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Research Article

Visual Fatigue Phenomenon in Visual Communication Design Integrating Artificial Intelligence

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In the process of cognition, people focus on self-feeling and realize the cognition of the world by judging the information conveyed by vision. Design changes lives, and our lives are always surrounded by design. This research mainly discusses the phenomenon of visual fatigue in visual communication design integrated with artificial intelligence. The article first analyzes the characteristics of optical illusion art. Taking typical works as an example, it expounds the application of optical illusion in modern design and the influence of optical illusion on design works. At the same time, it combines the basic principles of optical illusions to find out the elements and types of optical illusions, as well as various optical illusions that exist in life. This research uses artificial intelligence technology to efficiently create visual design, providing a basic space for higher quality design output. The proportion of subjects who could find the location of the inserted content was 66.7%. This study helps to better emphasize the visual design effect and link visual fatigue. The article starts from three aspects: web page, mobile phone, and traditional media. It analyzes the phenomenon of visual fatigue in modern visual communication design. While giving solutions, it also puts forward the dialectical concept of the balance between visual comfort and design.

1. Introduction

For human beings, they first know the world through vision. The optical illusion is a special visual phenomenon. Under the influence of optical illusion, people unconsciously produce a kind of psychological association. It is mainly achieved by stimulating the human senses. As long as it is carefully observed, it is not difficult to find that optical illusions can be seen everywhere in daily life. In order to further prove the application of optical illusion in visual communication design, the article first analyzes the characteristics of optical illusion art. Taking typical works as an example, it expounds the application of optical illusion in modern design and the influence of optical illusion on design works. At the same time, it combines the basic principles of optical illusions to find out the elements and types of optical illusions, as well as various optical illusions that exist in life. The purpose of artificial intelligence is to make artificial systems such as computers become intelligent. Around this goal, the field of artificial intelligence has gradually developed and many subtechnologies have been born. It realizes the "communication" between man and machine, and the machine "understands and responds" to human beings, etc.

With the continuous improvement of machine learning algorithms and the further improvement of hardware computing capabilities, the development of artificial intelligence has reached a new climax. In the magical and challenging field of the creative form, it uses the form of optical illusion to try to break through the audience's psychological and visual stereotypes. It has achieved certain results in modern design. Whether it is for the audience's cognition or psychological and visual fatigue, it has an irreplaceable role.

In visual communication design, the use of optical illusions has become quite common. It masters the principle of optical illusion, which is meaningful in both positive and negative aspects. For the application of artificial intelligence decision prediction, image recognition, pattern recognition, voice interaction, and other technologies in visual

communication, many studies start by improving the overall experience of the audience. It discusses the application of artificial intelligence and other technologies. The positive aspect is that making the right use of the fun brought by optical illusions and making good use of optical illusions can also cultivate original visual arts thinking ability. The negative aspect is to avoid misleading misunderstandings and reduce the chance of causing flaws and imperfections in the work. This article provides an important basis for the creative design of visual graphics through the research on the application of optical illusion in visual communication design. The creative design of visual images incorporates the principle of optical illusion, which enhances the expressive power of visual graphics creativity. This effectively solves the problem of homogeneity in the creative design of visual images. It makes the visual graphics have personalized characteristics, which can effectively meet the application of the creative design of visual graphics in real life.

2. Related Work

The content of artificial intelligence research includes knowledge acquisition, representation, and application, as well as machine perception, learning, and reasoning. The application of the principle of optical illusion in graphic creative design realizes the unique and personalized development goal of graphic design. It focuses on grasping the fundamentals of graphic design, improves the original design concept by using the principle of optical illusion, and endows graphic design with a new meaning. The application of the Fibonacci indicator algorithm proposed by Etminaniesfahani et al. to a wide range of benchmark functions demonstrates its ability to handle difficult optimization problems [1]. Hassabis et al. investigated the historical interaction between the fields of artificial intelligence and neuroscience and highlighted current advances in artificial intelligence. These advances are inspired by research on neural computing in humans and other animals [2]. Pomorski and Perchi's work involved fault detection and isolation (FDI) of induction motors. They found that the knowledge of analyzing redundant relationships alone cannot supervise them. It cannot distinguish the normal operating state of the motor and the faulty speed sensor state from the behavioral analysis model [3]. Lemaignan et al. believed that human-computer interaction challenges AI in many ways. They attempted to describe these challenges and demonstrate a set of key decision-making problems that cognitive robots need to solve successfully in sharing spaces and tasks with humans. They began by identifying the required individual and collaborative cognitive skills: geometric reasoning and situational assessment based on perspective and affordance analysis [4]. In order to solve the problem of kinship verification in face images, Zhengping et al. proposed a neighborhood exclusion metric learning algorithm based on local feature fusion [5]. Rongpeng et al. considered 5G cellular networks as key enablers and infrastructure providers for the ICT industry. It provided various services for different needs. They further introduced fundamental concepts in AI and discussed the relationship between AI and candidate technologies in 5G cellular networks [6]. Kompella et al. argued that CCSA gives robots the intrinsic motivation to acquire, store, and reuse skills. Skills were acquired by associating intrinsic rewards with world model improvements, and reinforcement learning is used to learn how to acquire these intrinsic rewards [7]. Compared with various traditional PPI feature extraction methods based on sequence information, Wei L proposed two novel feature extraction methods [8]. Glauner et al. believed that the detection of nontechnical losses (NTL), including electricity theft, faulty meters, or billing errors, has attracted increasing attention from researchers in electrical engineering and computer science [9]. Havinga et al. believed that wireless sensor networks (WSNs) usually consist of a large number of small, low-power, and inexpensive sensor nodes distributed over a large area. Since WSNs can be deployed in different environments (contexts) for different applications, the number and types of events may vary in different environments and contexts [10]. The application of optical illusion in graphic creative design combines the functions and functions of the principle of optical illusion. It achieves a better visual effect through a change of the original thing. The application of the principle of optical illusion in graphic creation focuses more on the transformation of the original graphic. This can enhance the interest in graphic design and bring people a better sensory experience. Artificial intelligence empowering traditional industries has become a hot topic at the moment. In the fields of medical care, transportation, education, security, and entertainment, artificial intelligence is playing a role. This enhances the well-being and productivity of humans.

