

THE LEVELS OF IMPACT OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES ON GRAPHIC DESIGN OF ADVERTISING MATERIALS

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The development of artificial intelligence technologies is having a significant impact on graphic design, especially on the creation of advertising materials. Generative algorithms such as DALL-E, MidJourney, Stable Diffusion, and Adobe Firefly are transforming creative processes by automating tasks, personalizing content, and expanding designers' capabilities. However, along with these advantages come challenges related to changes in professional competencies, legal regulation, and ethical considerations. The aim of this article is to classify and analyze the impact of artificial intelligence technologies on the graphic design of advertising materials. The methodological approach includes a systematic review of scientific literature, the study of practical examples, and a comparative analysis of artificial intelligence tools. As a result, a classification of the levels of influence of artificial intelligence on the graphic design of advertising materials is proposed, including process automation, creative decision-making support, content personalisation, economic aspects, technological progress, and legal issues. The analysis shows that artificial intelligence technologies not only optimise the process of developing graphic content, but also redefine the role of designers, requiring new professional competencies. The conclusion emphasizes the need for a balanced approach to integrating artificial intelligence technologies into graphic design so that they complement the creative process rather than replace the human factor.

Keywords: artificial intelligence, graphic design, advertising materials, classification, impact, generative design.

ЖАСАНДЫ ИНТЕЛЛЕКТ ТЕХНОЛОГИЯЛАРЫНЫҢ ЖАРНАМАЛЫҚ МАТЕРИАЛДАРДЫҢ ГРАФИКАЛЫҚ ДИЗАЙНЫНА ӘСЕР ЕТУ ДЕҢГЕЙЛЕРІ

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Жасанды интеллект технологияларының дамуы графикалық дизайнға, әсіресе жарнамалық материалдарды жасауға айтарлықтай әсер етеді. DALL-E, MidJourney, Stable Diffusion және Adobe Firefly сияқты генеративті Алгоритмдер тапсырмаларды автоматтандыру, мазмұнды жекелендіру және дизайнерлердің мүмкіндіктерін кеңейту арқылы шығармашылық процестерді өзгертеді. Алайда, осы артықшылықтармен қатар кәсіби құзыреттіліктің, құқықтық реттеудің және этикалық аспектілердің өзгеруіне байланысты проблемалар туындайды. Бұл зерттеудің мақсаты-жасанды интеллект технологияларының жарнамалық материалдардың графикалық дизайнына әсерін жіктеу және талдау. Әдістемелік тәсіл ғылыми әдебиеттерге жүйелі шолуды, практикалық мысалдарды зерттеуді және жасанды интеллект құралдарын салыстырмалы талдауды қамтиды. Нәтижесінде процестерді автоматтандыруды, шығармашылық шешімдерді қолдауды, мазмұнды жекелендіруді, экономикалық аспектілерді, технологиялық прогресті және құқықтық мәселелерді қамтитын жарнамалық материалдардың графикалық дизайнына жасанды интеллекттің әсер ету деңгейлерін жіктеу ұсынылды. Жүргізілген талдау жасанды интеллект технологиялары графикалық мазмұнды әзірлеу процесін оңтайландырып қана қоймай, сонымен қатар жаңа кәсіби құзыреттіліктерді қажет ететін дизайнерлердің ролін қайта анықтайтынын көрсетеді. Қорытындыда жасанды интеллект технологияларын графикалық дизайнға интеграциялауға өлшенген көзқарастың қажеттілігі атап өтіледі, осылайша олар адам факторын алмастырудың орнына шығармашылық процесті толықтырады.

Негізгі сөздер: жасанды интеллект, графикалық дизайн, жарнамалық материалдар, жіктеу, генеративті дизайн.

