Ioana Catalina ENACHE, Narcisa Elena VALTER, Florin Felix RADUICA, Oana Roxana CHIVU

INTEGRATING ARTIFICIAL INTELLIGENCE INTO THE PHOTOGRAPHIC DESIGN PROCESS

Abstract: *This paper explores the impact of using Artificial Intelligence (AI) in the photographic design process. In the context of rapidly evolving technology, AI applications have become increasingly prominent in various fields, including the photographic industry. This study examines how advanced machine learning and image processing algorithms can improve and simplify creative processes in photography. The main issues addressed include the use of AI in automatic image selection and editing, automatic identification of relevant subjects and generation of artistic effects. These technologies bring not only efficiency but also an increase in the quality of the final results. The paper also highlights the ethical issues associated with the use of AI in photographic design and the importance of human control in these automated processes. The study draws on current research in AI and photography, examining practical applications of existing technologies and exploring future prospects. The results indicate that the intelligent integration of AI into the photographic design process can bring significant benefits, but it is essential to consider ethical issues and maintain a balance between human creativity and automation.*

Key words: *AI, editing image, photography, artistic effects.*

1. INTRODUCTION

In the realm of visual storytelling, photography has always been a powerful medium capable of capturing the essence of moments, emotions, and landscapes. Over the years, technological advancements have continuously pushed the boundaries of what is possible in the world of photography. One of the most transformative innovations in recent times is the integration of Artificial Intelligence (AI) into the realm of image editing [1]. As we stand at the intersection of art and technology, AI is reshaping the landscape of photography, offering new possibilities for artists and for enthusiasts [2]. This article delves into the exciting frontier where AI and photography converge, exploring the profound impact of AI-powered image editing on the creation of artistic effects.

The days are gone when editing photos was just about adjusting contrast, brightness and color balance. Today, AI algorithms, fueled by vast datasets and sophisticated neural networks, have ushered in a new era of creative expression [3]. From enhancing details to generating entirely new visual elements, AI is becoming an indispensable tool for photographers seeking to push the boundaries of their craft.

This article aims to unravel the intricate ways in which AI is revolutionizing image editing, enabling photographers to achieve unprecedented levels of creativity and artistic flair. We will explore the various artificial intelligence-based techniques that generate artistic effects, from realistic enhancements to surreal transformations, and how these innovations redefine the very essence of what it means to be a visual artist in the digital age.

2. EVOLUTION OF ARTIFICIAL INTELLIGENCE

Beginning with the introduction of computers in the 1950s, which required human interaction to operate, researchers committed almost fifty years to developing these machines' autonomous learning capabilities [4]. This advancement represents an important milestone not only in the field of computer science, but also in different businesses and human civilization as whole [5]. Essentially, computers have evolved to the point where they can do innovative jobs autonomously.

The path to artificial intelligence (AI) has been marked by an unwavering quest of increased computational autonomy. We have seen a paradigm change since the early days of computers that required explicit human directions, with machines today capable of tackling complicated issues on their own [6]. Artificial intelligence (AI) applications are increasingly expanding beyond the commercial and service industries to include industry and agriculture. This growth emphasizes the rising significance and broad usage of the general technology and underlying technological elements that support AI. As AI evolves, its influence grows in areas that have historically relied on manual operations [7]. The introduction of AI into manufacturing processes streamlines production, increases efficiency, and paves the path for more flexible and responsive operations. In agriculture, AI is transforming practices, providing precision farming solutions, and improving resource efficiency.

The growing use of AI in a variety of industries highlights not just its adaptability, but also the importance of its key technological capabilities. These key components, ranging from machine learning algorithms to neural networks, are influencing AI's disruptive influence across sectors.

In essence, the increased integration of AI into industry and agriculture represents a paradigm change in how technology is used to address difficulties and increase production across a wide range of areas. As AI's skills grow and adapt, its application is poised to reshape existing processes, boosting innovation and efficiency in

(a)

(b)

Figure 1. PIXLR - AI-generated images

industries where its promise is only beginning to be realized.

3. VISUAL COMMUNICATION AND ARTIFICIAL INTELLIGENCE

One of the most important modern issues in the world of professional graphic design is the influence of novel technologies, which are becoming more and more common.

