

Research on Interactive Art Form Based on Artificial Intelligence Technology

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Abstract. As a boundary element of technological research, art stimulates the development of human creativity from a new perspective. In future information era, human-computer interaction requires constant innovation to cope with the storm, in which art boundary research can provide effective creative thinking for it. The interactive art form under artificial intelligence technology is guided by artistic and emotional thinking, and deconstruct the traditional human-computer interaction experience mode and cognitive paradigm, it has the potential to provide a new creative thinking model and method for human-computer interaction research.

1. Introduction

The "Algorithm Art" exhibition held in Stuttgart, New York in 1968 marked the beginning of convergence between art and computer technology. In the late 1980s, with the development of computer technology, Internet digital science penetrated into every part of life. For art workers, interactive art is no longer a single physical aesthetic performance, but is dominated by human-computer interaction. Furthermore, interactive art also synthesizes human, machine and environment regarding human beings as the core. Artificial intelligence provides multi-sensory technical support for interactive art. It improves the interaction mechanism from the aspects of sight, hearing, touch and smell. The fusion of art creativity and technology makes the interaction between human and machine tend to be intelligent, natural, emotional and humane. This not only provides us with an aesthetic orientation for our future interaction design, also provides a blueprint for us to build creative design thinking.

2. The transformation of interactive art design objects

The development of modern interactive art is closely related to interactive design, but the development of interactive art is much earlier than the interactive design under the technical support. Interactive art is not a derivative of the modern science and technology development. As early as in the misplaced vision of European medieval religious paintings, we can already see that creators try to enhance the communication between the works and the audience through simple "visual games". As a manifestation of human creativity, art has been incorporated into the spiritual world from the very beginning. The biggest difference between technology and art lies in the "unfamiliarity" of technology. In the twentieth century, the great development of media technology brought unprecedented panic to the art workers. Artistic creation has experienced the resistance from the beginning to the acceptance and then the fusion. However, because of the level and creativity of art itself, it brings an infinite extension to the development of later technology.

The late Brian Shackel's paper "Ergonomics for a computer" was published in *Design* in 1959 and can be seen as the start of the serious consideration of research in human-computer interaction. It brought our attention to the need to include human factors into computer science research [1]. In the 1980s, people's exploration of information science continued to flourish, and artificial intelligence, behavioral cognition and other disciplines became popular. The concept experience officially entered the eyes of artists and scientists. Interactive art under the innovation of information technology is an emerging field that is constantly being updated. The paper interaction art of the "Cubism" era was

replaced by a broader multi-channel virtual creation environment in the digital age. Artists no longer complete a work independently like traditional art, but more collaboratively in a multi-person way, which is especially reflected in the cooperation between artists and technicians in different fields [2].

In the early stage, interactive artists developed interactive rules through art research, and attracted participants to enter the art world they created through the physical form, emphasizing the satisfaction of form and technology application, ignoring the participants' experience and cognitive patterns. Under the rapid development of the Internet, art needs a sense of experience and entertainment. The object of interactive art creation shifts from the study of objects to the study of human behavior, focusing on people, emphasizing human participation and degree of cooperation among people, behavior, creative elements and environment. The creative elements refer to artistic creation itself, other than human beings, such as information, media, technology, etc. even the artist's personal intangible emotional factors are also included. The relationship among them is shown in Fig. 1. In the future, with the deepening of behavioral research, participants' sense of experience and entertainment will be infinitely satisfied, and the objects of interactive art design will inevitably turn to content meaning research, triggering people's emotional resonance.