УРОВНИ ВЛИЯНИЯ ТЕХНОЛОГИЙ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА НА ГРАФИЧЕСКИЙ ДИЗАЙН РЕКЛАМНЫХ МАТЕРИАЛОВ

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Развитие технологий искусственного интеллекта оказывает значительное влияние на графический дизайн, особенно на создание рекламных материалов. Генеративные алгоритмы, такие как DALL-E, MidJourney, Stable Diffusion и Adobe Firefly, трансформируют творческие процессы, автоматизируя задачи, персонализируя контент и расширяя возможности дизайнеров. Однако наряду с этими преимуществами возникают проблемы, связанные с изменениями в профессиональных компетенциях, правовом регулировании и этических аспектах. Цель данного исследования - классифицировать и проанализировать влияние технологий искусственного интеллекта на графический дизайн рекламных материалов. Методологический подход включает в себя систематический обзор научной литературы, изучение практических примеров и сравнительный анализ инструментов искусственного интеллекта. В результате предложена классификация уровней влияния искусственного интеллекта на графический дизайн рекламных материалов, включающая автоматизацию процессов, поддержку принятия креативных решений, персонализацию контента, экономические аспекты, технологический прогресс и правовые вопросы. Проведенный анализ показывает, что технологии искусственного интеллекта не только оптимизируют процесс разработки графического контента, но и переопределяют роль дизайнеров, требуя новых профессиональных компетенций. В заключении подчеркивается необходимость взвешенного подхода к интеграции технологий искусственного интеллекта в графический дизайн, чтобы они дополняли творческий процесс, а не заменяли человеческий фактор.

Ключевые слова: искусственный интеллект, графический дизайн, рекламные материалы, классификация, генеративный дизайн.

Introduction

Modern artificial intelligence technologies are actively transforming graphic design, exerting a particularly significant influence on the development of advertising materials. The advancement of machine learning algorithms and generative models such as DALL-E, Midjourney, Stable Diffusion, and Adobe Firefly enables the automation of visual content creation processes, reducing both time and financial costs. These technologies allow advertising agencies and brands to personalize marketing campaigns, tailor content to specific audiences, and enhance designers' productivity. However, alongside these evident advantages, the integration of AI into advertising and marketing raises several concerns related to the preservation of creativity, the legal protection of intellectual property, and the evolving professional role of designers [1], [2].

Despite the rapid development of AI technologies in the graphic design of advertising materials, there remains a gap in the scientific literature regarding the systematization of their influence. Existing studies either focus on specific aspects – such as the automation of routine tasks, generative design, and content personalization – or examine AI in design more broadly, without specifically addressing its impact on the advertising industry [3], [4]. As a result, there is no comprehensive classification of the levels of AI's

impact on the graphic design of advertising materials, which complicates the understanding of its real potential and associated challenges.

The objective of this study is to develop a classification and analysis of the levels of AI's influence on the graphic design of advertising materials. To achieve this objective, the research addresses the following tasks:

- Identifying key AI technologies used in the graphic design of advertising materials;
- Classifying the levels of AI's impact on advertising graphics, including functional, creative, economic, technological, social, educational, ethical, and legal aspects;
- Analyzing the transformation of professional competencies among designers due to the automation of advertising design;
- Identifying ethical and legal challenges related to AI-generated advertising materials;
- Examining practical case studies of AI technology applications in advertising campaigns.

The methodological framework of this study includes an analysis of scientific literature, an examination of practical cases, and the interpretation of statistical data, enabling a comprehensive assessment of AI integration in advertising material development. This holistic approach not only systematizes existing knowledge but also identifies key challenges and future directions in the field. The

practical significance of the study lies in its potential application as a foundation for adapting professional standards in graphic design, as well as for developing strategies for the responsible implementation of AI technologies in advertising and marketing.

The evolution of artificial intelligence (AI) technologies in graphic design constitutes a component of the overarching process of digital transformation within the creative industries. Preliminary research in this domain is concomitant with the development of image processing algorithms and computer graphics in the mid-20th century [5]. Subsequent advancements in neural networks and machine learning have led to the integration of AI into visual content creation processes, encompassing automated image generation, adaptive color correction algorithms, and intelligent design analysis systems [6]. A seminal development in this field was the introduction of Generative Adversarial Networks (GANs) by Goodfellow et al [7]. This development enabled AI to not only replicate visual imagery but also to generate entirely new works that exhibited distinctive stylistic features. Research by Elgammal et al. explored the application of such networks in the creation of artistic content, laying the foundation for modern generative platforms such as DALL-E, Midjourney, and Stable Diffusion [2]. These technologies have significantly expanded the boundaries of traditional graphic design, allowing for the automatic generation of advertising materials and the adaptation of visual content to diverse audiences.

