



Research on Application of Artificial Intelligence in Modern Environment Design

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Abstract. With the development of science and technology and the arrival of the era of big data, the wide application of artificial intelligence in design has become a trend. With the intervention of artificial intelligence, 5G, sensors and other digital technologies, environmental art space realizes the interaction between virtual and reality, providing a lot of convenience for human beings. Artificial intelligence technology brings new opportunities and challenges to environmental design. Under the multiple coupling of “technology-space-society”, environmental art design has been reconstructed profoundly, and the trend of digital environment and digital technology environment is becoming more and more obvious. Modern environmental design has also realized the transformation from serving industrial civilization to serving digital civilization, which has important practical significance. This paper explores the application of artificial intelligence technology in modern environmental design from the perspective of artificial intelligence in environmental design. Make environmental design meet the requirements of modern digital age, and constantly promote the development of environmental design.

Keywords: Artificial Intelligence · Environment Design · Big Data · Digitalization · Virtual Reality

1 Introduction

With the rapid development of social science and urbanization, traditional urban environment design lacks corresponding scientific data, and it is difficult to meet the new design requirements under the background of modern science and technology development. In recent years, the development of artificial intelligence technology, quantitative research and calculation of environmental design data, put forward more accurate calculation methods and analysis basis. It has been widely used in many aspects and made a lot of breakthrough progress. With the widespread use of ARTIFICIAL intelligence, many scientists are discussing how to apply it to emotional work. Especially in the field of art creation, how to use artificial intelligence to create complex art has become an important topic of artificial intelligence and environmental design. What role artificial intelligence plays in the overall creative system of modern environmental design is a theoretical problem that needs to be solved urgently in the academic circle.

2 Enter the Era of Artificial Intelligence

2.1 Concept of Artificial Intelligence

Artificial intelligence is also known as AI. It endows human developed wisdom to machines through the form of creation, manufacturing and processing, and establishes artificial systems with certain intelligence. Artificial intelligence belongs to the field of computer science. The aim is to create intelligent machines with human intelligence. And replace human thinking, memory, movement, decision-making and other abilities with machines [2].

2.2 Development Status of Artificial Intelligence

Compared with other countries, Artificial intelligence in China started late. In 1981, the Society of Artificial Intelligence (CAAI) was founded in Changsha [1]. In July 1987, the book *Artificial Intelligence and Its Applications* was published, which greatly promoted the research of artificial intelligence technology in China. In 2016, the term artificial intelligence was written into the 13th Five-Year Plan. China plans to become the world's major AI innovation and research and development center by 2030.

At present, China has initially established the research and development and application of artificial intelligence industrial system. On the one hand, with the development of modern science and technology, people's research on machine learning, recognition technology and other fields is more and more in-depth. On the other hand, with the continuous development of artificial intelligence technology, people pay more and more attention to the research of artificial intelligence, and it is strongly supported by the government. With the development of science and technology and the support of the government, China's artificial intelligence products have made great breakthroughs in continuous innovation and development [5]. In today's society, the development of ARTIFICIAL intelligence technology is mainly reflected in face recognition, autonomous driving and banking data systems. There are three main technologies that provide AI: programming methods, machine learning methods, and learning methods.

In recent years, the intelligent research in the field of environmental design dominated by computer computer-aided design and machine learning has developed vigorously. Its goal is to provide a certain degree of automatic artificial operations, provide personalized artificial intelligence technical support for designers, and provide professional guidance for amateurs.

3 Relevance of Artificial Intelligence to Environmental Design

Environmental design is a subject of scientific planning and rational design of specific environmental space. It covers a wide range of practical art disciplines integrating architecture, horticulture, interior, ecology, design and other fields. Look at the Fig. 1.

Provide automated manual services in architectural design, interior design, visual communication design, landscape design and soft decoration layout design. Its service content should not only contain the personalized knowledge of designers, but also have professional guidance and research for amateurs. In this regard, as in other fields, the formation of ARTIFICIAL intelligence relies on the following aspects to serve humanity.