3. Methods

The workflow of visual communication design creation: the basic design cycle model for visual communication design demonstrates the constant trial and error process in design. It often needs to go through multiple cycles repeatedly to get the best solution. The designer's understanding of the problem and solution deepens with each iteration of the cycle. The entire basic design cycle process is as follows [11]:

(1) It needs to determine the standard. The designer determines a visual standard after collecting and analyzing data on communicators, communication content, channel media, audiences, and expected effects.

(2) The design framework needs to be determined. Designers have a design framework in their hearts. These frameworks are obtained by designers through previous training and work experience. It is actually some specific design processes for different design results that the designer knows at the time of creation, such as whether to make an electronic poster or a packaging box. Their design frameworks are different, and even for posters, there will be different design frameworks.

(3) It is necessary to determine the style and tonality. It determines the style direction and overall tonality according to the content.

(4) The elements need to be determined. Here, it is necessary to determine the constituent elements of the design creation, including information such as the main object, text, background, mask, and decorative materials determined according to the style.

(5) The layout needs to be arranged. This process is the process of starting production, which completes the visual design through a series of actions.

(6) Detailed adjustment is required. After the final debugging to the visual satisfaction, the design results are produced, and the visual design is basically completed.

(7) The design needs to be completed. At this point, the first round of basic design is completed.

(8) It carries out a new round of creative revisions for the entire program. It makes the entire visual design work have highlights to attract readers while ensuring the transmission of information. On the whole, the creative phase and the analytical phase are not isolated. Creative thinking is carried out throughout the process.

Intelligent Search. In terms of material data collection and retrieval, it is obvious that artificial intelligence technology is superior with the support of computing speed and big data. However, because the screening of data requires the comprehensive consideration of designers, this is an activity with a high demand for intelligence. Therefore, the main aspects of intelligent retrieval that artificial intelligence technology can be applied to are highlighted in audience analysis and inspiration for designers. The preliminary research stage is a very important way for designers to understand the design project. Therefore, it can only partly rely on artificial intelligence. On the whole, designers need to investigate and analyze the information of the communicator and clarify the content and channels of communication.

In audience analysis, artificial intelligence can accurately analyze the target audience due to the support of big data and its own analysis and reasoning function. This provides powerful technical support and reference examples for designers to understand and analyze the audience. On the basis of effectively improving efficiency, it can also help designers make analysis and reasoning more accurately. In the process of creative inspiration, designers can quickly search for relevant materials through the associative ability of artificial neural network and powerful identification and search function. This can effectively help designers inspire thinking.

3.1. Professional Support. For knowledge in the professional field, a neural network expert system can be established to realize the storage and reasoning of knowledge, automatically update project cases, and use its associative ability to comprehensively recommend combined projects to designers. For the VI design of large-scale food enterprises, using the neural network expert system and big data analysis, it can directly provide a series of visual elements required for the VI of large-scale food-type enterprises. Visual design creation requires not only knowledge in the visual field but also a certain professional cognition of the project field. It can realize the knowledge structure of the basic element system and the application element system required for the visual recognition of the corporate brand image through continuous learning. Moreover, it recommends suitable application project solutions to designers according to the needs of the project field. When designing packaging, it can learn all kinds of packaging type knowledge in an all-round way. When designers input green tea packaging and audience, they can understand the type of packaging that the audience likes through the analysis of big data. It will provide designers with a series of information such as all the classification types available for green tea packaging, the structure diagram and material of the box type, and the more important green tea packaging precautions.

The formula for the sigmoid function is as follows:

$$f(x) = \frac{1}{\left(1 + e^{-x}\right)}. \tag{1}$$

The formula for the Tanh function is as follows:

$$f(x) = \frac{\left(e^{x} - e^{-x}\right)}{\left(e^{x} + e^{-x}\right)}. \tag{2}$$

The formula for the ReLU function is as follows:

$$f_n(x) = \max(0, x). \tag{3}$$

The formula for the Leaky ReLU activation function is as follows:

$$f(|x|) = \max(\chi|x|, |x|). \tag{4}$$

The formula for the mean value of the activation function in the hidden layer is as follows:

$$\lambda \longleftarrow \frac{1}{m}\sum x_i. \tag{5}$$

After getting the mean and variance, the normalization formula is as follows:

$$x \longleftarrow \frac{x - \mu}{\sqrt{\alpha + \pi}}. \tag{6}$$

3.2. Visual Generation. It is possible to use artificial intelligence technology for the visual design of the copy extension type and the generation of size rubbings, but it requires the cooperation of people and technology to complete. The first is to digitize the design process. It converts the design framework steps into the information that can be processed by each layer of the artificial neural network and then stores it in the neural network design framework library. This is the process of training machine learning, which must be assisted by designers or technicians to complete the machine learning training because, in general, pure artificial intelligence technology practitioners cannot digitize the behavior of design creation. When the machine learns a certain design framework, it needs an actor

corresponding to the framework and a supporting element library. These all require designers to train and build. During the completion of the visual design scheme, most of the trial and error and adjustments in the early stage are carried out by the machine. It can also quickly realize the formation of a variety of basic visual design solutions. This not only greatly improves the efficiency of design but also leaves room for the improvement of design quality. Artificial intelligence technology is also equivalent to helping designers in the first round of the basic visual design creation process in the previous basic design cycle. Then the designer can directly enter the second round of the design iteration process to make creative adjustments and modifications to the overall plan.

