Scholar Publishing Group
International Journal of Art Innovation and Development
https://doi.org/10.38007/IJAID.2021.020306
ISSN 2789-7192 Vol. 2, Issue 3: 62-77

The Expression Mode of Graphic Creative Art in Art Design in the Age of Artificial Intelligence

Alli Rizwane Jalali*

American University of Afghanistan, Afghanistan

**corresponding author*

Keywords: Artificial Intelligence, Art Design, Creative Graphics, Art Ecology

Abstract: The paper discusses new concepts in graphic design. Graphic language is a powerful form of visual language, and it is the main support for many categories of modern design, and is widely used in modern design. To design logos, fonts, packaging, posters, etc., designers must first master the graphic language. The advantage of a graphic language is that it does not violate the boundaries of the text. Simple visual graphics can grab the viewer's attention and convey information from the image to the viewer in a short period of time, including research on graphic arts teaching methods. Graphic design is the foundation of all categories of modern design. It is impossible to imagine what other kinds of design would look like without graphic design. Due to the intervention of computer design software and Internet technology, graphic works are widely used in product design, architectural design, interactive programs and other three-dimensional worlds and new media, and playing an increasingly important role. According to the survey analysis, the use of graphics in advertising has grown significantly from 12% to 68%.

1. Introduction

The paper discusses new concepts of graphic creativity. In the design standards of visual communication, graphics are the visual focus of elements, and because graphics have immutable imaging characteristics, they are transformed into powerful, accurate and effective sources of information, accepted by the public, and ultimately realize the value of design. Graphics have become the carrier of information, playing an important economic role in the commodity market, showing the value of artworks and commodities, promoting the prosperity and development of the social economy, and establishing the important position of graphics in application design.

Graphic creativity exists in all aspects of this society, and the good development of all walks of life requires the participation of creativity and graphics. Graphic creativity comes from our eyes and the way we see life, and the graphic creative aspect determines the quality of the design. Most

people don't know where their ideas come from. Creativity comes and goes without a trace. Sometimes people can't figure it out by day and night; of course, as a creative person, human can't wait for inspiration every day, so people need to use some skills to put yourself in battle and deal with the daily work. Inspiration comes from everywhere, there is no set way. Just because one good idea comes up using one method, but it doesn't mean another great idea can be presented using the same method. The most important thing in the idea itself is the creativity, so it is very stupid to wait for the rabbit to follow the same pattern. So, we need to figure out some different ways to stimulate creativity.

When people are lamenting the deep influence of artificial intelligence technology on the ecology of art creation and the field of art, they also worried about whether artificial intelligence will reconstruct the art ecology in the future and threaten the existence of human artists, which has caused peoples' anxiety and panic to react to this phenomenon. When the "intelligence" of artificial intelligence programs continues to improve, and AI is increasingly infiltrating the field of art, how should people view the phenomenon of artificial intelligence art? How to correctly understand the impact of artificial intelligence technology on art? Studying the problems in the field of artificial intelligence and art can help people understand the current phenomenon and application practice of artificial intelligence and art creation, and respond to the panic of the academic circles about the intervention of artificial intelligence in the field of art, and view human civilization and art from another perspective. From a practical point of view, research on related issues can also inspire and guide art creators and producers to attach importance to the application of new technologies such as artificial intelligence, and promote the prosperity and development of the art and cultural industries. Since artificial intelligence art is an emerging art form in recent years, the current academic research on this issue is still in its infancy, and it is impossible to form a systematic study and objective evaluation of this issue. This paper is dedicated to comprehensively sorting out the current phenomenon of artificial intelligence art, starting from the internal and external ecological elements of art, analyzing the all-round impact of artificial intelligence on it, and enlightening people to correctly understand the application of artificial intelligence.

2. Related Work

In terms of artificial intelligence and art design, there are also many researches by domestic and foreign experts. Jeavons used artificial intelligence processing and structured database technology to eliminate much of the tedious work associated with knowledge. The knowledge storage system had been inseparable from the development of computer science [1]. Hassabis D believed that a better understanding of biological brains could play a crucial role in building intelligent machines. He surveyed the historical interaction between the fields of artificial intelligence and neuroscience, and highlighted current advances in artificial intelligence [2]. Rongpeng believed that AI-enabled 5G cellular networks will enable the acclaimed ICT push to become a reality [3]. By studying similar inventions of the industrial, digital and artificial intelligence revolutions, Makridakis S claimed that the latter is the goal, which will bring about widespread changes that will also affect every aspect of our society and life [4]. Burton E provided practical case studies and links to resources for AI educators. Specific recommendations were also provided on how to integrate AI ethics into AGI courses [5]. Youssef A believed that artificial intelligence is here now, available to anyone with access to digital technology and the internet. But its impact on social order is not very clear [6]. These methods provide some references for our research, but due to the short time and small sample size of the relevant research, this research has not been recognized by the public.

3. Artificial Intelligence and Artificial Intelligence Art Design

3.1. Virtual Reality Technology

Virtual Reality technology is referred to as VR technology, and its technical principle diagram is shown in Figure 1. Virtual reality technology has brought a huge impact on our current production and life as well as human's inherent view of time and space. First of all, the creation of virtual environment by virtual reality technology has changed human's previous experience of time and space, and even reshaped a new meaning of time and space. "Mobile time dominates local time, timeless time abolishes the clock time of the industrial age". The space-time created by virtual reality is not the continuous and eternal space-time in time and space that people have known in the past. Virtual reality technology builds a virtual environment that human beings can change and interact freely through an intelligent control system. Secondly, virtual reality technology provides a brand-new means of interaction, which has changed the way of human interaction in the past and defined a new concept of human-computer interaction [7].