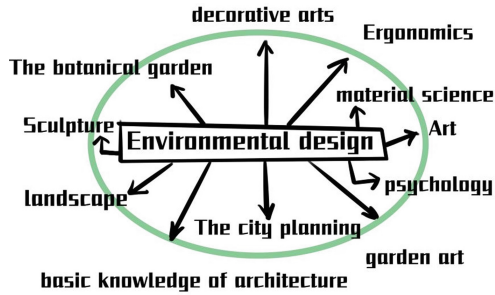


Fig. 1. The contents of the environment design (Photo by Author).

- (1) Big Data -- AI relies on big data for computing and learning. The more data, the stronger the learning ability, the higher the level. Big data's powerful computing power and virtual reality technology can enable computers to quickly and effectively show real scenes in a complex environment, bringing visual experience to on-site personnel and giving people an immersive experience and beauty.
- (2) The development of software and hardware - software that can process a large amount of data, hardware that can support the operation of software and excellent hardware technical skills, which is the technical basis for the realization of local artificial intelligence.
- (3) Deep Learning -- The most attractive aspect of deep learning in recent years has been learning methods that mimic the human brain, which comprise artificial intelligence algorithmic neural networks. These nerve cells send messages to each other via electrical signals. The part of the assembly where information is transmitted is called a synapse. Synaptic connection structure is used for information processing, and neural network is formed through mathematical modelling [4].
- (4) Change the way of life - intelligent life for designers to create a more ideal living environment. Therefore, in the application of artificial intelligence technology, in addition to convenience and practicality, we should also pay attention to the basic content, related elements and performance effects of ecological design based on different conditions, so as to prevent designers from affecting the realization of environmental design goals based on personal subjective evaluation. Environmental design is designed to better serve human beings. Similarly, the emergence of artificial intelligence technology is also to effectively stimulate people's minds to understand themselves and change the world. Artificial intelligence is a combination of behavior based on systems research, psychology, control technology, computer technology and voice technology [7]. In addition, various mathematical models and theories are needed to improve the development rate of artificial intelligence.

In the design of interior exhibition halls, when the audience receives new information, vision is not only considered as a subjective form of expression, but also can be reflected in the brain through real contact with external information, thus forming a sensory system. With the development of ARTIFICIAL intelligence technology, the accuracy and digitization of artificial intelligence technology help modern exhibition halls to more



Fig. 2. Artificial Intelligence Exhibition Hall (Source Internet).

accurately capture the real needs of every audience. Through the collection and analysis of the relevant data of the audience, a clear portrait of the user can be obtained, which is of great significance to improve the fixed communication and delivery ability of modern exhibition halls. When displaying a famous painting, the audience can use intelligent technology to enter the era of the writer, restore the creation process of the writer, imitate the painter's brush strokes, and feel the interest of painting closely. Through this harmonious way of interaction, it is of great help to improve the audience's cognition. As shown in Fig. 2. Therefore, the visual information received by the audience is more refined, which can avoid the problem of aesthetic fatigue, which is also the goal of modern environment design in the future [3].

4 Multi-dimensional Performance of Artificial Intelligence Application in Modern Environment Design

Artificial intelligence technology uses technological means, multimedia technology to establish and analyze big data, digital information technology to provide technical support for the modeling industry, create intelligent environment, and express visual effects. Information technology is applied to environmental design to meet the interactive needs of visitors in the new era. Artificial intelligence played a big role in China's just-concluded Winter Olympics. For example, contact-free logistics and distribution robots, intelligent disinfection robots, As shown in Fig. 3 (a), athletes' health monitoring robots, hexapod ski robots, As shown in Fig. 3 (b), coffee robots and so on.