Beginning with the revolution in digital printing that occurred in the latter half of the 20th century, which at one point empowered graphic designers, new technology has contributed to the popularization of design, providing amateur practitioners with more access to different aspects of the field.

Due to pragmatism and emerging technologies, many non-design companies gradually began to include graphic design services that were previously provided only externally to accelerate the production of necessary, but non-creative, design materials [8].

Artificial intelligence (AI) in graphic design mainly helps to speed up procedures and, some claim, boost creativity by giving designers more options for a particular assignment. Artificial Intelligence (AI) has an edge over human intervention since it can evaluate large and diverse datasets and forecast or even create the best design for a given application. The main method used to accomplish this is machine learning, which simulates the process of learning new information by humans. In order to extract information and produce outputs from input data, algorithms use a variety of strategies. As they are exposed to more training examples, they gradually improve their performance.

AI is used in many graphic design tasks, such as image processing, choosing fonts and colors, creating different layouts and compositions, customizing and researching users, and process automation.

Many AI-powered applications have been developed for image editing, simplifying traditionally time-consuming and arduous operations. As an example, Adobe Sensei, a collection of artificial intelligence and machine learning technologies incorporated into Adobe's creative tools, uses a variety of AI algorithms to optimize images and videos, improve the accuracy of complex selections, automate repetitive tasks, and enable intelligent search and content discovery [9].

When thinking about cloud-based editing tools, Autodesk's PIXLR should be emphasized. Numerous AI-driven tools are integrated into this platform, such as AI cutout, which allows for accurate backdrop selection and removal from photos, an AI backdrop Replacement Tool, which makes automatic background changes easy, and features that allow for image enlargement without compromising quality. To understand how such a program works, let's take as an example the process of creating an image using the given description - I want the picture of a girl living on the moon reading about the earth along with her favorite plush toy.

Figure 1 illustrates the exceptional quality of the data that were produced. The resulting photographs are remarkably clear and faithful to the original description, and they are highly detailed. It is also clear that the composition aspects of each description have an impact on the image quality. Figure 1 illustrates the notable distinctions between the variations a and b.

These minute changes in the outcome show how the computer can comprehend and bring to life various elements of the provided description, thereby adjusting to the user's requirements and preferences. Overall, the high caliber and variety of the outcomes demonstrate the effectiveness and adaptability of AI technologies in the field of image creation, providing users with a wide range of options. Using this tool, two images were generated in 7 seconds.

Gencraft uses AI technologies, which, through machine learning algorithms and natural language processing, interpret and transform words entered by the user into graphic images. By understanding the meaning of the words and the context in which they are used, then generating relevant images based on this information.
Using this tool, two images (Figure 2) were generated in 7 seconds.

Figure 2. Gencraft AI-generated images

Dream Studio is a platform with a wide customization palette. One of its standout features includes a "negative prompt" that lets users indicate items they want to keep out of the final picture.
Users may also easily change the image ratio, which is important because a lot of AI image generators automatically create images with a 1:1 ratio.