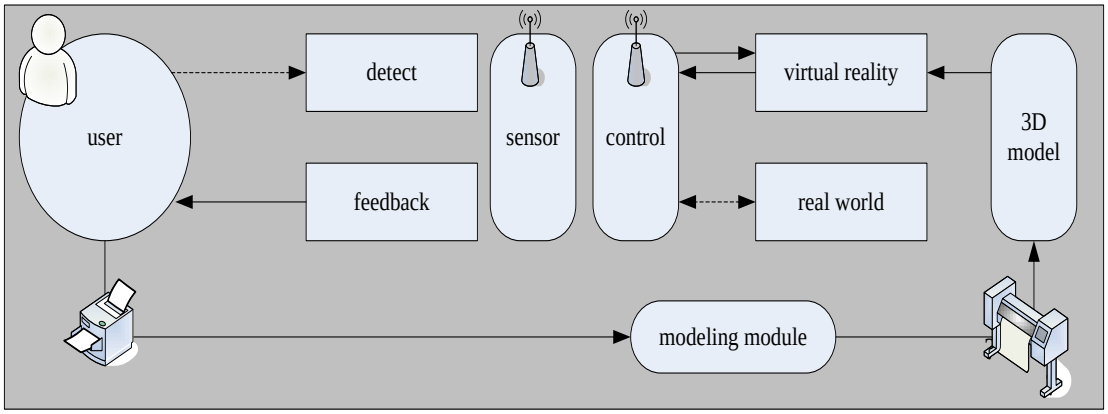

Figure 1. Technical schematic diagram of virtual reality technology

3.2. Art Design of Intelligent Somatosensory Interaction

The research of artificial intelligence interactive art involves a very wide range of content. This paper mainly uses the technical realization means of interactive art under the background of artificial intelligence technology as the starting point to classify and study intelligent interactive art. The artificial intelligence interactive art involving biological features is studied as biological intelligent interactive art. The artificial intelligence interactive art related to perceptual factors such as sound and vision is divided into the research scope of intelligent somatosensory interactive art. Finally, the art form that studies the subjective impression of art, such as the brain thinking of art practitioners, is included in the brain wave interactive art for research [8].

The core technology of somatosensory interaction is video motion capture technology, as shown in Figure 2. The audience can change or control the content displayed on the screen by making certain actions in front of the corresponding window. These actions are all non-contact. Intelligent somatosensory interaction art design is the creation of art design based on intelligent somatosensory interaction. The biggest feature of this interactive art design is that it can attract audience interaction. At present, intelligent somatosensory interactive art design has been widely used in museums, science and technology museums, corporate exhibition halls, science museums, memorial halls, libraries, art galleries and other exhibition venues. In addition, the creation of pure art forms based

on intelligent somatosensory interaction is also very common. Table 1 shows the main methods used in the paper [9].

Table 1. The main research methods used in this paper

serial number	research content	main research methods	The proportion
1	A review of research at home and abroad	Literature research method, induction method	25%
2	Research on artificial intelligence technology that fits with art design	Literature research method, interdisciplinary research method, case analysis method	31%
3	Concept, classification, characteristics and aesthetic research of artificial intelligence art	Induction, literature research, case analysis	20%
4	Concept, classification, characteristics and aesthetic research of artificial intelligence interactive art, intelligent robot art and virtual reality art	Interdisciplinary research method, literature research method, case analysis method	21%
5	Research on the development trend of future technology and artificial intelligence art in the 21st century	Literature research method, interdisciplinary research method	3%

