

Analysis of Interaction Between Designers and AI Tools in the Digital Context of Visual Design

Xiangyang Bian¹ & Yimeng Shi¹

¹ Fashion & Art Design Institute, Donghua University, Shanghai, China

Correspondence: Xiangyang Bian, Fashion & Art Design Institute, Donghua University, Shanghai, 200051, China. Tel: 86-188-0592-7162. E-mail: 532348478@qq.com

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Abstract

Diversity of vision, which is the most complex product of human creativity. The complicated data and information enter the visual space in a diversified form, and the audience can communicate with each other through feeling and perceiving the atmosphere. There is a relationship between the generation and transmission of emotion and the information we receive, and the two complement each other. Modern society is full of digital cues and real-world feedback. In the past, without large-scale industrialization, people only need to interpret the relationship between people and things, but in the current situation, people are gradually independent from space, and the connection between people and artificial intelligence is filled with the whole modern society. Especially as designers, we need to look at the relationship with AI tools from an open mind, rather than a traditional design approach, so that our design work can keep pace with The Times.

Keywords: visual design, artificial intelligence tools, creativity

1. Introduction

Artificial intelligence is an umbrella term relating to machines that have the ability to perceive, synthesize, and infer information (Köymen & Hoşer, 2023). In science fiction movies, AI is often portrayed as an omniscient consciousness that is superior to humans at almost any task. Although today's technology is still far from artificially reconstructing the human brain, AI applications have often surpassed human intelligence at assigned tasks, such as natural language translation, chess, and so on. With the advent of deep learning techniques, early machine learning methods excelled at most tasks. Deep learning refers to the creation of artificial neural networks in which inputs are processed in different levels of neurons in an attempt to mimic the learning process of the human brain. Today, such algorithms define the state of the art in many disciplines, such as computer vision and speech recognition.

2. The Purpose

This study analyzes trends in AI image creation tools and how this new type of tool will affect designers' workflows as well as their design outputs. And explore the feature of creating images using Midjourney in the AI image creation tool, and how designers can use this feature to serve their own designs.

3. Method

The research method of this study is case study. Firstly, through the literature research at home and abroad, the concept of artificial intelligence and the background of artificial intelligence image creation tools, as well as the types and characteristics of artificial intelligence image creation tools are clarified. Secondly, it analyzes the image case of artificial intelligence image creation tools, and what help such images can bring to designers' design practice.

In this study, Midjourney was chosen as the AI image creation tool.

4. Visual Design and Digitalization

As the amount of information to be processed in the design process has increased, human information processing capacity has rapidly become overloaded. Additionally, the complexity of the products being developed is increasing, which has led to the need for automation support tools that can be integrated throughout the design process. In traditional design solutions, the designer was always viewed as a cognitive system, so in the current

design field, the combination of humans (viewed as decision-makers) and automation tools (viewed as assistants to decision-makers) maximizes the additional cognitive capabilities in the decision-making process (Woods, 1985).

Designers have always used tools, ranging from pencils to CAD to 3D printing. The availability and the transformative power of these tools have, in turn, influenced the designer's workflow and their creative output - design. Now, there is a new tool: generative artificial intelligence (AI). Generative AI uses deep learning algorithms to generate creative outputs based on given inputs (such as images, text, videos, and sounds) referred to as "prompts". For example, the prompt "create a puma wearing Burberry clothing" would generate various computer-generated a puma wearing Burberry-branded windbreakers and checkered shirts, as shown in the image below (Figure 1). Although AI and parametric generative design have a long tradition, recently, this technology has made significant progress, such as generating realistic videos, high-resolution scalable patterns. So, how will this new tool impact the designer's workflow and their design output?



Figure 1. The author used Midjourney to generate: Puma wearing Burberry clothing.

Artificial intelligence (AI) mapmaking tools have the advantage of supporting deductive reasoning, which allows them to easily generate a large number of preliminary options at the same time. The different levels of automation reflect the substitution of human physical and control abilities for tasks in the process. Additionally, these tools have huge data storage and computing capabilities, which enable them to provide different types of prescriptive analysis that humans do not have the time or ability to conduct. However, AI tools still lack inductive reasoning, which is usually associated with human creativity. In fact, humans have difficulty processing multiple hypotheses at the same time, but are capable of inductive reasoning. Some people used to believe that these automated tools would eventually replace designers in the design process (Ningning & Rong, 2023). But in reality, designers will continue to play an important role, but this role is changing, so it is necessary to establish interaction between automated systems and humans.

Therefore, the author aims to study the role of AI tools as interactive designers in task execution, especially in design tasks, and how to explore the interactive nature between designers and AI software, i.e. the degree of interaction between the two parties, which is the focus of the author's research. It remains to be seen whether AI will lead the way in design or whether designers will create more adaptable AI programs.

In the field of computer vision, the algorithms' image generation capabilities can significantly improve over time, such as for enhancing information visualization levels and speech recognition. With the advancement of technology in GPT-2, GPT-3, and the latest GPT-4 (Open AI, 2023) have been developed, which can interpret and generate text by selecting keywords. These algorithms can be considered the foundation of generative AI. Generative AI tools allow users to provide a set of initial requirements or examples, such as keywords, images, or videos, which are processed by neural networks (Open AI, 2023). The results can be comprehensive or optimized. Different keywords, word orders, and descriptions will all affect the AI's interpretation and analysis of keywords, so some people believe that mastering AI tools requires a significant amount of time to study their design and production methods and logic. Only when the interaction between designers and AI software is unobstructed can the designers achieve their original design goals (Passalis & Doropoulos, 2021).

Therefore, it can be said that the development of digital technology has promoted the technological update of visual communication design.