Recent studies have highlighted the multifaceted impact of AI on graphic design. Bohnacker et al. analyze algorithmic methods of generative design, which enable the automation of creative processes and enhance designers' productivity. Elgammal et al. investigate the capabilities of Creative Adversarial Networks

(CAN), demonstrating AI's ability to

transcend established stylistic norms and create original design solutions.

The automation of design processes is a prevalent subject in literature. Li H. et al. examine AI's impact on routine tasks such as image retouching, color scheme generation, and typography [8].

Materials and research methods

This study employs a methodological approach that is both comprehensive and systematic [9]. This is achieved by means of a thorough analysis of scientific literature and the examination of empirical data. The methodological choice is driven by the need for a thorough investigation of the impact of artificial intelligence technologies on the graphic design of advertising materials. This investigation encompasses the functional, creative, economic, technological, social, and legal aspects of such materials. The foundation of this research is a systematic review of scientific literature. This facilitates the identification of key applications of artificial intelligence in graphic design and the classification of existing approaches. Empirical analysis involves the examination of practical case studies that illustrate the integration of AI into advertising campaigns and design processes, providing insights into major trends in the commercial use of AI technologies and enabling a comparative assessment of their effectiveness against traditional graphic design methods.

Results and discussion

Research indicates that modern neural network technologies significantly accelerate workflows; however, this raises concerns regarding the diminishing role of traditional design methods and the evolving professional competencies of designers (Figure 1).

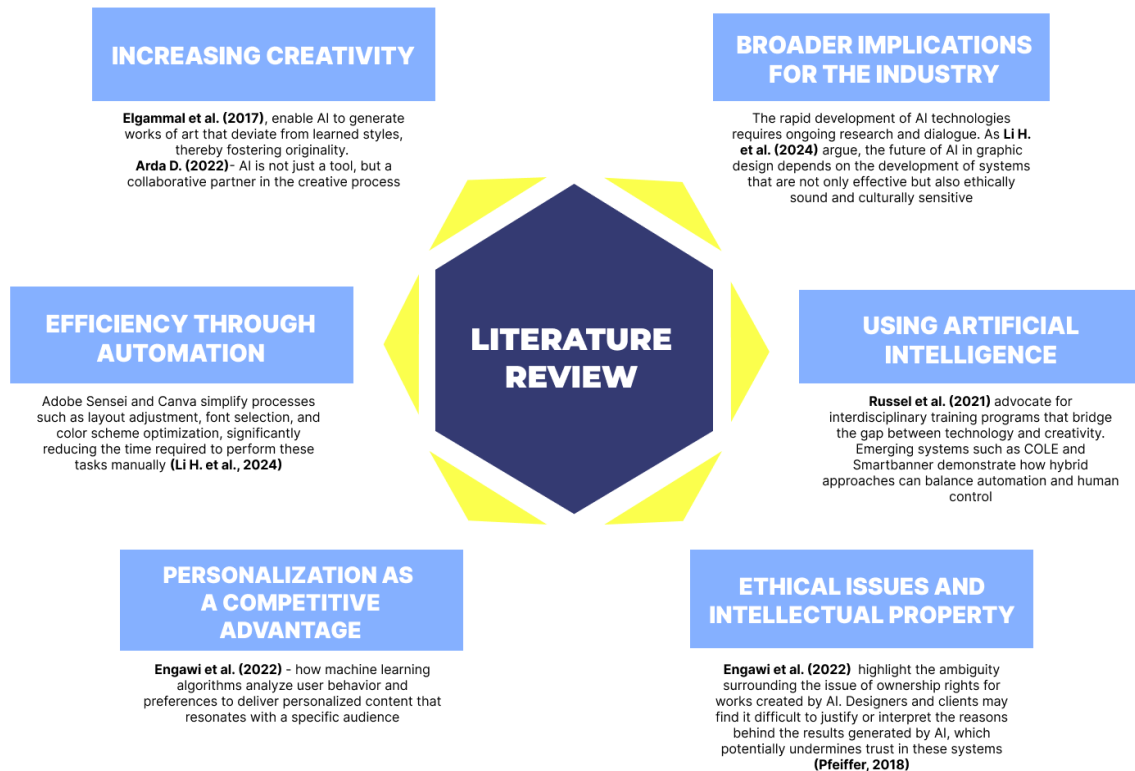


Figure 1. Infographic of the literary review of the study [authors' material]