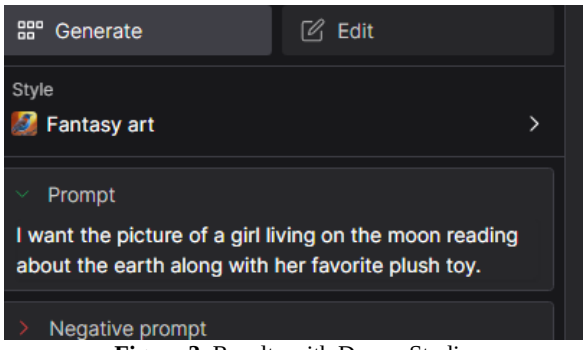

Figure 3. Results with Dream Studio

Figure 4. Dream Studio –fantasy art style

This tool gives users the ability to change the style of taking images. This feature allows you to explore and apply different artistic styles or image editing techniques, helping to diversify and customize the results. By adapting the image style, users can unique and distinctive visual effects, whether they want to create pictures with a pictorial appearance, appeal to a retro style, or experiment with modern editing effects.
This aspect of an image generator tool gives users an extensive palette of options for their creativity and allows them to express their artistic visions and preferences in varied and engaging ways.
In the process of image editing, two distinct styles of realization were implemented: anime and fantasy art. This approach allows bringing a variety of aesthetics into the image, based on the conventions and characteristics specific to each style.
The anime style is characterized by distinctive features such as large and expressive eyes, stylized hair and vibrant colors.
This style is often associated with Japanese culture and aesthetics, being popular in anime and manga productions.
In image editing, the use of anime style can give a distinctive and attractive appearance, capturing the essence and energy characteristic of this genre.
On the other hand, the fantasy art style has its roots in imagination and broad mythology, often featuring fantastic scenes and characters, from mythical creatures to unreal landscapes.
This style is distinguished by elaborate details, rich colors and magical or supernatural elements. In image editing, the application of fantasy art style can add an epic and mysterious dimension, inviting viewers into fantastic and adventurous worlds.

Figure 5. Dream Studio – anime style

The use of Artificial Intelligence (AI) proves to be an effective method for modifying already existing images, adapting them to the precise requirements of the user. Starting from an existing image, we wanted to modify it to create a new presentation image. The process began by uploading the image to the Canva platform, a popular and affordable tool for graphical editing. After the image has been uploaded, we have been able to select the specific areas of the image that we want to edit.

Figure 6. Initial photo

Canva offers a wide range of editing options, including adjustments of colors, contrast and brightness, adding or removing elements, applying artistic filters, and more. On this platform using the Magic Edit eight we were able to generate new images, which correspond exactly to the requirements and preferences indicated. This approach has enabled us to obtain customized and professional images, tailored to our requirements.

Figure 7. Isolated image modification

When partial modification is desired, users can focus their intervention on specific areas of the image while preserving its overall appearance. This approach is useful in situations where you want to improve or correct isolated aspects of the image without affecting its overall appearance (Figure 6).

On the other hand, when choosing for more substantial changes (Figure 8), a significant transformation of the entire visual framework can be observed. In these cases, users can choose to apply changes that affect more aspects of the image, resulting in a deeper and more dramatic transformation of it. Regardless of the level of intervention chosen, the flexible approach offered by the editing platform allows users to customize their images according to their specific preferences and needs.

Figure 8. Substantial changes

We do not always get the best results when trying to modify an image. As you can see in the images shown in the figures below, the results are below expectations.
In the original image, we intended the selected area to be replaced with the image of a white bear. However, the final result did not meet our expectations (Figure 9). This situation illustrates the complex and sometimes unpredictable process of graphic editing, which may require advanced skills and attention to detail to the desired results.

Figure 9. AI unacceptable results

Furthermore, the image's quality and compatibility with the environment and size of the chosen area can have an impact on the final outcome. Inadequate selection of the image to replace may result in inappropriate integration into the base image. The procedure of combining the replacement image with the existing background might be complex and demands extensive graphical editing abilities. The employment of inappropriate or insufficient joining procedures may result in a clear transition between the image to be replaced and the rest of the image.
Images generated by Artificial Intelligence (AI) could be a valuable supplementary tool in the design process. The enormous database underpinning AI systems enables designers to have quick and precise access to important content, assisting in the creation of high-quality products with a consistent visual style. However, there are several issues that may arise when using similar descriptions in image production. They can result in standardization of the output and, implicitly, a loss of aesthetic value for consumers. This emphasizes the significance of a large and diverse AI database to avoid uniformity in created products. It is critical that designers do not rely solely on AI in the design process and set stringent standards for their own aesthetic qualities and originality (Figure 10).

Figure 10. Automatically generated images (left and middle) and artwork drawn by combining them [10]

Artificial intelligence (AI) technology can be successfully used to create logos, providing numerous benefits and potential in the visual design process. AI systems can be trained to develop logo concepts depending on user-specified requirements. This can save time and effort in developing early concepts while also providing a wider range of possibilities for final selection. Finally, one can ask a very pertinent question -Can these works be considered "art"? There are advocates who believe that works generated by artificial intelligence can be perceived as "art" depending on their interpretation and reception by the public [11]. They argue that the ability to evoke emotions and communicate ideas is not exclusively related to the human origin of the creative process.

