Introduction

AI technologies enhance efficiency across various fields by automating tasks, analyzing large data sets, and supporting decision-making [1]. However, their application in graphic design and art remains controversial due to ethical concerns about copyright, originality, and intellectual property. Supporters argue that AI boosts productivity and expands creative possibilities, while critics warn of devaluing designers' work and diminishing uniqueness. A thorough analysis, including expert opinions and case studies, helps assess AI's impact on graphic design.

This study explores AI's role in cover design, highlighting its benefits, challenges, and ethical implications. The goal is to determine optimal ways to integrate AI while preserving creativity and originality.

4.1. AI-designed book covers: innovations, flaws, and public perception

A review of online literature highlights the emergence of AI-designed book covers and public reactions. Notably, several physical publications have utilized neural networks for covers and illustrations, yet many exhibit noticeable flaws, prompting debates about their quality.

A recent example is the republishing of Virginia Woolf's works in Ukraine, featuring AI-designed covers for the first time (Figure. 1) [2]. In October 2023, Komubook's founder, Pavlo Shved, announced collaboration with AI on covers for titles like To the Lighthouse and The Waves. Many generated images depict a woman contemplating the sea, often due to neural networks' challenges in generating faces, leading to abstract compositions that may not suit every project.

[4]***Authors:*** *Lotoshynska Nataliia, Kustra Natalya*
Number of characters: *000000*
Author's sheets: *0,00*

Figure 1 - The covers for Virginia Woolf's works

A source: [2]

Another example is I Want to Mars, published by Ranok (Figure. 2), where both text and graphic design were AI-generated [3]. The cover shows a child in an astronaut suit but contains flaws like eye asymmetry and incorrect ear anatomy. Such imperfections can negatively impact the book's perception, as covers are crucial for first impressions.

Figure 2 - The book *I Want to Mars* (Ranok Publishing House)

A source: [3]

In The Book of Love and Fury by Maryna Ponomarenko, AI-generated illustrations by Kseniia Zabrodska show abstract images [4]. While intriguing, the silhouettes lack clarity, highlighting AI's limitations in producing coherent abstractions. Additionally, the collection's illustrations lack a common theme or color scheme, further diminishing visual cohesion (Figure. 3 a,b).

AI's role in publishing sparks mixed reactions; interest remains high as society evaluates the outcomes of expert-guided neural network work. This reflects the book industry's evolution and growing reader interest in innovative approaches.
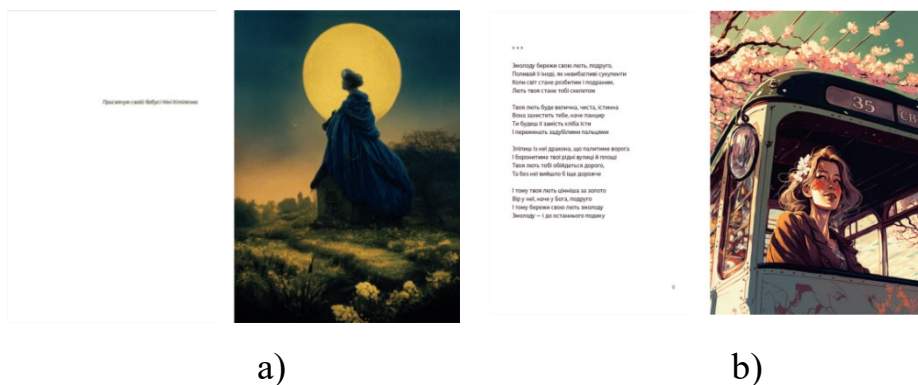
a)   b)

Figure 3 - The illustrations in the edition of The Book of Love and Fury
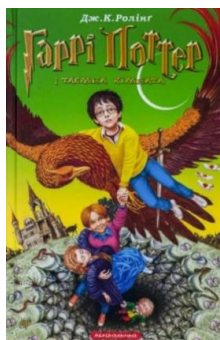
A source: [4]

Various programs enable AI interaction, such as ChatGPT, which analyzes and describes images but does not generate them. Models like GPT-3 can integrate with platforms like DeepAI or DALL-E for image generation. Microsoft Copilot, based on GPT-4, offers extensive functionality, including DALL-E 3 for image creation [5]. Midjourney, a tool developed by a small team, is also popular for graphic content creation.

4.2. Study of the artificial intelligence technologies impact on book covers design

In order to see and analyse how AI actually copes with the generation of covers compared to human work, a number of practical studies have been conducted. These studies compare the design of books that are out of print and have been sold to a broad audience of Ukrainian readers [6], self-designed covers and, of course, the design of covers created by AI.