In modern environment design, artificial intelligence is applied in urban street environment space. Digital technology is the core technology, and digital equipment such as intelligent voice interactive all-in-one machine, intelligent dustbin, uav and intelligent advertising machine is introduced into street environment space, so as to create new subspace systems such as intelligent lighting and intelligent transportation. Obviously, digital technology has improved the urban street space environment. The overall infrastructure and operation will help to maintain the overall health of the surrounding environment, to achieve a smart and green state, and the decorative effect of digital technology in environmental art design [6]. Digital technology is increasingly important in the intentional pattern of contemporary environmental design. It can be applied to diversified environmental systems such as museums, art galleries, exhibition Spaces, catering Spaces, commercial Spaces and rural Spaces to promote the innovation and quality improvement of environmental design patterns. From the current application effect, digital technology has satisfied the public's functional demand for environmental



(a) Intelligent disinfection robots



(b) Hexapod ski robots

Fig. 3. Artificial intelligence technology at the Winter Olympics in Beijing, China (Source Internet).

art. Various infrastructures based on digital technology are applied to environmental art, which greatly improves the identifiability and directivity of environmental art space elements and enhances the visual effect of environmental art. VR, holographic projection and other technologies combine reality and virtuality, influence the communication and communication mode between the environment and people on the level of visual system, constantly blur the boundary between the physical world and the digital world of environmental art, and realize the real wisdom of environmental art.

5 Problems and Countermeasures of the Development of Artificial Intelligence Technology in Environmental Design

5.1 Problems Faced

At present, there are still many problems in the application and research of artificial intelligence technology in the field of environmental design. First of all, the current data collection level is low, there is a great lag. Imprecise data collection, unable to carry out effective post-mortem analysis. Secondly, many current studies and applications are too idealistic and far from achieving practical results. There is a need for better analysis of complex realities. Third, the design community has not realized the use of ARTIFICIAL intelligence technology to improve product quality and efficiency, and tends to hold a conservative and negative attitude towards the use of new technologies such as artificial intelligence and other emerging technologies. Finally, in order to conduct AI analysis, a huge amount of data is needed, which will lead to the disclosure of personal information, thus arousing people's concern about privacy.

In human society, the way people behave is often influenced by tasks and actions. At present, artificial intelligence based on big data and deep learning can only solve partial problems, but cannot solve all the problems of the intelligence category used. As far as we know, the field of environmental design system is a complex and multi-dimensional interdisciplinary integrated system, which is an extremely complex subject range. Although the application of ARTIFICIAL intelligence in environmental design has achieved success, such as face recognition technology, virtual reality technology,

big data collection, architectural structure analysis, landscape structure display analysis, indoor furniture display analysis, but compared with the large-scale task system, artificial intelligence still has a longer way to go.

5.2 Corresponding Countermeasures

- (1) Formulate corresponding legislation and increase r&d income
Under the joint efforts of the government, enterprises, design units and all sectors of society, all departments should formulate development plans, improve relevant laws and regulations, and integrate resources from all aspects reasonably. Related technology companies and design firms have also launched a series of incentives to promote the use of AI in cities. We will increase our support to science and technology research and development institutions and various laboratories, and vigorously support the development of artificial intelligence technology from all angles. Fully promote the research and development of key basic technologies, promote breakthroughs in key technologies, and lay a solid foundation for the development of artificial intelligence.
- (2) Strengthen cooperation among enterprises
The development of ARTIFICIAL intelligence requires the joint efforts of major technology companies. It focuses on the combination of intelligent technology and design, in order to realize the innovation of design services, in order to ensure the scientific and efficient design, and widely used in practical design, to promote the needs of science and technology and people, need to strengthen cooperation between various enterprises, to provide a better environment for artificial intelligence in the new century.

6 Conclusion

With the rapid development of science and technology, the traditional environment design has been unable to meet the needs of people, the application of artificial intelligence in modern environment design, has become a design trend in the future. The increasing progress of digitalization and big data technologies, as well as the diversified development of society, have promoted new forms of environmental design and promoted the development and progress of modern cities. Environmental design should seize the tide of The Times, adopt advanced technology and means, and guide the application of digital technology through new interaction mode and ecological civilization concept. Through the organic combination of modern environmental design and artificial intelligence technology, positioning the development goal of current environmental design, to contribute to the new era of environmental design and technology construction.

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