Under the premise of given data and generator G [12],

$$f(D) = a\log(D) + b\log(1 - D). \tag{7}$$

The derivative of $f(D)$ is as follows:

$$\frac{df(D)}{dD} = a \times \frac{1}{D} - b \times \frac{1}{1 - D}. \tag{8}$$

The optimization function for the generator of GANs can be written as follows:

$$V(G, D) = E_{x-p}\log D(x) + E_{x-p}\log(1 - D(x)). \tag{9}$$

It does not use weight pruning but uses the method of adding penalty items. Its optimization goals are as follows:

$$W(P, G) = \max\left\{E[D(x)] - E_{x-p}\left[D(x) - \lambda \int \max(0, D(x))\mathrm{d}x\right]\right\}. \tag{10}$$

3.3. Decision Improvement. In designing important decision-making, due to the relatively low level of intelligence of artificial intelligence technology, it is still unable to replace the dominant position of human beings, and human beings are needed to make important decisions. It generates a certain degree of decision-making based on a technical analysis of the relevant items of the proposal. However, the final decision is still left to the designer. For example, the designer should comprehensively consider which VI application system solution combination or which green tea package to use in the solution provided by the system according to the actual situation.

When the final basic visual scheme is selected and generated, the designer still needs to go through two rounds of iterative design and make creative modifications and detailed adjustments to the entire basic scheme. Only in this way can artificial intelligence generate designs that appear to be artificial "mentally retarded." Therefore, in terms of decision-making power, intelligent technology makes basic decisions. Designers make decisions to improve, and the collaboration mode is one auxiliary and one main. This is supplemented by technical decision-making, and the designer's decision-making is the main one.

It builds a Gaussian pyramid $G(I)$:

$$G(I) = [I_0, I_1, I_2, \ldots, I_K]. \tag{11}$$

The Laplacian pyramid at level K is represented as follows:

$$h_k = I_k. \tag{12}$$

Laplacian pyramids for other layers are represented as follows:

$$h_k = L_k(I) = g(I) - u(g(I)). \tag{13}$$

It restores the image with a Laplacian pyramid as follows:

$$\begin{aligned} I_u &= u\left(I_{u+1}\right) + h_k, \\ f(x, z) &= D(x) + m - f(x, D(x)). \end{aligned} \tag{14}$$

The autoencoder corresponding to the discriminator model not only reduces the reconstruction error of the real image but also makes the reconstruction error of the reconstructed image close to a fixed value.

3.4. Algorithm Architecture. Based on the definition of artificial intelligence art, this research proposes an artificial intelligence art image generation system from the randomness and autonomy of the attribute game. It adopts a creative adversarial network as the functional core. The creative evaluation system acts as the driving force between the generator and the discriminator within the algorithm. This gives it the ability to generate optical illusion images. In addition to this, the system also incorporates the consideration of the person being the subject. It assesses the creativity and ambiguity of the generated optical illusion images. It is fed back to the artificial intelligence algorithm to optimize parameter settings. This eventually produced AI art images that caused the subject's optical illusions. The presentation form of the AI art system is shown in Figure 1.

In creative adversarial networks (CAN), the generator G aims to receive two signals from the discriminator D. This signal acts as two contradictory forces to achieve three things: (1) it is necessary to generate novel works; (2) new works should not be too novel. It should not be too far from the known distribution; otherwise, its arousal potential will be too high, activating negative responses; (3) new works should increase the ambiguity of style. The basic architecture of the creative adversarial network designed by the article is shown in Figure 2.

Therefore, the creative adversarial network also has two networks that balance each other, the discriminator D and the generator G. Discriminator D has access to a dataset of human artworks. Each art image contains an art style label (Renaissance, Baroque, Impressionism, Expressionism, etc.) and uses it to learn to distinguish between different art styles. Generator G cannot access any existing images. It generates new images starting from random inputs but is different from Generative Adversarial Networks. It receives two signals from discriminator D: (1) the classification result of "whether it is a work of art"; (2) the classification result of "what kind of artistic style" [13].

The red curve represents the entropy, and the blue curve represents the inversion of the uniform distribution cross-entropy. When the classes are balanced, both functions have

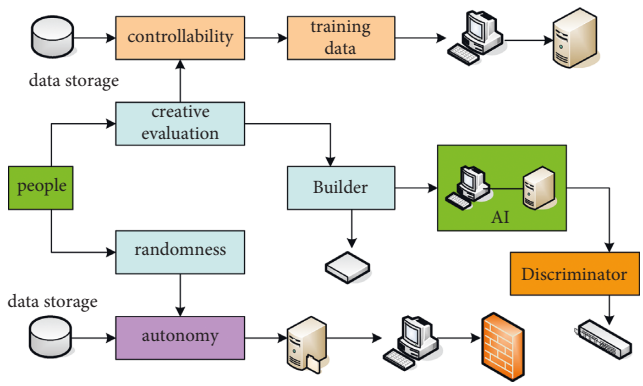

Figure 1: The presentation form of the AI art system.

