particles and magnetic fields to create tension vision. The Closer World "is a project that utilizes generative art to explore sound and vision, as well as dissemination and reception. It was awarded the bronze medal in the 2022 Design Marathon, as shown in Figure 3. The most core part of the installation system of "The Closer World" is the real-time generated images on the large screen. This work collects the sound inside the exhibition hall and generates turbulent particle effects in real time through the software Touch Designer (visual programming). As time goes by, the number of people in the exhibition hall gradually increases, causing the particle effects on the screen to gather and disperse due to the complex sound on site. They gradually condense into a whole in chaos, becoming inseparable. The author team visualizes sound through the means of generating art, in order to speculate on the current situation of the Uka era, where the population was repeatedly and unconsciously stirred by a large amount of information from the era, as well as the situation of individual consciousness in the global system.

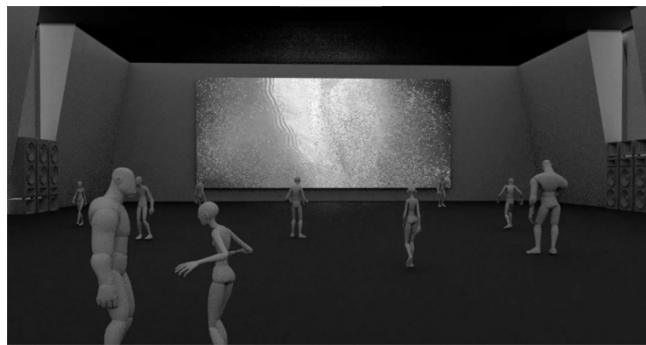


Figure 3: "A Closer World" by Liu Yuting, Peng Hanting, Zheng Nina, Wang Chenyu, and Han Wei, 2022

## 5. Conclusion

In the past five years, the research heat of generative art in China has continued to rise, gradually becoming a means that more people are willing to try and assist in creative design. It intersects with interaction, Digital art and other fields. When algorithmic generative art intervenes in image expression, it exhibits the infinite derivation brought about by randomness and the pattern solidification generated by logic. Under digital media, generative art is based on modern networks and digital technology, utilizing the latest digital means to combine human artistic thinking, logical thinking, and sensibility. Its essence is a crystallization of human artistic creation. Its emergence is rich in human culture and emotions, and is the crystallization of human wisdom. Video art is to reflect the current situation or past life of human beings with a video, which requires the combination of human life stories and human life emotions to endow the captured images with certain social spirit connotation and life philosophy. The design of display images not only showcases human society, but also the wisdom of human society. It is a comprehensive and comprehensive display, and also a medium for human information transmission. In the digital age, there is still vast space for the application of generative art in the field of design. This article aims to enhance the effectiveness of design methodology by conducting an inductive study on the selection of visual carriers in the creation of visual works in the context of generative art. However, how to better utilize generative art to complete future image creation, explore how to promote the integration of generative art and traditional art expression forms, and explore its potential visual

expression will become a research direction that needs to be continuously explored in the future.

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