4. CONCLUSIONS

The use of artificial intelligence in the production of artistic works can cause controversy and debate, as there are divergent opinions about qualifying these works as "art". The main argument against classifying these works as "art" is based on the idea that they are not the result of genuine human creative thinking. According to these critics, the essence of art derives from the artist's ability to express emotions, to reflect artistic trends and movements,

and to develop a unique style through his creations. In contrast, advocates include works made by artificial intelligence in the artistic sphere, arguing that they can be perceived as works of art according to their interpretation and reception by the public. They suggest that the ability of a work to evoke emotions and communicate ideas is not strictly conditioned by the human origin of the creative process. Therefore, even if artificial intelligence is not able to experience human emotions and intentions directly, the works created by it could still be appreciated and interpreted as works of art by the public, thus underlining the subjectivity and diversity of the concept of art in contemporary times.

REFERENCES

[1] Walker, Sue. (2017). Research in Graphic Design. The Design Journal. 20. 1-11.10.1080/14606925. 2017.1347416.

[2] Chatterjee, Anjan. (2022). Art in an age of artificial intelligence. Frontiers in Psychology. 13.10.3389/ fpsyg.2022.1024449.

[3] Lee, H.-K. (2022). Rethinking creativity: creative industries, AI and everyday creativity. Media, Culture & Society, 44(3), 601-612. https://doi.org/10.1177/01 634437221077009

[4] Steels, Luc. (2006). Fifty Years of AI: From Symbols to Embodiment - and Back. 4850. 18-28. 10.1007/978-3-540-77296-5_3.

[5] Pothen, Ashlyn S. (2022). Artificial Intelligence and its Increasing Importance. Learning Outcomes of Classroom Research, Publisher: L' Ordine Nuovo Publication, India.

[6] Tiwari, Tanya & Tiwari, Tanuj & Tiwari, Sanjay. (2018). How Artificial Intelligence, Machine Learning and Deep Learning are Radically Different?. International Journal of Advanced Research in Computer Science and Software Engineering. 8. 1. 10.23956/ijarcsse.v8i2.569.

[7] Leddy, Marie & McCreanor, Niall. (2023). The Potential Utilisation of Artificial Intelligence (AI) in Enterprises. European Conference on Innovation and Entrepreneurship. 18. 526-535. 10.34190/ecie.18.1.1720.

[8] CORAZZO, James, HARLAND, Robert, HONNOR, Alison, RIGLEY Steve, (2019) The challenges for graphic design in establishing an academic research culture: lessons from the Research Excellence Framework 2014. The Design Journal, The Design Journal, 23(1), 7-29. https://doi.org/10.1080/146 06925.2019.1682446.

[9] Adobe - Experience speed and scale with Adobe Sensei GenAI, https://business.adobe.com/products/ sensei/adobe-sensei.html, Accessed: 2024-03-09.

[10] Liao,Shanxi & Ji, Xiaoyu. (2023). A Study on the Applicatio of Generative Artificial Intelligence Technology in Image Design. Proceedings of the 2nd International Conference on Intelligent Design and Innovative Technology (ICIDIT 2023), 10.2991/978-94-6463-266-8_36.

[11] Cheng, M. The Creativity of Artificial Intelligence in Art. Proceedings 2022, 81, 110. https://doi.org/10.3390/proceedings2022081110 Proceedings of the 2nd International Conference on Intelligent Design and Innovative Technology (ICIDIT 2023)

Author(s):

Lecturer. Ph.D. Ioana Catalina ENACHE, National University of Science and Technology Polytechnic Bucharest, Department of Engineering Graphics and Industrial Design, E-mail: catalina.enache@upb.ro.

Assoc. Prof. Ph.D. Narcisa VALTER, National University of Science and Technology Polytechnic Bucharest, Department of Engineering Graphics and Industrial Design, E-mail: narcisa.valter@yahoo.com

Eng. Felix RĂDUICĂ, PhD Student, National University of Science and Technology Polytechnic Bucharest, Department of Engineering Graphics and Industrial Design, E-mail: narcisa.valter@yahoo.com

Prof. Ph.D., Oana CHIVU, National University of Science and Technology Polytechnic Bucharest, Department of Quality Engineering and Industrial Technologies, E-mail: virlan_oana@yahoo.co.uk