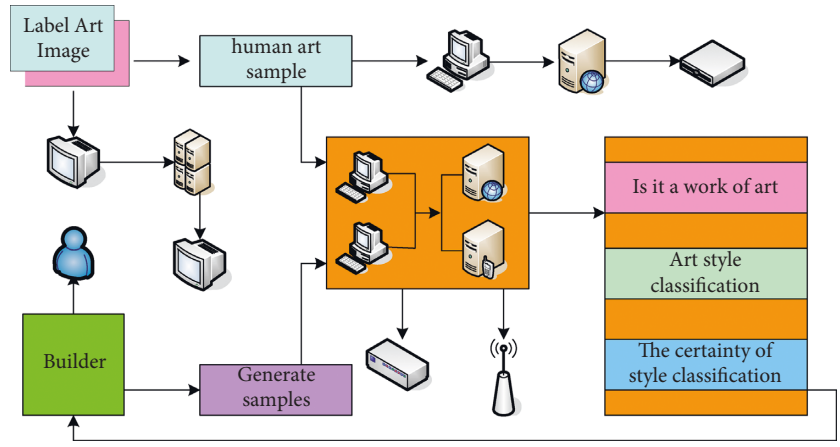

Figure 2: Basic architecture of creative adversarial networks.

a maximum value. Compared with the entropy zeroing at the boundary, the inverted cross-entropy tends to be infinitesimal at the boundary. This leads to excessive penalties (underfitting or overfitting) when classifying correctly. The cross-entropy loss function is shown in Figure 3.

Generative Adversarial Networks are essentially a modification of the loss function of Generative Adversarial Networks. It achieves the vision explained in the previous section by adding a style classification loss function and a style ambiguity loss function. To achieve style ambiguity, a loss function needs to be designed. This enables the generator G to generate images while maximizing the entropy of the generated images. In this study, in order to facilitate the operation, the maximization operation in this step is equivalently transformed to minimize the average distribution of the cross-entropy after the reduction. To prevent overfitting and underfitting, if the probability of the generated image being classified as a certain artistic style is higher than a certain threshold, overpenalization is performed using cross-entropy. Conversely, if the probability of starting the classification of the generated image is too high, the loss function will increase sharply. This results in a fitting span that is too large, possibly past the point of best fit. Therefore, it is necessary to redefine the loss function with different adversarial objectives [14] as follows:

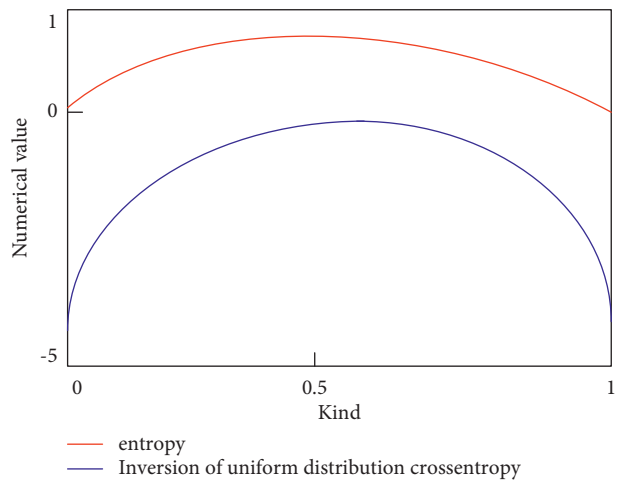

Figure 3: Cross-entropy loss function.

$$\min_G \max_G V(D,G) = E[\log D(x) + \log D_c] + E[\log D_r(x) + D_c], \tag{15}$$

where $D_r(x)$ is the transformation function that attempts to distinguish between existing artistic images and generated images; $D_c(x)$ is the function that differentiates between

different artistic styles and estimates the loss. The entire network is trained with the TensorFlow framework on an NVIDIA GeForce GTX 1060 Ti GPU. The software information used in the experiment is shown in Table 1.

The steps of image generation by creative adversarial network are as follows:

Step 1. It extracts random noise from the latent space.

Step 2. It uses random noise to generate image A using generator G.

Step 3. It uses the discriminator D to judge whether the generated image A is "art or not" and continues if it is "yes."

Step 4. It performs "artistic style classification" on the generated image A. It continues when the "Art Classification Uncertainty" is greater than the threshold.

Step 5. It upgrades the discriminator D according to the classification result.

Step 6. It extracts and generates the intermediate layer A' of the contour feature of the image A, A.

Step 7. It generates the target object image B.

In this article, the generator G and the discriminator D are trained using a round-robin approach. It trains the generator for a certain number of times after the discriminator has been trained for a specified number of times, and so on.

In the end, the discriminator with the optimal solution will be obtained [15]:

$$D1(x) = \frac{p(x)}{p_1(x) + p_2(x)}, \tag{16}$$

where $p_1(x)$ represents the probability distribution of the real data.

The formula for KL divergence is as follows:

$$\mathrm{KL}\left(\frac{p_1}{p_2}\right) = E\log\left(\frac{p_1}{p_2}\right). \tag{17}$$

The formula for the KS divergence is as follows:

$$\mathrm{JS}(p_1 p_2) = \frac{1}{2}\mathrm{KL}\left(p_1\frac{p_1 + p_2}{2}\right). \tag{18}$$

It uses KL divergence and KS divergence for formula simplification:

$$\mathrm{JP} = 2\mathrm{JS}(p_1 p_2) - 2\log 3. \tag{19}$$

In the case where the discriminator is optimal, the objective function of the generator is essentially equivalent to optimizing the JS divergence between the true distribution and the generated data distribution.

Table 1: Software information used in the experiment.

Serial number	Software	Version
1	Operating system	Microsoft Windows 10 Professional 10.0.18156
2	Python	3.6.4
3	NumPy	1.14.3
4	TensorFlow	1.8.0
6	Keras	2.2.2

4. Visual Fatigue Phenomenon Results

Since the feature vector of the generated image in each layer of the neural network has been recorded inside the algorithm, the feature vector transmitted by the middle layer of the neural network is output every certain step and learning depth. It visually detects the one that best reflects the contour features of the original image and reduces the color display range to [0, 255]. It normalizes other noise data to make the contour features more concise and intuitive. The outline features of cats are shown in Figure 4.