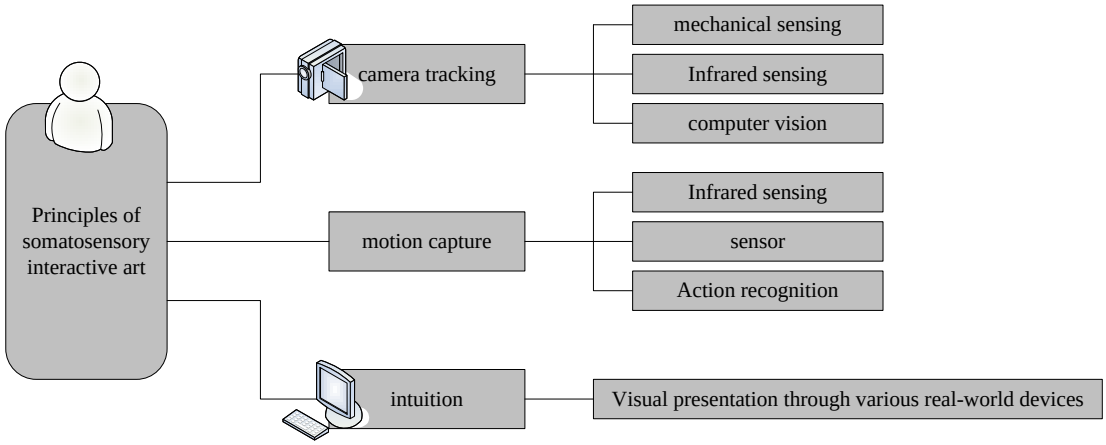

Figure 2. Schematic diagram of the principle of somatosensory interactive art

3.3. Immersion of Experience

The immersive experience of art is always the aesthetic feature pursued by every art form. This "immersive" experience refers to the sensory and spiritual stimulation brought about by the natural, non-oppressive way of interaction created by art. As a product of human civilization, art is created and presented in a way that is inseparable from the social background and humanistic environment of its era. As a new form of contemporary art, intelligent interactive art is bound to have an inseparable relationship with the current characteristics of the times [10]. In fact, as early as the early 20th century, non-narrative films were the earliest attempts at immersive art experience, but the real interactive art for immersion began to rise after the emergence of artificial intelligence technology, which is what we usually call intelligence interactive art [11]. Intelligent interactive art usually regards this immersion as the standard of artistic aesthetics, and tries to build an immersive artistic interaction method in artistic creation, so as to satisfy the needs of the audience and art practitioners in multi-dimensional perception such as sight and hearing, touching and other levels. As shown in Figure 3, the intelligent interactive art endows the artistic content with the appearance, imagination and association through the simulation of various perceptual factors at the physical and psychological levels of real people. This immersive aesthetic is not a brand-new aesthetic model, but is based on people's aesthetic laws of objective things in the real society, generally looking for the visual image presented by this immersive art in the real world. Then comparing it with visual objects with similar natural and aesthetic properties, and measuring the immersive beauty of intelligent interactive art with traditional images familiar to human beings. In addition, this immersive beauty is also reflected in the randomness of the aesthetic process. In the past, the audience's aesthetics for traditional visual art was mainly limited to the plane within the line of sight, usually a two-dimensional level of aesthetics. In intelligent interactive art, the audience can actively adjust the visual angle of themselves and the art scene for multi-dimensional and three-dimensional aesthetics [12].

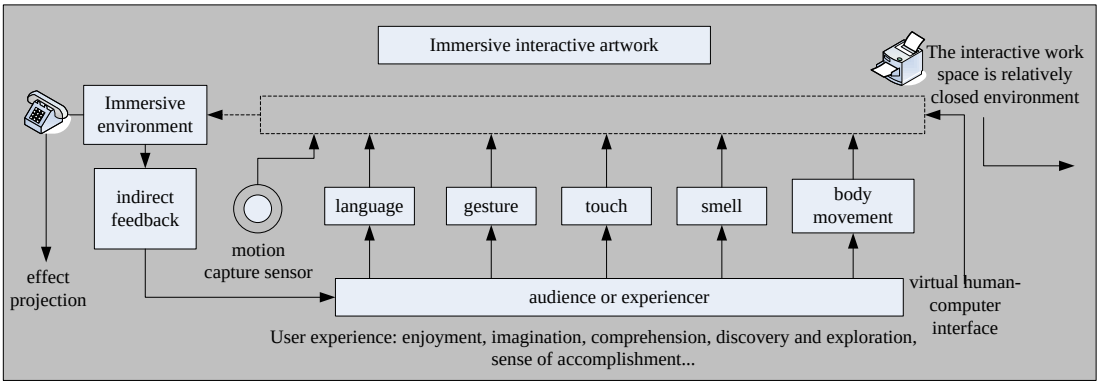

Figure 3. How immersive art experiences are built

In 2017, scientists further created the CAN program based on the improvement of the GAN program, as shown in Figure 4. At this time, the researchers modified the goal to be achieved by the program, and the creation of the past works was no longer limited to the preset the training group, but let it deviate from the existing artistic style in the art history as much as possible, but keep it within the scope of art. It has to be admitted that the improvement work of the CAN program is very innovative, and the original standard of the discriminator has been modified, so that let two key questions, namely "is the work art" and "what style of the generated art belong to", are operated in an adversarial manner, thus ensuring the artistry and innovation of the work [13].

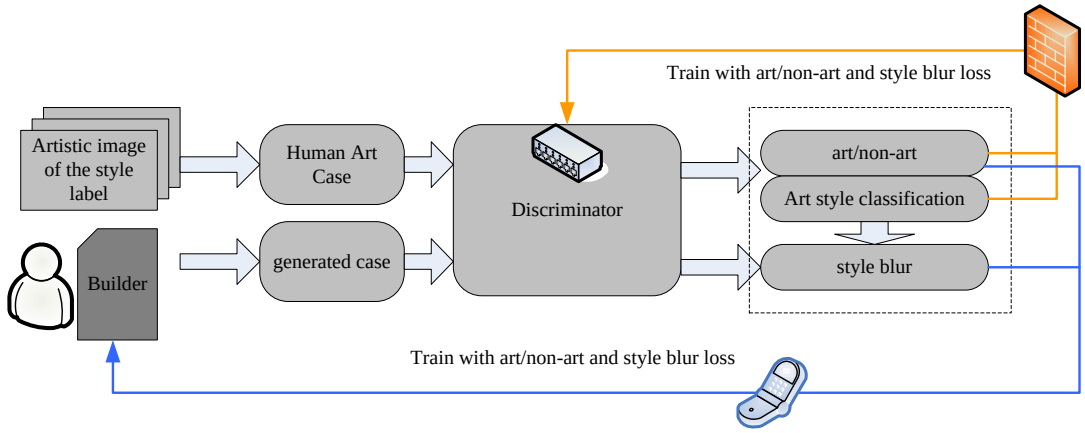

Figure 4. Schematic diagram of CAN program

3.4. Simulation Analysis of Adaptive Particle Filter Algorithm Based on Particle Swarm Optimization

Under the same conditions, for the same group of randomly selected particles, the particle filter algorithm is used. And the particle filter algorithm is used to adjust the linear weight of the particles, and the improved algorithm of the article is used to track the target [14]. The simulation results are shown in Figure 5 and Table 2. The noise scale difference and the noise process difference are known, and there are unknown trace effect diagrams for the noise scale difference and the noise process difference [15].