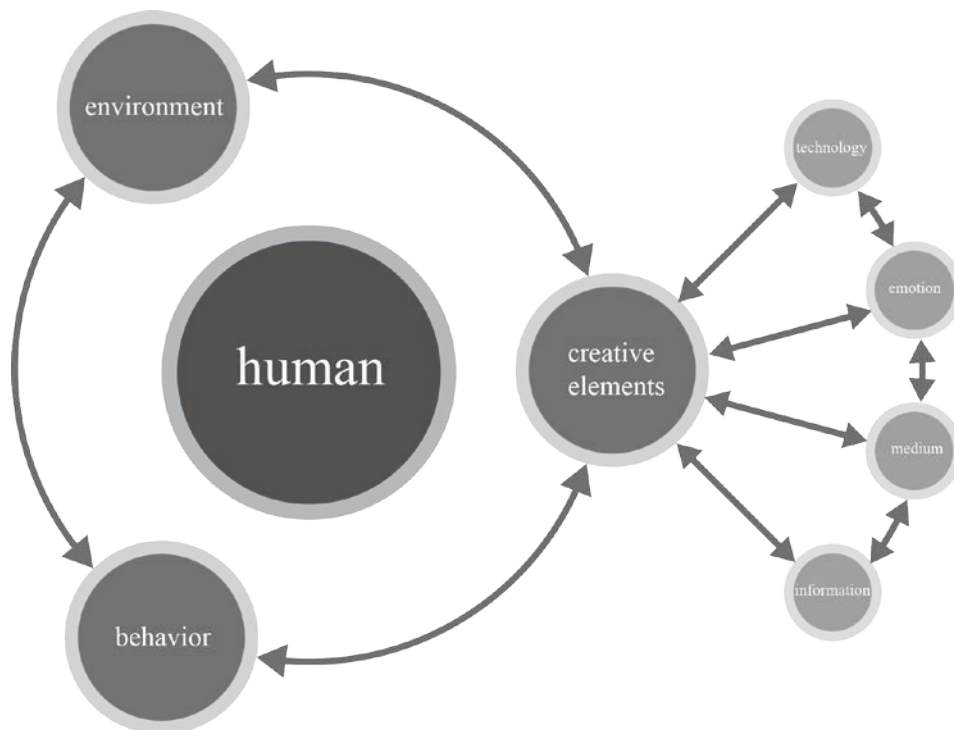


Fig. 1. The relationship between the elements of human-centered interactive art

3. Artificial intelligence interactive art form characteristics

Artificial intelligence technology is designed to perfectly replicate human thinking, react to the surrounding environment, detect stimuli, decode emotions, and identify features within a dynamically. artificial intelligence also provide technical support for interactive art creation such as sensor technology, virtual technology, biotechnology and other advanced technologies from a multi-sensory perspective. The interactive art under the support of artificial intelligence technology is a complex form. It no longer based on a single visual experience, but on the basis of studying human behavior and comprehensive senses. With somatosensory, virtual immersive and multimedia synthesis, the art form has strong interactivity, gameplay, initiative and inheritance. Nowadays, art is infinitely exerted into multiple levels under the stimulation of artificial intelligence technology. From the outside and the inside, it is deeply rooted in the heart, transforming everything into data and presenting it in a constantly changing virtual form.

The neuro-mirror device of the former Santa Maria de la Manna Dolo Church in Spoleto, Italy, created by the interactive design studio Ultravioletto, brings technology and innovation to the field of

artificial intelligence interactive art. As shown in Fig. 2, visitors are placed in front of an ever-changing immersive mirror interface, which decodes participants' information (gender, physical characteristics, emotional status, etc.) in a real-time and simultaneously convert the data streams into tangible icons using artificial intelligence technology. The device successfully transform the organism into digital data stream. This experience combines materiality and abstraction, revealing the morphological features between living organisms and the semantics triggered by their interactions.