The results showed that 12 of the 30 subjects believed that the image was generated by a computer. This shows that this part of the subjects quickly felt the difference between the image and the existing human artwork. That is to say, for them, the image losses the discussion premise of artistic creativity (general generative adversarial network is shown in Figure 5(a)). Another 18 subjects believed that the image was created by humans, indicating that the generated image used in this experiment successfully deceived 60% of the subjects. In this experiment on the common generative adversarial network and the common creative adversarial network, the deception ratios are 53% and 35% (the common creative adversarial network is shown in Figure 5(b)). This shows that the optical illusion image generation system based on the creative adversarial network constructed in this study has stronger functionality in imparting creativity to the generated images than various algorithms before optimization.

In the following, this article will compare three generative networks on the CIFAR-10 dataset and the CelebA dataset through the above evaluation methods: a progressive generative adversarial network based on multilayer feature constraints, a traditional deep convolutional neural network (DCGAN), and LAPGAN. The comparison results of the generation quality of MC-GAN on the CIFAR-10 dataset are shown in Table 2.

It can be seen that on the CelebA dataset, when generating images of size 64×64, DCGAN and CAN proposed in this article are 10.61 and 11.10, respectively. The difference is not very big, and the generated quality is very high. When generating images of size 356×356, the inception score of DCGAN is 4.60. The inception score of CAN is 6.51, which is much higher than the inception score of DCGAN. Therefore, it is verified by comparative experiments that the quality of the algorithm in this study is much higher than that of DCGAN in generating high-resolution images. The generation quality comparison of the CelebA dataset is shown in Table 3.

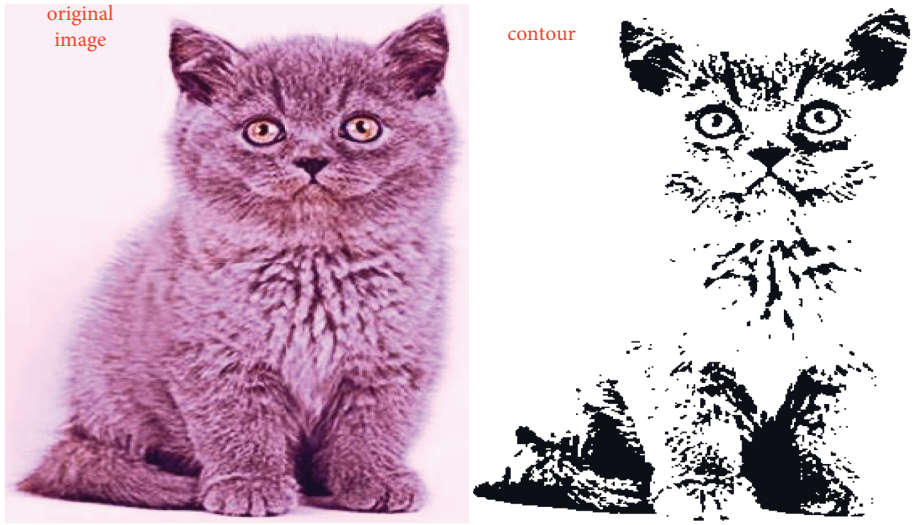

Figure 4: The outline feature output of the cat.

On the CIFAR-10 dataset and CelebA dataset, the proposed methods such as CAN, DCGAN, and LAPGAN are used, respectively. Each of them generates 1000 generated samples and uses the MS-SSIM method to calculate their respective MS-SSIM values. The diversity comparison of dataset MC-GAN is shown in Table 4.

The diversity comparison corresponding to the CelebA dataset is shown in Table 5.

When answering the liking of the generated images, 2 subjects gave less than 1 point, accounting for 7% of the total. This indicates that the generated image has an extreme effect on some subjects when stimulating the arousal potential. Excessive stimulation situations were not completely avoided (likeability, and novelty statistics are shown in Figure 6(a)). In total, 45% of the subjects scored below 2.5, while 55% scored above 2.5. This shows that the generated image has a 10% advantage in delivering hedonic stimuli with higher aesthetic preference than hedonic stimuli with lower aesthetic preference. It reflects that the generated image is more in line with the aesthetic concept of the subjects and can bring them a certain aesthetic enjoyment (complexity, authenticity statistics are shown in Figure 6(b)).

The purpose of this experiment is to learn from the subjects the extent of the optical illusion experience and to evaluate the system's mastery of the types of optical illusions. The experimental results show that 22 subjects believe that the generated images contain nonnative content (as shown in Figure 7(a)), accounting for 73.3% of the total. There are 16 people who can directly point out the content of this part, accounting for 53.3% of the total. In total, 20 subjects were able to find the location of the inserted content, accounting for 66.7% of the total (as shown in Figure 7(b)).

In the experiments on the CIFAR-10 dataset, it uses multiple versions of PC-GAN proposed in this study and existing algorithms such as DCGAN, PG-GAN, and BEGAN to generate 1000 generated samples each. They averaged their respective MS-SSIM values using the MS-SSIM method. The value of its MS-SSIM is shown in Table 6.

Under normal circumstances, warm colors, solid colors, high-brightness colors, strong contrasting colors, large-area colors, and concentrated colors have a feeling of progress. Moreover, cool colors, turbid colors, low lightness colors, weak contrast colors, small area colors, and dispersed colors have the meaning of retreat. The recognition distance of color is closely related to the background. The stronger the contrast, the farther the recognition distance. The closer the brightness is, the is closer the recognition distance. On the yellow background, purple can identify 12.5 meters, and purple can identify 9 meters (red, yellow, cyan, and black backgrounds are superimposed as shown in Figure 8(a)). On the red background, yellow can identify up to 8.5 meters, green can identify 1.2 meters, and purple can identify 3.7 meters (orange, green, purple, and white background superimposed as shown in Figure 8(b)).

