Development of Environmental Art Design System under the Background of Artificial Intelligence

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Abstract. The application of artificial intelligence technology in environmental art design system, with the development of artificial intelligence technology, how to apply artificial intelligence technology to environmental art design system? This paper studies the environmental art design system under the background of artificial intelligence. Firstly, it analyzes the application status of environmental art design system and the application of artificial intelligence in environmental art design system. Then, the contrast experiment is used to compare the environment art design image generated by artificial intelligence with the traditional manual drawing image. After in-depth analysis and data collection, this paper concludes that the environmental art design image generated by artificial intelligence is clearer than the traditional manual drawing, the designer's use efficiency is greatly improved, and the three-dimensional effect of the drawing surface is also significantly improved. Even its ability to simulate reality goes beyond hand-painted expression. After analyzing the experimental data, this paper further concludes that the definition of the artificial intelligence generated environment art image is twice as high as the traditional hand-painted image, and the design efficiency is 84% higher. In this paper, through the in-depth study of modern computer drawing software, the difference and connection between traditional hand-painted techniques and modern technologies are compared, which fully proves the important role and value of modern computer technology in environmental art design performance.

Keywords: Artificial Intelligence, Environmental Art Design, Contrast Experiment, Artificial Intelligence Generating Environment Art Image

1. Introduction
Artificial intelligence technology has been used in many fields, and it also plays a role in art creation [1-2]. Due to artificial intelligence, the creative spirit of artists can produce very specific works of art, such as pictures made according to deep learning algorithm, creation of artificial music, creation of artificial poetry, driven by human subjective thinking, computer as a creative tool, combined with human text design code [3-4]. The application of environmental art is less [5]. Many experts and scholars in the field of environmental art design call for the application of artificial intelligence to the
performance of environmental design as soon as possible, hoping to draw a more vivid, real and delicate picture of the expression effect by computer. At the same time, it can solve the tedious and repetitive labor of the designer's hand-painted performance, so that the designer's creative ability can be simulated in a real way [6-7].

At present, with the continuous development of artificial intelligence, it is necessary to use artificial intelligence and other related technologies to innovate in the field of environmental art design [8]. In foreign countries, first of all, Professor Johnson from the United States said in his own work: "artificial intelligence is a very important discipline. It is a discipline that studies intelligence. It can expand human consciousness infinitely [9]. In fact, Professor Nelson's words have made a good definition of artificial intelligence. In China, Professor Long Jie think artificial intelligence is another more advanced tool. It can make machines replace human intelligence, do things that human beings can't do or help people live more relaxed lives [10].

In this paper, under the background of artificial intelligence, the environmental art design system is studied. Firstly, the application status of artificial intelligence in China's art design industry is understood, and the main problems are found. In the end of this submission, the emergence of computer graphics software and virtual reality technology is a historic leap in the ecological art design system. Yes. Then this paper discusses the applied wisdom of art design system. You have important reference value for the further development of artificial intelligence technology, ecological design.

2. Image Processing Technology in Environment Art Design System under the Background of Artificial Intelligence

2.1 Artificial Intelligence

Artificial intelligence is a new technology science to research and develop the theory, method, technology and application system of human intelligence simulation, expansion and expansion.

Artificial intelligence is computer science. Try to understand the essence of intelligence and create a new type of intelligent machine that can respond to human intelligence. Research in this field includes robotics, speech recognition, image recognition, natural language processing, and expert systems. The emergence of artificial intelligence makes the theory and technology more and more obsolete, and the application fields become more and more extensive. The committee can imagine the scientific and technological products brought by artificial intelligence in the future. Artificial intelligence can simulate the information process of human consciousness and thinking. Artificial intelligence is not human intelligence, but it can think like human beings and surpass human intelligence.

2.2 Application of Artificial Intelligence in Environmental Art Design Drawing

(1) Computer graphic art design

Computer graphics design is a field of computer graphics, which is a subject between art design and art design. Computer graphics is the method and technology of converting graphic data into graphic display. Computer is a graphic subject, graphic input, and graphic application. The software part includes the software and Application Research of graphic system.

(2) Accuracy of computer graphics processing software

Computer graphics design is a field of computer graphics, which is a subject between art design and art design. Computer graphics is the method and technology of converting graphic data into graphic display. Computer graphics is the check of graphic input, graphics object construction and representation, graphics database management, graphics data communication, graphics operation, technology and application of a discipline. It includes the research of graphics system hardware, graphics software and software application.

(3) Easy modification of computer graphics processing software

CAD software can display and change the object properties. You can display and change the current properties of any object in the drawing. That is to say, it can solve the designer's mistakes in
drawing in any environment. It reduces the mechanical operation of repeated drawing for environmental designers and greatly improves the efficiency of designers. It is a great leap forward for the environmental art design industry to realize the performance of environmental art design drawings by computer.

2.3 Processing Technology of Environmental Art Design Drawings by Artificial Intelligence

In the analysis of linear operation of environmental art design image by artificial intelligence, an image can be regarded as composed of infinitesimal pixels, each pixel can be regarded as a point source, then an image is a collection of numerous point sources.

In the mathematical model, the point source is represented by the $\delta$ function, and the two-dimensional $\delta$ function is defined as follows

$$\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} \delta(x, y) \, dx \, dy = 1 \quad (1)$$

In image processing, when the unit pulse $\delta(x, y)$ is input, the output of the system is called impulse response function, expressed by $H(x, y)$, which is the response to point source, called point spread function.