5. Creativity and Artificial Intelligence Mapping

Take AI software Midjourney as an example, Midjourney uses a powerful large language model to read and interpret the text prompts provided by designers. This language model has the ability to understand your

description of the Subject, Medium, Environment, Lighting, Color, and Mood (Figure 2) . It can be compared to a universal translator of creativity, which will interpret your words and convert your creativity into a unique "design clue" that seeds the essence of your description in code. This "design clue" is then encoded into a potential vector, which plays an important role in the image generation process. As the initial "clue", it is similar to the designer's initial stage of creating a sketch in their mind, and the vector becomes the raw material for creating artworks.

Through this method, Midjourney converts the text prompts into the initial data required for the specific image generation process.

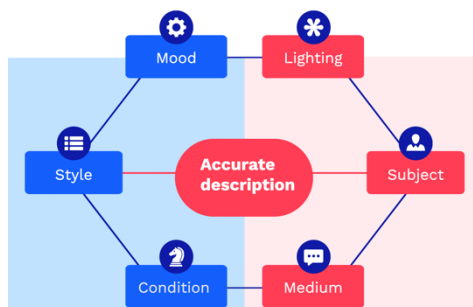


Figure 2. Self-made pictures by the author: The Descriptive clues.

6. Discussion: How Is Designer's Visual Perception Different from Artificial Intelligence's Image Perception?

The language model' The concept of artificial intelligence can be understood in more detail by roughly dividing it into four areas: analysis, big data, deep learning, and image recognition. First, analysis is a method of machine learning. It is a concept that aims to quickly obtain the next answer by statistically analyzing the data obtained from each processing result (KÖYMEN & HOŞER, 2023).

Big data is a concept of processing data by relating it to a large amount of data, while image recognition is also known as computer vision, which is part of machine vision, meaning that the computer recognizes image data (Dubberly & Pangaro, 2023).

However, AI image recognition is a technology that identifies individual objects, such as dogs or cats, by probabilistically finding the most similar object by comparing the computed value of the input image with the computed value of the labeled data (Buzzaccarini et al., 2024). This is done in a completely different way from how we perceive the image, so we often find images generated by Midjourney quite strange, but it is difficult to pinpoint exactly what is wrong. This is because AI-generated images enter our visual perception in a similar but unreasonable way. The following image was created by the author using Midjourney (Figure 3), where the author prompted as: "A group of cheetahs sitting on a Chinese street reading books." By looking at the two images below, we can find many unreasonable places, especially the areas outlined in green by the author with a green dashed line. AI blurs the cheetah's inherent features and simply searches for algorithms that process images by finding similarities in their outlines and colors.



Figure 3. The author used Midjourney to generate: Cheetahs reading books on the streets of China.

Designers often rely on more than just external contours when it comes to grasping cues for features. The author created the image below based on the pattern, where the viewer can recognize the animal just by its features. The author extracted the cheetah's gaze, the black tear line on its face, and omitted its body patterns and used only the cheetah's golden yellow as the background to make the viewer recognize it as a certain animal at a glance (Figure 4). The designer's visual perception comes from their level of creativity. Creativity can be understood through the iterative integration.



Figure 4. Self-made pictures by the author: Features of a cheetah.

7. AI tools for Designers

From a graphic design point of view, in combination with AI drawing tools, not only can provide designers with ideas and inspiration, here AI serves as a system for analyzing input commands and creating visual effects, but at the same time, it also provides designers with an interdisciplinary and broad field of work (Paulus & Kenworthy, 2019). In addition to art and graphic design, it can be used in many different fields (Jeeyong, 2020). In the 21st century world, art and design continue to find new and evolving channels.

Artificial intelligence is one of these new mediums, which not only opens unlimited doors for designers, but also helps them quickly create complex images that designers thought were impossible. This is achieved by analyzing various data and using cognitive abilities to check whether different objects are relevant to the design (Song et al., 2022). The AI system is also able to select appropriate colors, styles, backgrounds, layouts, and overall layouts. These capabilities of AI can allow designers to save more time and cost in the process. Today, manual work has been automated due to the opportunities provided by technology, and AI can optimize the design process and save time. For example, the artificial intelligence design system can quickly draw a design idea. The author used Midjourney to generate illustrations about Shanghai street scene (Figure 5), prompting words: Shanghai, rivers, boats, clouds, buildings. Such an illustration provides a big frame for picture design. In terms of composition and tone, it can be used as a reference for the author and save the time of arrangement and combination. Here, designers need to conduct research and classification, sort out and simplify key information in design thinking, and deliver it to artificial intelligence tools in an optimal way to facilitate deep learning model construction (Kicinger et al., 2005).



Figure 5. The author used Midjourney to generate: Street scene illustration of Shanghai.

8. Conclusion

The digitalization of industry and the so-called Industry 4.0 revolution provide new opportunities to discuss design activities and supporting tools. In particular, advances in artificial intelligence and data-driven design tools have enabled us to rethink the role of designers and decision AIDS in the design process (Forsgren & Schröder, 2023). The traditional view of designers at the center of the design process is changing, and tools that serve only as support are developing a sense of autonomy, and at the same time, humans are controlling the direction of this autonomy.

Analyzing the characteristics of the images generated by AI tools is also an effort to better understand how AI tools can better integrate and assist designers in performing their design activities. Designers strike a balance between AI and design practice, and the combination of their creativity and technology can achieve excellent results. The speed and efficiency provided by AI will improve designers' workflows, while human emotion, originality, and aesthetic understanding will add meaning to the depth of design.

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Figures

Figure 1. Puma wearing Burberry clothing.

Figure 2. The Descriptive clues.

Figure 3. Cheetahs reading books on the streets of China.

Figure 4. Features of a cheetah.

Figure 5. Street scene illustration of Shanghai.

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