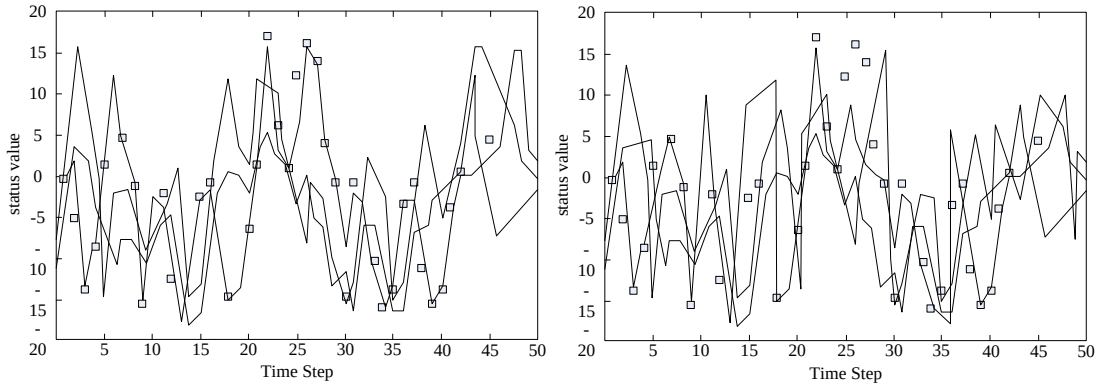

Figure 5. Tracking effect when the noise is known

Table 2. Mean Squared Error (RMS) of Three Algorithms

algorithm	Noise is known	Noise unknown
PF	3.6115	4.6512
PSO-PF	2.7075	3.1562
APSO-PF	2.4226	2.8654

The time spent by each of the three algorithms is also calculated, and the time used is shown in Table 3 and Figure 6:

Table 3. Time taken by the three algorithms

Algorithm	PF	PSO-PF	APSO-PF
The time spent	3.12561	2.21631	2.6312
Effectiveness	3.1256	3.61663	3.6312
Accuracy	0.2636	0.31636	0.1326
The complexity	23.632	24.636	13.231
Noise change	2.232	3.231	2.231
Result error	4.263	0.313	3.261

It can be seen from the results that the adaptive particle filter algorithm for particle swarm optimization consumes the least time. Due to the addition of particle swarm optimization, the complexity of the algorithm increases, so the particle swarm optimization particle filter algorithm consumes more time. Compared with the particle swarm optimization particle filter tracking algorithm used before, the method proposed in this paper adding the learning factor and inertia factor adaptive adjustment at the same time has almost no increase in time, but the effect has been increased to a certain extent [16]. Figure 6 is a schematic diagram of time and efficiency [17].

Figure 6. Schematic diagram of time and efficiency

3.5. Particle Filter Algorithm Based on Genetic Algorithm

A threshold is set. If the variance does not exceed the threshold, all particles are retained without genetic algorithm [18]. If the variance exceeds the threshold, crossover and mutation operations are

required [19].

$$x = ax_k^m + (1-a)x_k^m + \eta \tag{1}$$

$$x = ax_k^n + (1-a)x_k^n + \eta \tag{2}$$

The criteria for crossover are as follows:

$$P(z_k|x_k) > \max\left\{P(z_k|x_k^m), P(z_k|x_k^n)\right\} \tag{3}$$

$$xk = x_k^j + \eta\eta \sim N(0, \xi) \tag{4}$$

$$P(z_k|x_k) > P(z_k|x_k^j) \tag{5}$$

Weight update, update particle weight [20]:

$$w_k^i = w_{k-1}^i \frac{P(zk|x_k^i)P(x_k^i|x_{k-1}^i)}{q(x_k^i|x_{k-1}^i)} \tag{6}$$

$$w_k^i = w_k^i / \sum_{i=1}^{Ns} w_k^i \tag{7}$$

$$x_k = \sum_{i=1}^{Ns} x_k w_k \tag{8}$$

Variance estimate:

$$x_k = \sum_{i=1}^{Ns} w_k (x_k - x_k)(x_k - x_k) \tag{9}$$

$$x_{num} = P_m * NP \tag{10}$$

$$Pc = \begin{cases} \dfrac{k1(f_{\max} - f')}{f_{\max} - f_{av}g} & f' \geq f_{avg} \\ k_3 f' < f_{avg} \end{cases} \tag{11}$$

$$Pm = \begin{cases} \dfrac{k2(f_{\max} - f)}{f_{\max} - f_{av}g} & f \geq f_{avg} \\ k_4 f < f_{avg} \end{cases} \tag{12}$$

The improved formula performs adaptive adjustment of crossover probability and mutation probability to improve the accuracy of the algorithm [21].

$$\begin{cases} Pc = 0.5 - 0.3 * \exp(1 - \dfrac{f_{\max} - f}{f_{\max} - f_{avg}}) \\ Pc = 0.2 \end{cases} \tag{13}$$

$$\begin{cases} Pc = 0.05 - 0.03 * \exp(1 - \dfrac{f_{\max} - f}{f_{\max} - f_{avg}}) \\ Pc = 0.02 \end{cases} \tag{14}$$

It is set to be optimal as:

$$q(x_t, k | x_{t,k-1}, y_k) = P(x_t, k | x_{t,k-1}, y_k) \tag{15}$$

$$P(y_k | x_{t,k}) P(x_t, k | x_{t,k-1}) \tag{16}$$

$$w_n^i = \frac{w_n^i}{\sum_{i=1}^{N} w_n^i} \tag{17}$$

$$\sigma^2 = \frac{\sum (f - f_{ave})^2}{N} \tag{18}$$

Compare with its weight variance [22-23].

$$\sigma^2 > \sigma_B^2 \tag{19}$$

$$res(x) = x(i)\hat{}2 - 10 * \cos(2 * pi * x(i)) + 10 \tag{20}$$

4. Graphic Creativity Draws Inspiration from Traditional Chinese Painting and Calligraphy Art

Different from Western alphabets, Chinese characters still have the characteristics of graphic symbols, so in terms of graphic creativity research, Chinese characters in Chinese character typesetting, printing and drawing are very important graphic design skills. There are many different Chinese characters in China, each with its own style. The first Chinese character seen in the world was oracle bone script. The oval bone inscriptions, as the name suggests, are the oracle bone inscriptions of the Shang Dynasty three thousand years ago. In the process of creating civilization, oracle bone inscriptions were researched. The record of the oval bone is the most eye-catching. Since then, Bronze, Liuguo, and Qin Xiaozhuan had appeared one after another. Gold inscriptions were engraved on bronze ware, also known as Zhongdingwen. The patterns and colors on the finished Shang prints are very beautiful, and they are perfectly shaped figures. As a cultural tool in the old society, in 221 BC, Qin Shihuang unified China and integrated the writing system. Xiaozhuan was built at the beginning of Dazhuan. Commonly used for writing modern stamps, as well as making annual cards, invitations, labels, etc. In terms of design, the name of a company or today's modern group will often use official script in official logos to enhance the company's image. Figure 7 shows the public's perception of art and design graphics.