For the linear operation $T[\cdot]$, if in the discrete system, if $t[\cdot]$ is not affected by the displacement of the input sequence, the system becomes a shift invariant system. For a two-dimensional, linear shift invariant system, if the input is $f(x, y)$ and the output is $g(x, y)$, and the linear operation of the system on the input is $t[\cdot]$, then there is

$$g(x, y) = T[f(x, y)] = T[\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} f(\alpha, \beta) \delta(x - \alpha, y - \beta) \, d\alpha \, d\beta] \quad (2)$$

Recorded as

$$g(x, y) = f(x, y) * h(x, y) \quad (3)$$

Thus, the computer can rely on artificial intelligence technology to generate and optimize the image.

3. Experimental Research on Environment Art Design System under the Background of Artificial Intelligence

3.1 Experimental Data

At the same time, the designer generates the image of environmental art through artificial intelligence. The image definition is 10, the image integrity is 10, and the image stereo degree is 9. At the same time, the designer generates the environmental art drawings by traditional hand drawing. The clarity of the drawings is 5, the integrity of the drawings is 8, and the stereoscopic degree of the drawings is 6. In two hours, the number of drawings drawn by the designer every 20 minutes is 4, 8, 13, 17, 21, 24, and 3, 6, 8, 10, 12, 13 by traditional hand drawing.

3.2 Experimental Process

This paper compares the efficiency of artificial intelligence generating environmental art images and traditional hand-painted environmental art drawings. First of all, select several environmental art design drawings with the same complexity and the same designer. After that, designers use artificial intelligence to generate environmental art images and traditional hand drawing to generate environmental art drawings. Two kinds of images are generated under the same control time length. The quality of the two images, the quality of the final image, the quality of the two images. In this experiment, the length of the reproduction time should not be too long, otherwise the generated image may be similar to the drawing, and it is not convenient to compare the image quality. In order to get the efficiency of using the two methods, we record the number of drawings reproduced by the designer every 20 minutes until the end of two hours.
4. Experimental Analysis of Environmental Art Design under the Background of Artificial Intelligence

4.1 Generating Image Parameters of Environmental Art through Artificial Intelligence
In this paper, artificial intelligence is used to generate environmental art images and traditional hand-painted environmental art drawings are compared. The overall effect, three-dimensional sense and local magnification of the two are compared. The results are shown in Table 1 and Figure 1.

|                     | Clarity | Completeness | Stereopsis | Fps |
|---------------------|---------|--------------|------------|-----|
| Artificial intelligence image | 0.47f   | 0.47f        | 0.41f      | 21.5|
| Traditional images  | 0.23f   | 0.37f        | 0.28f      | 21.5|

Figure 1. Drawing parameters of artificial intelligence environment art design drawing

From the experimental data, we can see that the parameters of the artificial intelligence generated environment art image in all aspects are better than the traditional hand-painted environmental art drawings, so the effect of rendering will be much better. This is because the artificial intelligence generated environment art image can achieve high-quality real-time rendering, the structure of the drawing results is clear, the three-dimensional sense is more obvious, and there is no obvious distortion and quality loss. It can complement the effect of the realistic direct volume rendering technology, which can complement each other to show the ideal state of the drawings conceived by the designer, and obtain the three-dimensional virtual intuitive image, which is scientific. Accurate acquisition of the three-dimensional shape, spatial location, spatial size and other information of defects can effectively solve the efficiency of the designer drawing drawings.

4.2 The Efficiency of Designers to Generate Environmental Art Images through Artificial Intelligence
This paper compares the efficiency of the same designer using artificial intelligence to generate environmental art images and traditional manual drawing to generate environmental art drawings. And every 20 minutes to draw the number of drawing statistics, and then analyze the efficiency of both. The experimental results are shown in Table 2 and Figure 2.
Table 2. Percentage of drawings drawn by AI and traditional methods

| Time (minutes) | Artificial intelligence image | Traditional images |
|---------------|------------------------------|-------------------|
| 20            | 4%                           | 3%                |
| 40            | 8%                           | 6%                |
| 60            | 13%                          | 8%                |
| 80            | 17%                          | 10%               |
| 100           | 21%                          | 12%               |
| 120           | 24%                          | 13%               |

Figure 2. Comparison of designers' work efficiency

From the experimental data, we can see that the efficiency of the method of artificial intelligence to generate environmental art image is much higher than that of traditional manual drawing, which can greatly save the designer's drawing time. Moreover, the design drawings generated by computer have high quality and strong stereoscopic sense. There is a big gap between them. This is mainly because the computer uses artificial intelligence technology to optimize the image. It can make its optimization effect more perfect through the continuous autonomous learning of pictures. After continuous updating and computer self-learning, the images drawn in the future will be more stereo. And the research work of artificial intelligence generation environment art image is mainly focused on the mobile phone and analysis of big data. Only by continuously optimizing the algorithm can we better show the specific details of the environmental art design drawings, and show the real three-dimensional creation environment in line with human visual habits, so that designers can easily and directly carry out environmental art on the information shown in the drawings. The creation of design will promote the development of design.

5. Conclusions

As a modern technology, artificial intelligence is widely used in ecological design system, which provides us with a new manufacturing method of environmental design system. In the past, the visual effect that people can hardly achieve by hand is easily completed by computer, even better than expected. All kinds of quick design means and methods provided by electronic computer liberate the designer's hands from heavy, slow and repetitive labor, thus deepening and enriching the human brain's artistic design creativity and the final artistic effect. We should further optimize the functions of these drawing software, so that they can draw more vivid, more artistic and more perfect drawings under the operation of designers, and greatly improve the design efficiency and quality. Therefore,
development and application of artificial intelligence technology in environmental art design system will have a significant on the environmental art industry.

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