

Analysis on the Innovation and Reform of Art Design in the Era of Artificial Intelligence

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Abstract: With the increasing penetration of artificial intelligence in various fields of people's life, the design field is also quietly changing, the traditional design boundaries are broken, and a new way of creation rises, promoting the traditional design to change and innovation. Among them, environmental design, as a comprehensive field involving architecture, urban planning, interior design and other aspects, because of its far-reaching impact on the quality of human life and the environment, it is increasingly necessary to use AI technology to achieve more efficient, intelligent and sustainable development. Artificial intelligence (AI) technology is rapidly transforming the field of environmental design, providing designers with innovative tools and methods. In view of this, this paper proposes the specific application of AI in environmental design and the innovations and changes it brings, focusing on the analysis of specific cases and practices of intelligent sustainable design, smart city construction, personalized design and user experience improvement, so as to provide new ideas for the future development of environmental design.

Keywords: Artificial intelligence; Environmental design; Innovate

Introduction:

The rapid development of artificial intelligence (AI) technology has had a profound impact on the field of art design. From the traditional design process to the modern intelligent design tools, AI is completely changing the face of art design, the reasonable application of this technology can help designers achieve immersive design experience, so that customers can preview and modify the design scheme in the virtual environment, so as to enhance the interactive design, intuitiveness, but also make the design process more efficient and flexible.

1. The impact of artificial intelligence on the field of art design

First of all, the application of AI can effectively improve the design efficiency. Designers can use AI-driven design software in actual design to generate complex patterns and structures through algorithms^[1].

Secondly, in terms of personalized design, AI needs to analyze a large amount of user data. AI can help designers understand user preferences and needs, so as to create design works that are more suitable for user personalized needs. This is even more critical in environmental design, for example, the design of smart homes can be automated and personalized design adjustments according to the living habits and preferences of residents to improve the user experience.

2. Application of artificial intelligence technology in environmental design

2.1 Application of intelligent design tools -- computer-aided design (CAD) software

Computer aided design (CAD) software is one of the most representative applications of artificial intelligence in environmental design. CAD software utilizes algorithms and numerical calculations to significantly improve design efficiency and accuracy. For example, in architectural design, designers can use CAD software to accurately draw architectural plans and elevations, mark dimensions (such as wall thickness of 200mm, room area of 50m²), and carry out complex structural analysis and optimization, where $V=L \times W \times H$ is the formula for calculating the volume of the building, V represents the volume, the unit is cubic meters (m³); L stands for length in meters (m); W represents the width, in meters (m); H stands for height in meters (m). Suppose you design a room 10 meters long, 8 meters wide and 3 meters high, the volume of which can be calculated as: $V=10\text{m} \times 8\text{m} \times 3\text{m}=240\text{m}^3$ By using

parametric design tools, designers can quickly adjust various parameters of the model (such as 4m column spacing and 1.2m window height), and see the effect of design changes at present, which can effectively improve the design accuracy and make the design process more flexible and intuitive [2].

2.2 Integration of virtual reality (VR) and augmented reality (AR) in environmental design

2.2.1 Application of VR technology in environmental design

The application of virtual reality (VR) technology in environmental design, through VR equipment, designers can create a virtual three-dimensional environment, so that users can experience the design scheme. For example, a room of 200 square meters can show its layout, decoration and furniture placement through VR. Users can move around the virtual environment and see details from different perspectives, which gives them a more intuitive understanding of the design scheme.

In addition, the technology can also help designers in the actual design process, complete the real-time modification and optimization of the scheme, such as in the design of a 20 meters long, 15 meters wide, 3 meters high exhibition hall, you can adjust the location of the exhibits and lighting effects through VR until the best visual effect is achieved. VR devices can also accurately simulate lighting and shadows, making designs more realistic. Designers can set the position of the light source (such as 2.5 meters from the ground) and observe the change of the light in different time periods, which is very helpful for optimizing the light design of the space.