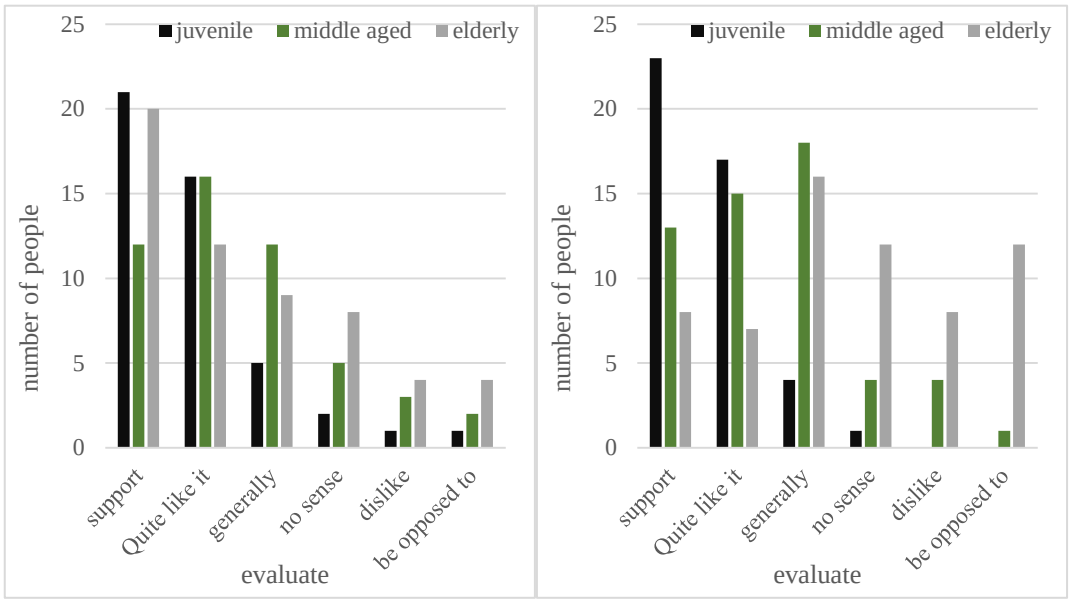

Figure 7. Statistics of the public's evaluation of art and design graphics

When practicing graphic creativity, techniques such as different shades, symbiosis, substitution, opposition and contradiction are often employed. The oldest starting point for shadow training is that shadows change accordingly if they are focused on an uneven or distorted background, and shadows change if the light source changes distance or angle. It often used to express the inherent contradictions of things. If real forms represent events, strange images reveal the essence; if real forms represent the present, strange images represent past and future, real forms represent reality, and strange images represent hallucinations. The art focuses on the combination of "real and virtual" graphics and "punch outlines", and they bound together as an indivisible whole in a unique close relationship. Among them, it is divided into contour symbiosis graphics and positive and negative symbiosis graphics, which have become an important graphic design technology and form. Substitution training is actually combining the forms of unrelated elements, intersecting the symbolic meanings of real-life elements, and forming complex concepts. Differential training refers to the gradual evolution of one figure into another by the process of changing shape and form as well as changing the object itself. Table 4 presents the actual usage of graphs in different periods.

Table 4. Use of different time graphs in practice

years	Number of design works	Graphic design percentage
2014	1561566	12%
2015	2654615	16%
2016	3156116	25%
2017	5312313	36%
2018	7564161	45%
2019	13213165	53%
2020	53313132	68%

The unique form of Chinese characters inspires a new approach to graphic creative practice, that is, zooming in on large images of figures, patterns and icons, as shown in Figure 8.

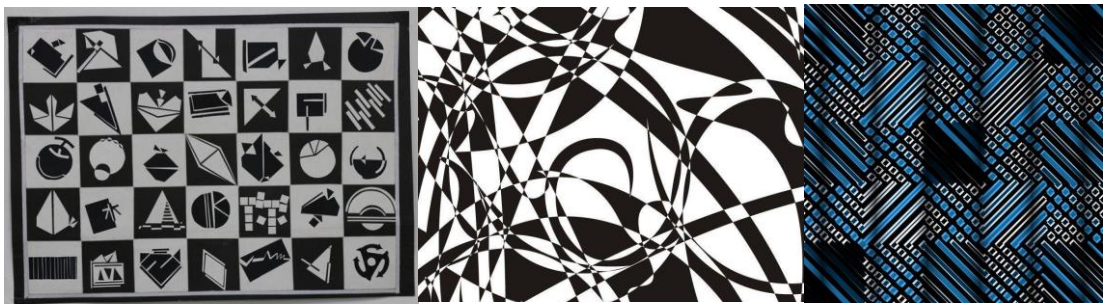

Figure 8. Artistic design graphic composition

Doing the text for the cross-practice. This type of training method not only removes the limitation of training graphs, but also allows new graphs to capture the information of visual elements on both sides. The expression of ideas should be accompanied by the presentation of images. Good creativity is the premise of artistic conception. However, without a relative graphic expression, the stated mood cannot be expressed. In a sense, artistic conception is also the personal expression of knowledge, as shown in Figure 9.