The arrangement can affect color optical illusions. After a series of explorations, the arrangement forms can be roughly divided into two categories: grid type and free type. The free arrangement is more reflected in post-modern style design works, advocating natural beauty, and casual beauty. However, no matter what form of arrangement, in order to achieve the desired design effect, graphics, text, and colors must be perfectly combined. As long as there is a failure in one item, it will drag down the overall effect. For example, in Figure 9, the *a* layout adopts a layout in which text and pictures are separated, while the *b* layout adopts a layout in which the text surrounds the picture. If the designer's purpose in a layout is to highlight a picture with an optical illusion of color, then the layout of the *a* layout is more successful. In the *b* layout, a large number of words form a gray color as a whole. It is similar to purple and gray in the simultaneous contrast illusion of color. It weakens the highlights that were originally intended to be expressed through the optical illusion of color. Different versions of the color illusion are shown in Figure 9.

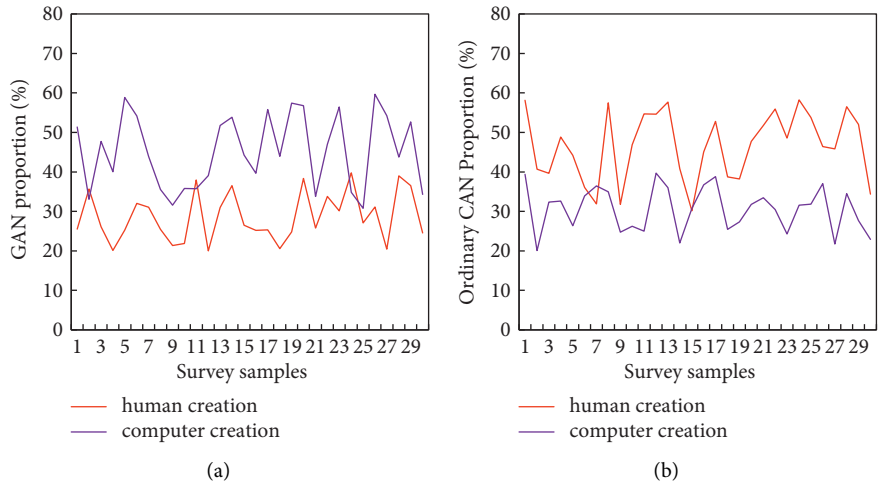

Figure 5: Online creative evaluation. (a) Common generative adversarial network. (b) Ordinary creative adversarial network.

Table 2: Comparison of MC-GAN generation quality for CIFAR-10 dataset.

Web framework	Inception score (32×32)
CIFAR-10 dataset	8.00
DCGAN	5.32
BEGAN	6.56
PG-GAN	8.54
CAN (our method)	7.66

Table 3: Comparison of generation quality of CelebA dataset.

Web framework	Inception score (64×64)
CelebA dataset	17
DCGAN	10.61
CAN (our method)	11.10
BEGAN	11.31
PG-GAN	13.51

Table 4: Dataset MC-GAN diversity comparison.

Model	MS-SSIM value
Our method	0.22
DCGAN	0.31
PG-GAN	0.43

Table 5: Diversity comparison corresponding to CelebA dataset.

Model	MS-SSIM value
Our method	0.32
DCGAN	0.34
PG-GAN	0.38

5. Discussion

The generation of visual fatigue, the response in the computer terminal, is particularly significant. With the development of technological life, computers have become the main part of the work life. The image on the computer screen is unstable. The page information is constantly refreshed, and the screen is glowing. We face these display devices with the eyes all the time. At present, whether reading documents, browsing news, or appreciating documents, most of them need to be done on the computer. This places high demands on the web design of computer equipment.

In the process of graphic creative design, the application of color should ensure the effective expression of graphic connotation and meaning. In the color application, in order to highlight the contrast, the applied color contrast methods mainly include "continuous contrast" and "simultaneous contrast." In the process of color comparison, the visual experience of the two color contrasts is clearer. Three or more color contrasts may bring some confusion to people's visual experience. The application of color optical illusion in graphic creative design is more to reflect the visual effect of graphic creative design. If the color application is more, it may cause visual harm, which leads to the deviation of the original idea of the graphic creative design. It can be seen that in the process of graphic creative design using the principle of optical illusion, we should pay attention to the balance and coordination of colors. It simplifies the color application based on the realization of the final purpose. It ensures that the application of color can highlight the artistic effect rather than causing the confusion about the artistic effect.

Poor web design results seriously affect reading speed. It can also cause sore eyes, astringent eyes, and other visual fatigue. At the same time, it will also cause the user's psychological irritability. The human eye maintains a certain distance when looking at the screen. After maintaining this state for a period of time, the eyes will suddenly appear tense. At this time, the use of the eyes has reached a limit. The eyes change from tension to relaxation, and after an instant relaxation, it will cause a certain blurred vision, which will cause visual fatigue. There are visual factors and nonisual factors for reading fatigue factors in web pages. In the process of reading, objective visual factors play a certain role, such as the typesetting of web pages, font size, font size, and the contrast between text and background color. Too large or too small fonts are easy to cause people's reading fatigue, but sometimes it varies from person to person.