For the studies, three different publications have been selected:

Harry Potter and the Chamber of Secrets by J.K. Rowling (Figure. 4 (a, b)). These books about the fantastic adventures of Harry Potter are quite popular among children and adults.
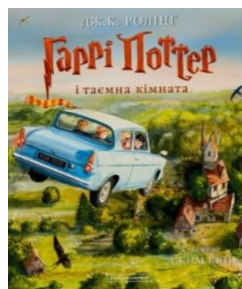
a)   b)

Figure 4 (a,b) - Harry Potter and the Chamber of Secrets by J.K. Rowling,
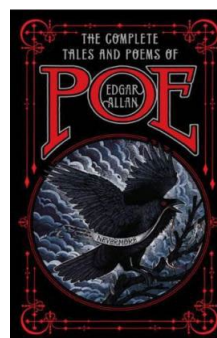
A-ba-ba-ha-la-ma-ha Publishing House

a) year of publication: 2016; b) year of publication: 2017

A source: [6]

A complete collection of prose works. Volume I by Edgar Allan Poe (Figure. 5 (a, b)). This collection includes works by Edgar Allan Poe, the founder of the detective horror genre, a celebrated writer and the author of world-famous works.
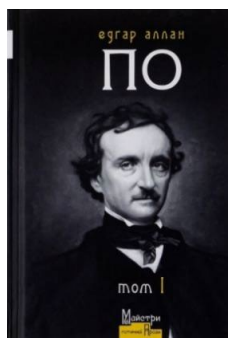
a)   b)

Figure 5 (a, b) - *A complete collection of prose works. Volume I*

by Edgar Allan Poe

a) Zhupanskyy Publishing House, year of publication: 2023

b) Barnes & Noble Inc Publishing House, year of publication: 2023

A source: [6]

The Kaidash Family by Ivan Nechuy-Levytskyi (Figure. 6 (a, b)). It is an example of a classic of Ukrainian literature and is included in the school curriculum.

a)   b)

Figure 6 (a,b) *The Kaidash Family* by Ivan Nechuy-Levytskyi

a) Knyzhkovyi Klub "Klub Simeinoho Dozvillia" Publishing House, year of publication: 2019; б) Znannia Publishing House, year of publication: 2020

A source: [6]

AI work began with Microsoft's free Copilot tool to generate covers. A request, including the book title and author, was entered, and the neural network created images based on its database.

When formulating a request for AI, keywords are often used to achieve a more precise understanding of the desired image. The generation of the cover for *The Kaidash Family* based solely on the title has yielded disappointing results with images depicting people of various nationalities in settings that do not align with the plot. Providing additional information about the author and the Ukrainian motifs of the work has significantly improved the outcomes, as the AI was better able to adapt to the specific subject matter.

Neural networks do not always respond adequately to corrections. When generating covers for *Harry Potter and the Chamber of Secrets*, the AI intermittently added mythical creatures, particularly dragons, which only appear in the fourth book of the series. Requests to create covers without dragons have not yielded positive results: the AI continued to include dragons, and sometimes in even greater numbers.

The final versions of the covers generated by the AI are shown in the following images (Figure. 7).

Figure 7 - The design of the covers generated by the AI

A source: [5]

Also, self-designed graphic projects for the covers have been developed. For the cover of *Harry Potter and the Chamber of Secrets* by J. K. Rowling (Figure. 8), various photographs were used, which allude to key events and elements of the plot without revealing any spoilers, as can sometimes be observed in the images of other publications. The composition itself features paintings in frames as well as a lantern on the left side, inspired by a scene from the work.

Figure 8 - The self-designed cover for *Harry Potter and the Chamber of Secrets* by J.K. Rowling

Authoring

The cover design for A Complete Collection of Prose Works. Volume I by Edgar

Allan Poe (Figure. 9) centers on the author, a common approach for similar editions. It features his photograph, a red background, a skull, and a torn sheet texture, visually dividing life and afterlife. This design aligns with Poe's work, which includes detective and horror stories.

Figure 9 - The self-designed cover for A Complete Collection of Prose Works. Volume I by Edgar Allan Poe

Authoring

The book cover of *The Kaidash Family* by Ivan Nechuy-Levytskyi (Figure. 10) is a vibrant collage featuring a pop art imitation with a pear as the focal point. This choice is not accidental, as the pear tree in the story is the source of many conflicts and quarrels within the family. In the background, there are bright explosions, symbolising the endless disputes among the members of the family.