Figure 9. Cross-practice of images and patterns

If we say that Chinese characters are the expansion of graphic creativity from content, scope to training methods. What Chinese painting brings to graphic creativity is the renewal of the concept of picture composition. Not only graphic creativity, but the whole idea of modern design originated from the Bauhaus. Bauhaus School of Design is the pioneer of modern design art. A large number of theories of modern design originate from Bauhaus, such as the theory of point, line and surface composition and the theory of golden section. Such design theory is indeed very instructive for graphic creative design, and we should also master it accurately. However, in the actual design process, especially when dealing with themes involving traditional content, we found that the proportions of the shapes and shapes can be well coordinated, and the layout can be arranged in a regular manner, but at the same time we always feel that there is a lack of "qi", which makes the whole graphics or pictures do not match the design theme temperament. This is indeed a problem that needs to be solved and researched. In the research of traditional Chinese painting art, it is found that the unique aesthetic characteristics of traditional Chinese painting and calligraphy art are also applicable to graphic creative design, and combined with western theories, it can make graphic creative design better. From the perspective of art, the artistic characteristics and aesthetic essence of artificial intelligence interactive art design are studied in detail, and the generality of the research

on the artistic characteristics and aesthetic essence of artificial intelligence interactive art design is summarized. Figure 10 is the frame diagram of art interaction.

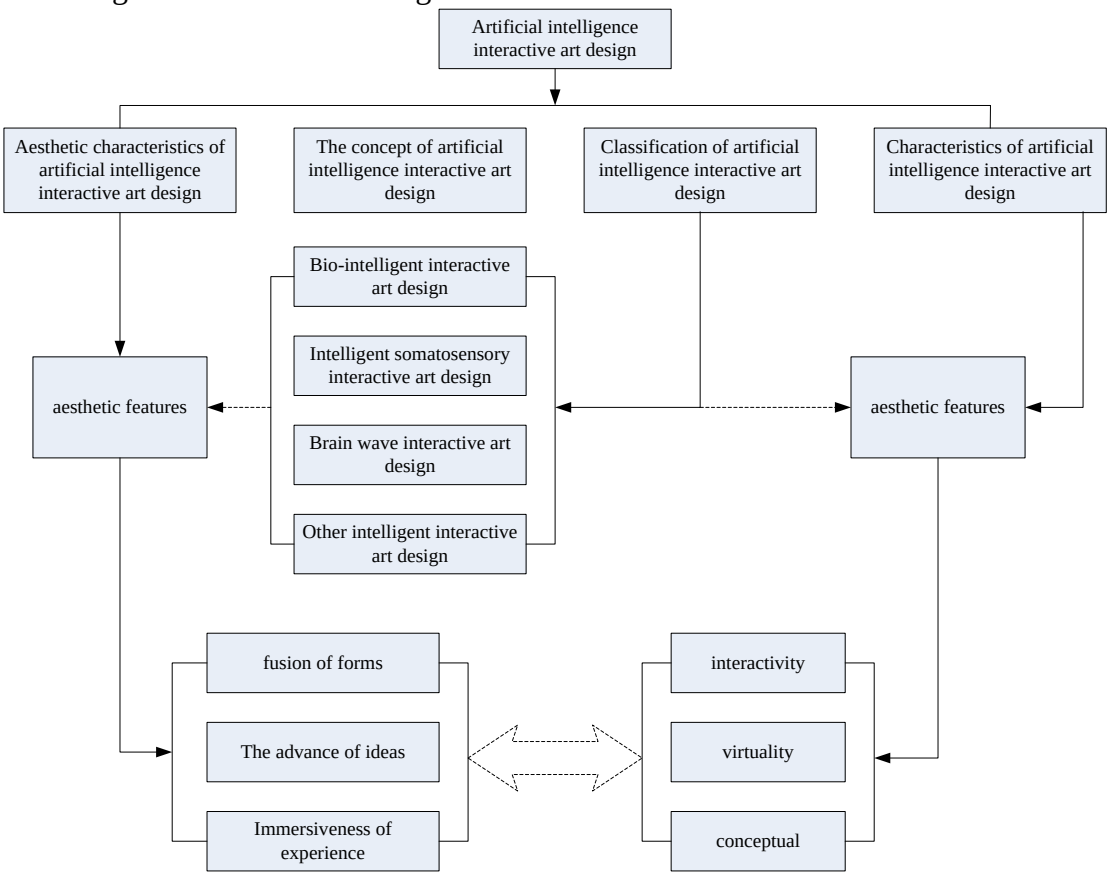

Figure 10. Framework structure diagram of artificial intelligence and art interaction

5. Discussion

Throughout the history of Chinese art, whether it is calligraphy or painting, the people who can be remembered and admired by the world are the artists who have original spirit in painting themes and techniques. It is because there are innovations in both the subject matter and the brush and ink techniques. Such paintings have long-term vitality. A painter with brilliant painting skills will always be a painter if he just blindly imitates. The originality of ideas depends on your mental model of thinking about problems. If people only do conventional thinking, ideas will not play a role in design. Just like a painter's copy, it will never have its own artistic style. Especially when doing graphic creativity, in addition to mastering the classification and internal composition rules of graphics, the more important thing is to make the graphics creative. Graphics without creativity are just a pile of visual elements, and cannot convey the information behind the graphics, and in actual design, there will be situations where the words are not expressive. Using the mind for creative activities depends on the method of creative thinking. A good creative way of thinking will keep the mind active, ideas will complement each other, and creative graphics will be guaranteed. We need to become familiar with and creatively explore different ways of thinking to keep our minds open and organized, and if one way does not work out, another way out. Creative thinking is active. Being positive means breaking the limits of conventional thinking and existing concepts. Another

approach is to emphasize the comprehensive use of thinking forms such as divergence, convergence, and fog. Divergent thinking is the basic idea of graphic creativity. It is a way of thinking and the process of finding different, many, even strange solutions to the same problem. For multi-faceted expansion, divergent thinking is also known as diffuse thinking and radiation thinking.