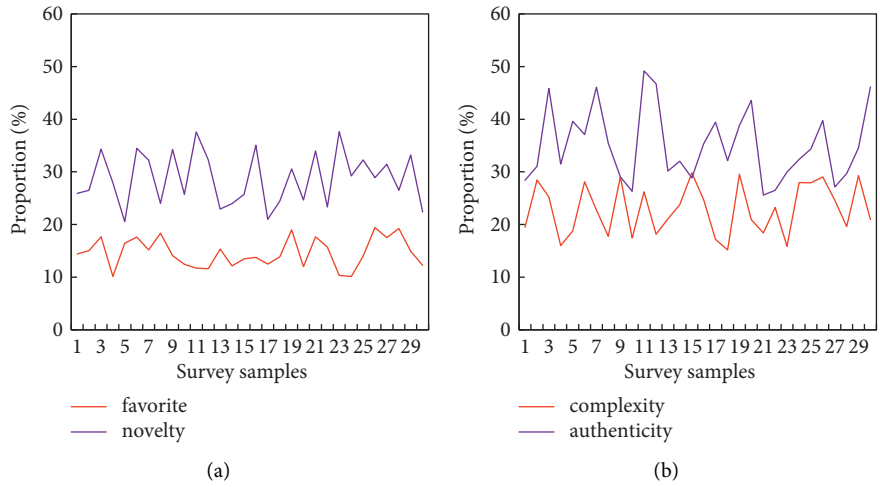

Figure 6: Likelihood of generated images. (a) Likeability and novelty. (b) Complexity and authenticity.

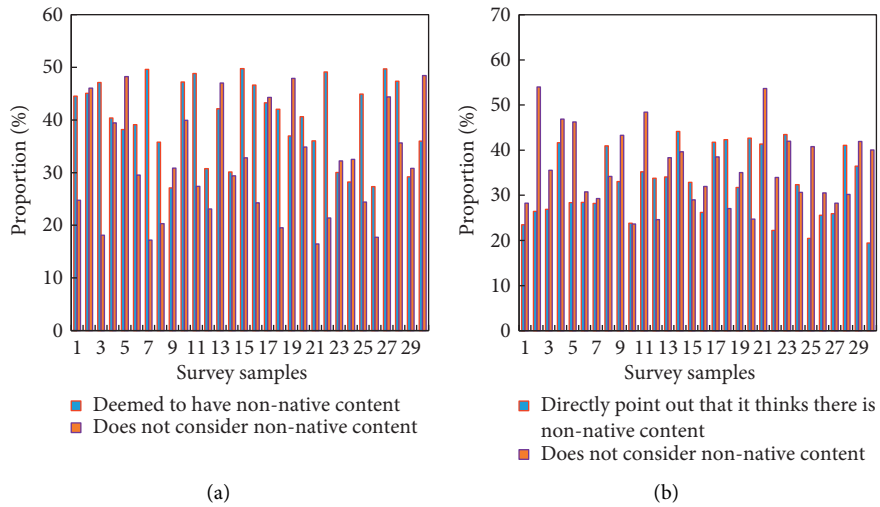

Figure 7: Understanding the extent of optical illusion experience. (a) Deemed nonnative content and nonnative content deemed nonnative. (b) It directly states that it believes that there is nonnative content and that the location can be found.

Therefore, the defects of artificial intelligence art are not only due to the lack of technical level but also due to the conflict of ideas and out-of-position thinking in human society. The ideal trend is that art should retain the pure part, and at the same time, it should also accept the popularization and pan-entertainment of artistic practice activities. In this way, artificial intelligence art can handle issues such as artistic style expression and drawing skills. It helps ordinary people to broaden their artistic practice ability. It actively tries to create art and enhances the active atmosphere of art in society as a whole.

From the modal point of view, artificial intelligence art is equivalent to conceptual art or performance art. Although this view generalizes the act of using artificial intelligence as an artistic means of conveying avant-garde temperament, it also makes artificial intelligence more general as a tool. In essence, it can only retain the old concept of the new technology shell. A major feature of artificial intelligence art is that it reflects the transfer process of creative functions from human to artificial intelligence. Therefore, with the change in the degree of transfer, there will be huge differences in the specific methods adopted by artificial intelligence art and the final effect of the works.

Table 6: CIFAR-10 dataset experimental data.

Web frame (resolution 32×32)	MS-SSIM
DCGAN	0.3665
BEGAN	0.4098
WGAN	0.3342

Visual distractions greatly affect the visual effect of browsing the web. Excessive decorations, unnecessary elements, infinite looping Flash animations, malicious plug-ins and annoying pop-ups, and some flickering of station carousel screen transitions all cause visual disturbance and lead to visual fatigue. Too much decoration in the background