Figure 10 - The self-designed cover for *The Kaidash Family* by Ivan Nechuy-Levytskyi

Authoring

4.3. An experimental comparison of works created using AI and traditionally created designs

To conduct a comparative analysis of book cover designs, key evaluation criteria were selected, including the harmonious integration of design and content, color selection, font compatibility, and design innovation. The most essential criterion is the alignment of design with content, as readers often judge a book by its cover before exploring further. A well-designed cover should capture attention and reflect the book's theme.

Color harmony is another critical factor, as an effective palette enhances composition and influences reader perception. Similarly, font selection should integrate seamlessly with the design, ensuring readability and appropriateness for the target audience. For instance, children's books may feature larger, more contrasting fonts for clarity.

The final criterion considers the novelty and relevance of the design. A modern and innovative cover helps a book stand out in a saturated market, aligning with contemporary trends to attract readers. Balancing uniqueness with commercial appeal remains essential.

To objectively compare various book covers, a survey was conducted using Google Forms, incorporating these criteria. Respondents rated AI-generated, self-designed, and existing book covers on a scale from 1 to 10, where: scores from 1 to 4 - the second cover is worse than the first; a score of 5 - the second cover is the same as the first; scores from 6 to 10 - the second cover is better than the first.

All scores were directly linked to the evaluation categories, so the question template was phrased as follows: "Rate cover 2 compared to cover 1 for ..." where the ellipsis was replaced by the relevant rating criterion. Thus, the survey allowed for the comparison of all self-designed covers against those from the publishing house and the neural network, without disclosing the origin or location of each design. This approach ensured the most objective results. In addition to the comparative characteristics, respondents provided an overall rating for covers, which also ranged from 1 to 10

(Figure. 11).

Figure 11- Evaluation of the covers with the help of Google Forms

Authoring

A total of 16 responses have been collected from both printing and design experts along with ordinary readers. The survey yielded scores for each cover in the specified categories, compared to the self-developed designs, and all data were exported to tables using Google Sheets (Figure. 12). This allowed for a more orderly view of the scores and enabled the calculation of average values for each question.

Figure 12 - The results of the survey in the form of a diagram

Authoring

After collecting cover ratings from respondents and organising them into the tables, the data were processed using the analytic hierarchy process — a methodology for solving decision-making problems by ranking alternatives based on multiple criteria. This method provides support for decision-making through hierarchical decomposition of the problem and the evaluation of alternative solutions, in particular: Problem analysis; Collection and assessment of data inconsistencies and their

minimisation; Synthesis of the decision-making problem; Evaluation of the importance of factors influencing decision priorities; Facilitation of discussion of the problem and reaching consensus.

The development of application software was carried out using the Builder C++ 6.0 programming tool, as this system has significant advantages in the field of visual programming. This product has a user-friendly interface, uses and creates function libraries (DLL-type objects), and its programmes can both initiate and process almost any Windows event. Builder C++ 6.0 allows combining data and code into one class (encapsulation), creating child classes (inheritance) and working with derived classes as base classes (polymorphism).

At first, when the programme is launched, all the images evaluated during the survey are displayed (Figure. 13). The first four images are analogues that were compared to the fifth, in this case, self-made design.

Figure 13 - Evaluation of the covers with the help of Google Forms

Authoring

In the programme environment, the first step was to input information about the ratios of the criteria and their weight in relation to each other. Thus, content with a weight of 9 points in relation to the selection of colours with a weight of 8.5 points is exactly 1.059. This scheme allows for the prioritisation of all criteria in order to later calculate the overall score based on these weights.

The next stage involved generating the matrices for the various criteria and inputting the data. All evaluations were taken from the table created as a result of the survey and data export. The corresponding values were entered into the first column of each separate table, with each criterion having its own data matrix. The result of the data processing was the calculated weight for each cover, which will later contribute to the overall assessment.