The purpose of this paper is to study the ideological trend of artificial intelligence art design in the 21st century from the two-way perspective of graphic creative artistic expression and artificial intelligence technology in art design, and divide the 21st century artificial intelligence art design trend into three categories: intelligent interactive art design, intelligent robot art design, and virtual reality art design. Each specific artificial intelligence art design research content includes concept definition, art classification, basic characteristics and artistic aesthetics. The research on the ideological trend of artificial intelligence art design in the 21st century mainly draws the following conclusions. According to the research status of artificial intelligence technology and artificial intelligence art, it is determined that artificial intelligence technology and art design are compatible with intelligent interactive technology, intelligent robotics, pattern recognition technology and virtual reality technology. According to the types of art design and artificial intelligence technology, the 21st century artificial intelligence art design is mainly divided into three categories: intelligent interactive art design, intelligent robot art design and virtual reality art design. Combined with the content of traditional art design and artificial intelligence technology research, the basic concepts, characteristics, art forms and aesthetics of artificial intelligence art design are determined. Using the thought of materialist dialectics, the relationship between artificial intelligence technology and art design, and the inevitable trend of art technicalization are analyzed. The artificial intelligence interactive art is divided into biological intelligent interactive art, intelligent somatosensory interactive art, brain wave interactive art and other intelligent interactive art, and obtains the artistic characteristics of interactivity, virtuality and concept, the fusion of aesthetic forms, the aesthetic characteristics, the advance of artistic concept and the immersion of experience and etc. Combined with the classification method of traditional art, intelligent robot art is divided into intelligent robot expression art, practical art and plastic art, and the aesthetic characteristics of artificial intelligence robot art are established from the perspectives of technology, culture and concept. The concept, research objects and research tasks of virtual reality art are defined. According to the realization means of virtual reality art, virtual reality art design is divided into immersion, desktop and distributed virtual reality art design.

It is an open mind, closely related to connection, intuition, imagination, inspiration and aesthetics. Divergent thinking is a part of promoting creative thinking and is a specific form of creative thinking. With this way of thinking, we can find many creative resources in a short period of time, form a positive and systematic thinking, and make many new plans in a short period of time to choose the ideal solution. Convergent thinking is the process of finding, testing and summarizing different graphic designs and choosing the correct or optimal layout based on divergent thinking. In other words, convergent thinking refers to the completion of a graphic design, the thinking is concentrated on this graphic design, and the correct conclusion can be drawn with the known data and methods. Also known as concentrated thinking, seeking common sense, convergent thinking, and concentrated thinking. It relies on designers to use existing knowledge and experience to synthesize different programming ideas into program logic and organize the final program. Divergent thinking and convergent thinking are both components of creative thinking and have the same and inseparable functions. The starting point of creative graphic thinking is mainly difference, and the end point of thinking is convergence. Diversification alone will not find the best and most suitable solution in a short period of time; instead, it will only bring us closer, not in the direction of

diversification, which is bound to perish. Only the combination of divergence and convergence can generate creative thinking and create different graphic designs. Reverse thinking is the opposite of thinking, it must break normal thinking and explore problems from the opposite direction of normal thinking. Reverse thinking, also known as cognitive dissonance thinking, is another special form of divergent thinking. Its uniqueness is not only reflected in the unique appearance and working style of the characters, but also in the designers expressing their ideas when they create them. In the creative process, it is necessary to use inverse relationship, inverse action, inverse method, inverse process, inverse scale, inverse result, inverse perspective, inverse structure, inverse text, etc., to study thinking from different angles. An inverted spatial image and image comparison library, the designer relies on the description of the object according to the understanding of the aesthetic and morphological laws of the graphic language, which is called descriptive thinking. Forms of thinking include representation, association and imagination. Descriptive thinking occupies an important position in creative thinking and plays a unique role.

6. Conclusion

As the basic support of various disciplines of modern design, graphic creativity lies in the integration of artistic design, and it is not a simple transfer of visual elements. New material has been injected, the scope of research on graphic creativity has been expanded, and new training methods have been inspired. In terms of composition theory, traditional art has an inspiring effect on graphic creative design. Designers who have grown up by learning Western design theory can find the essence of Chinese culture in art design, and use it to design, bringing new design ideas to graphic creative design. Graphic creativity is integrated into graphic creative art, which has positive significance both in the development of graphic creativity and the inheritance of Chinese culture. As the main designer of the design, there has also been a new improvement in the design concept and the understanding of culture and design. The design with cultural background is profound; the design with deep ideological level is full. The combination and integration of art and graphic creativity will definitely have a profound impact on future design categories. The research of artificial intelligence art design has strong characteristics of the times and technical background. Compared with other traditional art forms, its art form, artistic means and aesthetic characteristics are constantly changing. The research of this paper is only based on the current development level of artificial intelligence technology in the 21st century. For future research, there are still many areas in this paper that need to be improved. According to the development of artificial intelligence technology in the future and the evolution of the classification mode of artificial intelligence technology, the types of artificial intelligence art are enriched and updated. The development of new art is bound to impact the aesthetic consciousness of human beings. Both the perception aesthetics and conceptual aesthetics of artificial intelligence art will undergo huge changes with the integration of new technologies. Therefore, the aesthetic characteristics of artificial intelligence art described in this paper need to be constantly updated. The development of artificial intelligence technology will inevitably lead to remarkable achievements in human research on non-biological intelligence, and then stimulate human beings to change their own thinking consciousness and concepts, which will inject fresh nutrients into the artistic concept of artificial intelligence art. The creation of artificial intelligence art in feminism, environmental pollution, global warming and other topics involved in the paper may no longer be a hot topic, and new social background and characteristics of the times will generate new hot topics.