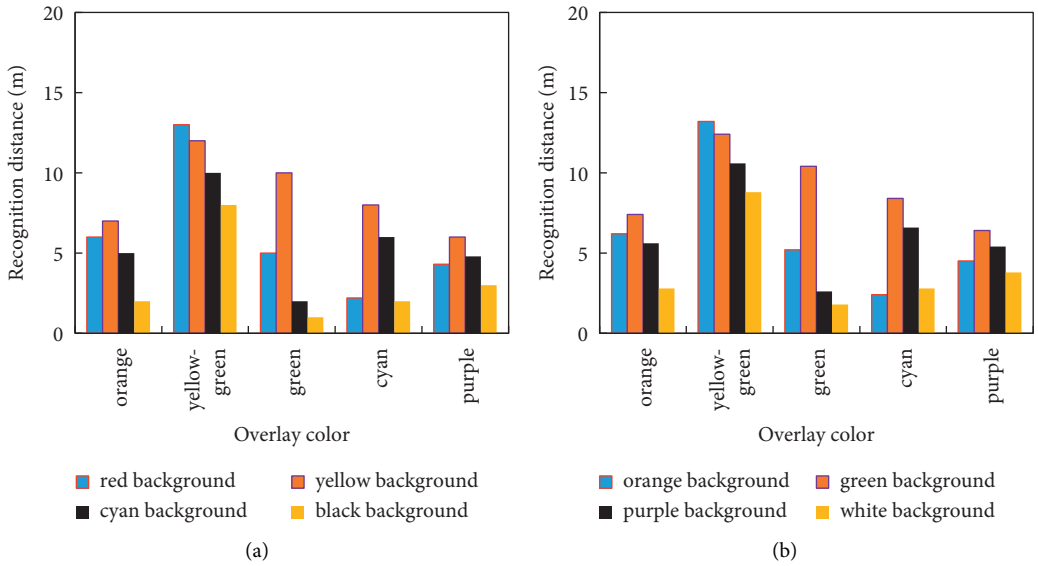

Figure 8: Recognition distance after background overlay. (a) Red, yellow, cyan, and black background overlays. (b) Orange, green, purple, and white background overlays.

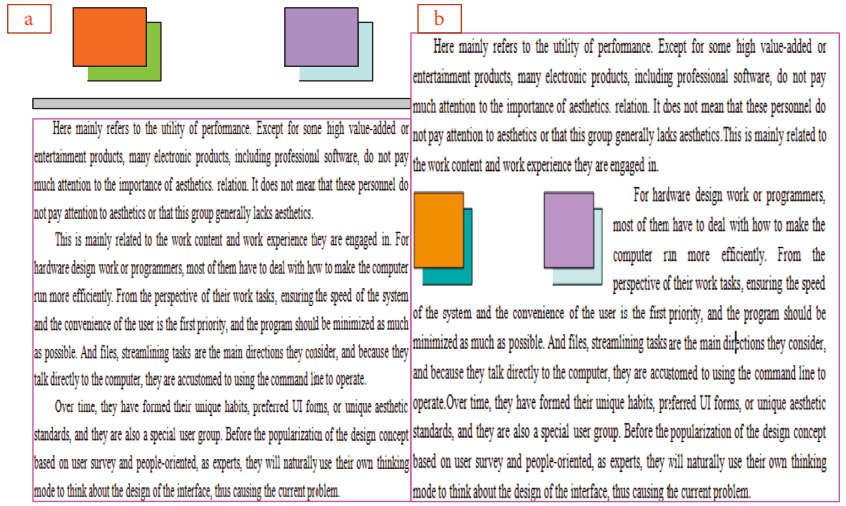

Figure 9: Different versions of the color illusion.

makes the eyes wander when trying to concentrate on this web page. Some typographic design, social media, and other elements make the surroundings produce a strong visual effect. The decor is just something added for visual appeal. It might be unnecessary underlines, extra italic styles for bold text, and borders around the page. These elements may exist to capture the user's visual interest but are somewhat self-defeating. If an element on a page does nothing to convey a message, it probably does not need to appear on the page. If present, it is likely to cause a visual disturbance. Prolonged viewing will cause visual fatigue.

From another point of view, the principle of optical illusion belongs to art culture. It has a certain cultural connotation and reflects people's feeling state of graphics. When applying the principle of optical illusion, it is necessary to form a kind of vibration beauty, which can reflect the profound artistic conception. However, in the specific application process, because the design ignores this problem, it will affect the artistic expression of graphics, and it is difficult to highlight the application effect of optical illusion. Therefore, combined with the above analysis, in the process of applying the principle of optical illusion, we should pay attention to grasp the problems existing in the application of the principle of optical illusion. In the selection of application methods, it is necessary to be able to properly correct the optical illusion. It is necessary to grasp the value connotation reflected by the principle of optical illusion. It is necessary to apply the principle of optical illusion reasonably in order to better carry out visual communication design.

Reflection of the intrinsic value of the principle of optical illusion: the principle of optical illusion grasps and analyzes the combination of graphics and texture in the process of

value embodiment. It uses an illusion phenomenon to greatly increase the visual impact of the graphics. In the specific design process, the symbiosis, intersection, splicing, or decomposition of graphics is an important way to express the creativity of graphics. However, some designers only consider the external image design in the process of graphic design. This enhances the color of the graphics and the visual impact of the graphics. It ignores the connotation of graphic design. Although this kind of design can attract people's attention in a short time, it will soon lose its vitality and bring visual fatigue.

The application of the principle of optical illusion, on the surface, is contrary to the laws of our daily life, and it does not conform to the conventional way of thinking. Under this circumstance, visual communication design is bound to bring greater visual stimulation to people. However, under this kind of stimulation, whether it can contain the theme meaning has a great influence on people's visual perception. From another point of view, the principle of optical illusion belongs to art culture. It has a certain cultural connotation and reflects people's feeling state of graphics. When applying the principle of optical illusion, it needs to form a kind of vibration beauty, which can reflect the profound artistic conception. However, in the specific application process, because the design ignores this problem, it will affect the artistic expression of graphics, and it is difficult to highlight the application effect of optical illusion.

6. Conclusion

With the rapid development of the Internet, information networking has gradually promoted the development of economic globalization, posed a great threat and impact on the survival of traditional industries, and affected the market development and operation of traditional industries. This article analyzes the occurrence of visual fatigue in visual communication design from the dual perspectives of visual physiology and visual psychology. Under the theoretical guidance of visual aesthetics and psychological adjustment, this article analyzes the phenomenon of visual fatigue in the current design, summarizes it in blocks, and then gives a design method to relieve visual fatigue so as to avoid visual fatigue in the current visual communication design. The article also provides guiding suggestions to reduce visual fatigue in visual communication design to achieve the most comfortable visual experience. The article only mentions artificial intelligence as a way to relieve fatigue and will explore other ways in the future.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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