Next, the data on the overall assessment from the respondents, which were also obtained as a result of the survey, were input. The previously calculated weights were applied to this assessment after the criteria priority matrix and each of the matrices with assessment values for the same criteria had been input. The table with the final weights was displayed for review, and an overall assessment of the designed cover was subsequently created (Figure. 14).
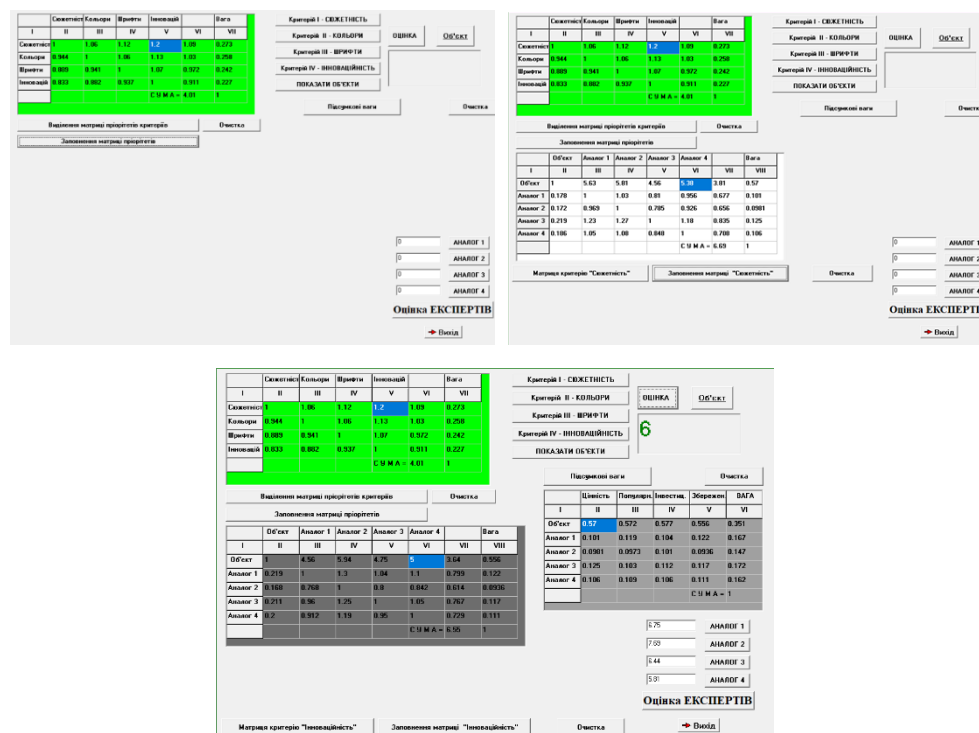

Figure 14 - The results of processing the results of the survey in the program

Authoring

The programme rounds the evaluation to the nearest whole number and displays the result on the screen. After these calculations, the self-designed cover received a score of 6, indicating that the initial average score of 5 was too low. This means the cover is actually better than all the designs submitted alongside it for comparison, including those from other publishing houses and AI-generated designs.

This mathematical method of processing results allows for the comparison of two objects based on precise numerical data and calculations. The defined criteria and their weighting factors play a key role in the process, so the data provided by the respondents directly influenced the final score of each cover as well as the results for the self-developed design.

Summary and conclusions

The research evaluates the effectiveness of innovative AI tools in optimizing design work. One notable advantage is the speed of design development; generating images took significantly less time than traditional methods. This study used a free service, resulting in no costs, but it had disadvantages, including a fixed image size (1024×1024), mediocre quality that would be noticeable in print, and inaccurate representations of requests. The neural network struggled to handle approximate wording based on the book's title and content, leading to potential delays in cover development when results didn't meet expectations. Additionally, the free service limited conversations to no more than five messages.

A major shortcoming of AI is its low effectiveness in generating textual information on images, necessitating additional specialists. Integration of content also received low ratings, highlighting the need for clear requirements during illustration generation. While AI demonstrated some success in selecting color schemes, results varied significantly. A well-trained neural network can perform better, but insufficient training leads to poor color matching.

AI has shown potential for novelty and innovation in design, offering

unconventional solutions that can be interesting to audiences. In some cases, generated illustrations approach the quality of professional work, although their market presence is still limited. AI-generated designs can attract reader attention but require further improvement to match traditional illustrations.

In summary, AI technologies hold significant development potential and offer a wide range of applications. However, in graphic design, particularly for covers, they often fail to meet high-quality standards expected from professional work. Surveys revealed that both experts and readers prefer designs by professionals due to AI's limitations in conveying book content, achieving correct color combinations, and generating readable text.

Overall, AI received lower average scores compared to human-designed covers, often rated between 1 and 4, with higher scores rare. The lowest ratings were in font compatibility and content harmony, while innovativeness received higher marks, with a score of 10 more common. However, the average score for AI designs was just 3 for content, compared to 5.94 for covers from A-ba-ba-ha-la-ma-ha Publishing House. Many issues with AI can be addressed through further training and expanding databases. Although AI is a useful tool for information gathering, its graphic content creation, including book covers, currently lags behind professionals. With proper training, AI may improve, but the creativity of human artists remains unmatched.