Fig. 2. The neuro-mirror device of the former Santa Maria de la Manna Dolo Church in Spoleto

The intelligent emotional interaction art Anima shown in Fig.3 created by media artist Nick Verstand uses artificial intelligence technology to decode human perception process of the real world and explore the interaction between human and non-biological intelligence. Anima is a spherical luminescent fluid suspended in the scene that explores the relationship between itself and the surrounding environment with motion, texture, light and sound. The continually flowing metal texture and constantly changing light on the sphere surface structure create an immersive experience of light and sound for the participants. Participants interact with Anima to create the illusion of integration of people and technology. Anima is like an emotional organism that communicates with the experiencer, exuding a sense of awe in the non-biological. Under the driving of this kind of emotion and behavior research, the interactive art form based on artificial intelligence technology are presenting the characteristics of soul and meaning. The content of interactive art creation has been transformed from simple things to qualitative changes that affect people's inner feelings.



Fig. 3. Anima

Through continuously researching on the interaction between human-behavior-environment-machine, the artist creates an interactive art form that combines art and technology. They trigger a deep resonance between human and non-biological intelligence from shape, semantics and emotion. But they ignored the emotional art environment left by the long history. The current artistic language created by modern technology is often forgotten with the rapid development of technology. Instead, those old memories and history often touched people's deep heart. The reproduce of history is often amazing, memorable and emotional. For the art of interaction, the most touchable part is the content of creation rather than application of new technology. The depth of the content affects the inner emotional and artistic experience of the participants. Therefore, the interactive art under artificial intelligence technology will be formed with cultural output capabilities that is integrated into traditional culture. It represents the future as well as the past. It is a modern art expression that human civilization inherits.

4. Interaction design model and method

Artificial intelligence technology reconstructs the relationship between artists and experiencers. Artists are no longer the only controllers of art creation, and experiencers are also one of the creators. In the past, people may not be able to imagine the intersection of art and technology, but now because art elements are involved in the field of technology, technology has unlimited creativity and productivity.

Artificial intelligence interactive art creation is a complex process, because artists need to have the sensible imagination, rational logic and new technology application ability. In the process of creation, the artist generates creative motives based on the accumulation of emotions in his real life, and uses storytelling to guide the experiencers to create creative impulses in the interaction. Similarly, interaction design also requires a design motivation that resonates with the user's psychology and physiology, triggering the user to use impulsiveness. The creativity of art comes from its hierarchy. Therefore, interactive design also needs a layered interactive language to capture the user's psychological dynamics, thus stimulating users' deep desire to use. According to the artificial intelligence interactive art creation process, the author considers the multi-level characteristics of art and proposes the following interaction design models and methods. The model focuses on the

creative potential and stimulates the development of interactive design thinking. The main process of its main innovation is shown in Fig. 4.