2.2.2 Application of AR technology in environmental design

Augmented reality (AR) technology brings new possibilities to environmental design by superimposing virtual elements on the real environment. Designers can use AR technology to add virtual design elements to a real scene, such as placing a virtual building on an actual open space and observing its coordination with the surrounding environment. AR technology can be implemented via a smartphone or tablet, making design presentations more convenient and interactive.

In interior design, AR technology can help users preview the placement of furniture and decorations. For example, a user can use an AR application to virtually place a sofa measuring 2m x 1.5m in the living room, adjusting the position and Angle until they are satisfied, which can effectively improve the intuitedness of the design process and reduce errors and rework in the actual layout. Designers can also use AR technology to display different decoration schemes, and users can scan the room to see the wall effect of different colors and materials, so as to make better decisions [3].

3. Innovation and change of environmental design in the era of artificial intelligence

3.1 Sustainable design and smart city construction

3.1.1 Intelligent application of sustainable design

In the era of artificial intelligence, AI technology helps designers create more environmentally friendly and efficient design solutions through intelligent analysis of energy consumption, resource utilization and environmental impact. For example, in building design, AI can help designers find the best energy saving solutions by simulating and optimizing the energy consumption of buildings. A common application is an intelligent building management system (BMS), which monitors and controls temperature, humidity and lighting within a building in real time for optimal energy efficiency. An AI-optimized energy management system for an office building with an area of 10,000 square meters can reduce energy consumption by 15%, saving about 200,000 KWH of electricity per year.

3.1.2 Environmental design in smart city construction

In smart cities, environmental design not only focuses on the building itself, but also covers the overall planning of urban infrastructure, public Spaces, and transportation systems. Among them, in the design of public Spaces, AI can help optimize the layout of green Spaces and public facilities, and improve the quality of life of urban residents. By analyzing urban population density, activity trajectory and environmental data, for example, in an urban area of 50 square kilometers, AI can recommend a 20% increase in green space in densely populated areas, thereby improving air quality and residents' health.

3.2 Improvement of personalized design and user experience

3.2.1 Application of artificial intelligence in personalized design

Through the analysis of user data by AI, designers can create highly customized design solutions that meet the unique needs and preferences of different users. For example, in residential design, AI can customize the room layout, color matching and furniture placement according to the user's living habits and personal preferences. Assuming a family likes an open kitchen and lots of natural light, AI can recommend an open kitchen design of 30 square meters with large south facing Windows to ensure plenty of sunlight.

3.2.2 Intelligent improvement of user experience

The improvement of user experience is a crucial part of environment design. AI technology dramatically improves the way users interact with their environment through intelligent analytics and real-time feedback. For example, a smart lighting system can automatically adjust the light intensity and color temperature according to the user's activity and time, providing the best lighting effect. In addition, AI can also provide a more convenient user interaction experience through speech recognition and natural language processing technology. For example, users can control smart devices in their homes through voice commands, such as adjusting the air conditioning temperature, playing music or opening curtains. If the user wants to set the temperature of the air conditioner to 24 ° C, the system can automatically adjust it by saying the command, which improves the operating comfort.

In short, from the application of intelligent design tools, to the integration of virtual reality and augmented reality, and then to the improvement of personalized design and user experience, the wide application of AI technology has prompted designers to constantly improve their skills and adapt to the technical needs of the new era. In the future, with the further development of AI technology, environmental design will usher in more innovations and changes, providing strong support for creating a more livable and sustainable living environment.

References:

- [1] ZHAO Niannian. Innovative Practice of College Art Design Teaching Reform in the era of Artificial Intelligence [J]. China National Expo,2022(7):79-81.
- [2] Xu Qianshan, Hu Jie. Artificial Intelligence Innovative Design of Yi Art and Medicine Integration [J]. Journal of Nanjing University of the Arts (Fine Arts and Design Edition),2021(6):208-211.
- [3] Xu Yanzhang. Innovative Thinking on the Cultivation of design art Talents in the Era of intelligent media [J]. Journal of Yellow River Institute of Science and Technology,2021,23(4):77-82.

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