Funding

This article is not supported by any foundation.

Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

References

[1] Jeavons, Andrew. What Is Artificial Intelligence?. Research World, 2017, 2017(65):75-75. https://doi.org/10.1002/rwm3.20554

[2] Hassabis D , Kumaran D , Summerfield C. Neuroscience-Inspired Artificial Intelligence. Neuron, 2017, 95(2):245-258. https://doi.org/10.1016/j.neuron.2017.06.011

[3] Rongpeng, Li, Zhifeng. Intelligent 5G: When Cellular Networks Meet Artificial Intelligence. IEEE Wireless Communications, 2017, 24(5):175-183. https://doi.org/10.1109/MWC.2017.1600304WC

[4] Makridakis S . The Forthcoming Artificial Intelligence (AI) Revolution: Its Impact on Society and Firms. Futures, 2017, 90(jun.):46-60. https://doi.org/10.1016/j.futures.2017.03.006

[5] Burton E , Goldsmith J , Koenig S . Ethical Considerations in Artificial Intelligence Courses. Ai Magazine, 2017, 38(2):22-34. https://doi.org/10.1609/aimag.v38i2.2731

[6] Youssef A , El-Telbany M , Zekry A . The role of artificial intelligence in photo-voltaic systems design and control: A review. Renewable & Sustainable Energy Reviews, 2017, 78(oct.):72-79. https://doi.org/10.1016/j.rser.2017.04.046

[7] Jia Q , Zhao K , Yu H . Art Design Education in the New Era Featured with the Integration of Arts and Motion Sensing Technology. Eurasia Journal of Mathematics Science & Technology Education, 2017, 13(8):5883-5891. https://doi.org/10.12973/eurasia.2017.01037a

[8] Hui J , Yang S . Using Color Difference Compensation Method to Balance and Repair the Image of Art Design. Complexity, 2021, 2021(2):1-10. https://doi.org/10.1155/2021/3516745

[9] Ito T , Moria, Yokoyama H . Radiolarian-inspired art design: Simplification and identification. Bulletin of the Geological Survey of Japan, 2020, 71(4):239-242. https://doi.org/10.9795/bullgsj.71.239

[10] Zhu W . Study of Creative Thinking in Digital Media Art Design Education. Creative Education, 2020, 11(2):77-85. https://doi.org/10.4236/ce.2020.112006

[11] Tang W , Feng W . Parallel map projection of vector-based big spatial data: Coupling cloud computing with graphics processing units - ScienceDirect. Computers, Environment and Urban Systems, 2017, 61(Part B):187-197.

[12] Tan J , Song Y , Zhu J L. Blue Phase LC/Polymer Fresnel Lens Fabricated by Holographics. Journal of Display Technology, 2017, 10(2):157-161. https://doi.org/10.1109/JDT.2013.2291068

[13] Kiran A , Crespillo A P , Rahimi K . Graphics and Statistics for Cardiology: Data visualisation for meta-analysis. Heart, 2017, 103(1):19-23.

https://doi.org/10.1136/heartjnl-2016-309685

[14] Delgado J , Martin G , Plaza J. Fast Spatial Preprocessing for Spectral Unmixing of Hyperspectral Data on Graphics Processing Units. IEEE Journal of Selected Topics in Applied Earth Observations & Remote Sensing, 2017, 9(2):952-961.

[15] Sloan P P , Kautz J , Snyder J . Precomputed Radiance Transfer for Real-Time Rendering in Dynamic, Low-Frequency Lighting Environments. Acm Transactions on Graphics, 2017, 21(3):527-536. https://doi.org/10.1145/566654.566612

[16] Abtin F G , Eradat J , Gutierrez A J . Radiofrequency ablation of lung tumors: imaging features of the postablation zone.. Radiographics A Review Publication of the Radiological Society of North America Inc, 2018, 32(4):947-69. https://doi.org/10.1148/rg.324105181

[17] Li L , Shen H W . Image-Based Streamline Generation and Rendering. IEEE Transactions on Visualization & Computer Graphics, 2017, 13(3):630-640. https://doi.org/10.1109/TVCG.2007.1009

[18] Dashtban M , Balafar M . Gene selection for microarray cancer classification using a new evolutionary method employing artificial intelligence concepts. Genomics, 2017, 109(2):91-107. https://doi.org/10.1016/j.ygeno.2017.01.004

[19] Chakradhar, Shraddha. Predictable response: Finding optimal drugs and doses using artificial intelligence. Nature Medicine, 2017, 23(11):1244-1247. https://doi.org/10.1038/nm1117-1244

[20] Hassabis, Demis. Artificial Intelligence: Chess match of the century. Nature, 2017, 544(7651):413-414. https://doi.org/10.1038/544413a

[21] Camerer C F . Artificial Intelligence and Behavioral Economics. NBER Chapters, 2018, 24(18):867-71. https://doi.org/10.1016/j.cub.2014.07.040

[22] Bose, Bimal K . Artificial Intelligence Techniques in Smart Grid and Renewable Energy Systems—Some Example Applications. Proceedings of the IEEE, 2017, 105(11):2262-2273.

[23] Kulkarni R H , Padmanabham P . Integration of artificial intelligence activities in software development processes and measuring effectiveness of integration. Iet Software, 2017, 11(1):18-26. https://doi.org/10.1049/iet-sen.2016.0095