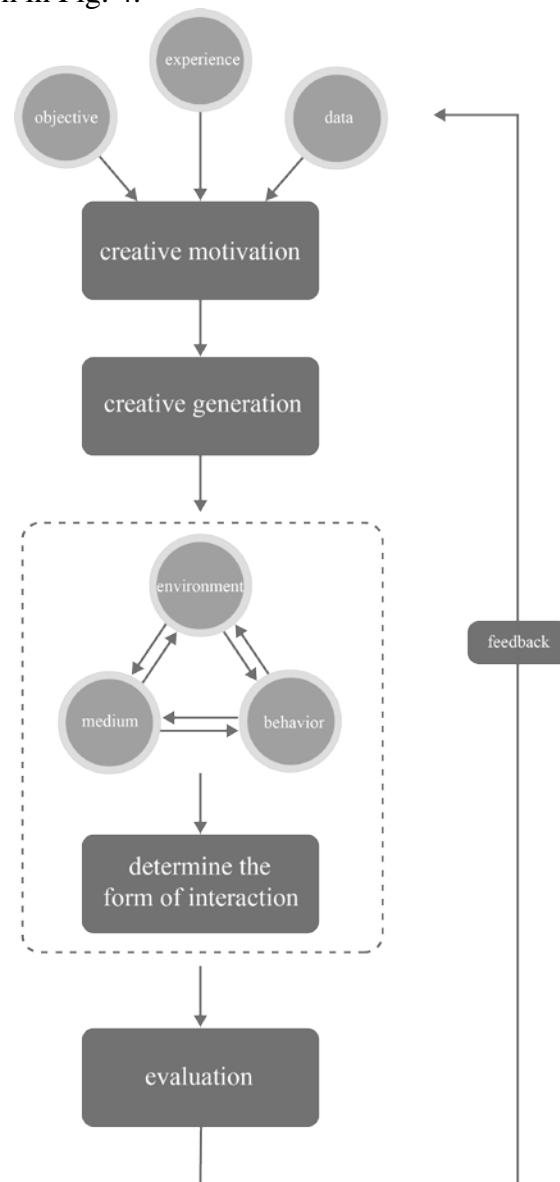


Fig. 4. Interactive design innovation thinking model

(1) Creative motivation

Creative motivation is the inner driving force that drives designers and artists to create. The commonality between modern interaction design and interactive art is that they are all emerging products of technological development. Artists and designers need to learn the new technology to combine their own experience, find problems, big data analysis to grasp the user's psychological needs, thus stimulating the creation of motivation.

(2) Creative generation

Designers and artists use motivation and goal analysis to understand user psychological trends and generate user-driven creative solutions.

(3) Determine the form of interaction

Establishing an interactive form requires careful planning. Human behavior is uncontrollable due to environmental and cognitive influences. Human behavior includes external physical manifestations and internal emotional changes. In addition, consider the diversity and complexity of artificial intelligence technology. Therefore, in response to these problems, designers and artists need to use the environment analysis, explore human natural interaction behaviors, and consider media to obtain reasonable interaction schemes to ensure user satisfaction.

(4) Evaluation

User experience feedback is the key to evaluating the success of a design for interaction design. User feedback will generate new questions, goals and data, stimulating design to generate new ideas.

5. Artificial intelligence interactive art form future development trend

At present, artificial intelligence is in the primary stage of development, and interactive art is mainly based on weak intelligent interaction. Strong intelligent interactive art is an advanced stage based on the development of various interactive arts. It will become an important popular art form in the singular period [3]. This kind of primary to advanced transformation will inevitably lead to the gradual weakening of physical expressions. As the line between non-biological intelligence and bio-intelligence gradually weakens, artificial intelligence interactive art will become a creative body with emotional thinking. In addition, with the development of brain-computer technology, it will cancel all physical expressions to a certain extent, and create a virtual parallel space that is directly dominated by the human brain and completely virtual.

6. Summary

The artificial intelligence interactive art form presents enormous creative potential in terms of dimensions, space and senses. By studying the interaction between artificial intelligence and art, we explore the emotional semantics between human-machine-environment and the essential emotional interaction between human and machine, thus promoting the development of human-computer interaction. The integration of artistic creativity and technologically advanced productivity will provide creative power for the future sustainable development of art and human-computer interaction.

References

- [1] E. Edmond, The Art of Interaction: What HCI can learn form interactive art, *Morgan & Claypool*, vol.2, pp. 5-11, 2018.
- [2] L. Chen, New Media Art History: A journey towards integration, *Tsinghua University Press*, vol.5, pp. 146-165, 2007.
- [3] L. Q. Tan, Singularity Art: How technology singularity will impact art, *China Machine Press*, vol. 2, pp. 35-37, 2018.
- [4] X. Y. Xin, Interaction Design: From logic of things to logic of behaviors, *ZhuangShi*, vol. 261, pp. 58-62, 2015.
- [5] B. Shneiderman, Designing the user interface: Strategies for effective Human-Computer interaction sixth edition, *Publishing House of Electronics Industry*, 2016.
- [6] Y. W. Ni and Technische Universiteit Delft, Design methods and strategies, *Huazhong University of Science & Technology Press*, 2015.
- [7] <https://www.urdesignmag.com/art/2019/07/01/neural-mirror-ultravioletto-carla-fendi-foundation/>
- [8] <https://www.urdesignmag.com/art/2015/11/16/anima-sculptural-installation-by-onformative/>