Simultaneously, there is an ongoing debate about the creative limits of artificial intelligence. Pfeiffer explores the issue of authorship in the creative industries, analyzing whether AI can be considered a true co-author of design solutions. In Investigation of Artificial Intelligence Tools in Design Process and Creativity, Arda D. observes that despite significant advancements in generative algorithms, creativity remains a distinctly human prerogative, with AI serving primarily as an auxiliary tool that expands the designer's toolkit rather than replacing them [10].

In the domain of advertising design, AI technologies have become pervasive due to their capacity to personalize content. Engawi et al. examine methods of adapting advertising materials to target audience preferences using machine learning algorithms. Research suggests that neural network algorithms empower companies to enhance the efficiency of marketing campaigns through the dynamic generation of advertisements tailored in real time. Nevertheless, these technologies also give rise to ethical concerns related to algorithmic transparency and the utilization of personal user data.

A review of the scientific literature also reveals a paucity of research on the legal aspects of AI applications in graphic design [3], [4]. The absence of clear regulatory mechanisms for copyright protection creates legal uncertainty in the use of generative algorithms in commercial projects, and it remains

unclear who holds the rights to content created by neural networks and how intellectual property protection should be ensured in the context of automated creativity [4].

Despite the rapid progress witnessed in this field, significant research gaps remain. Specifically, further investigation is required into the following aspects:

- the long-term impact of AI technologies on the professional competencies of graphic designers;
- the transformation of the labor market due to the automation of design processes;
- potential limitations of generative algorithms compared to traditional graphic design methods;
- the development of new legal and ethical standards for AI applications in commercial design.

The present study aims to address these gaps by undertaking a systematic review of extant knowledge of the impact of AI on the graphic design of advertising materials. In contrast to most previous studies, which focus on specific technological aspects, this research provides a comprehensive analysis that integrates theoretical foundations with practical examples. This approach enables not only an assessment of the current state of the field, but also the formulation of prospective directions for further investigation.

The research undertaken identified six levels of artificial intelligence's impact on the graphic design of advertising materials: functional, creative, economic,

technological, social and educational, as well as ethical

and legal (Figure 2).

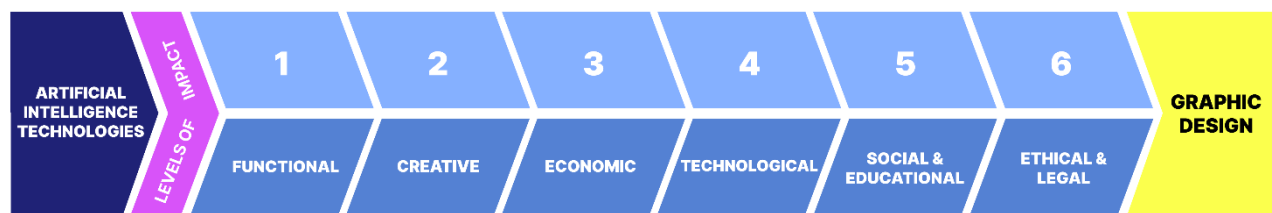


Figure 2. Levels of impact of artificial intelligence on graphic design [authors' material]

The results indicate that these levels form a logical sequence of changes driven by AI integration into the design industry. At the functional level, AI technologies primarily influence the automation of routine tasks. The analysis of tools such as Adobe Firefly, Midjourney, DALL-E and Stable Diffusion reveals their pervasive utilization in processes including color correction, background removal, image retouching and graphic stylization. Statistical data substantiates that these technologies curtail the time required for routine operations by 60-70% in comparison with conventional methods. This finding is consistent with industry reports, which indicate a substantial increase in designers' productivity following the adoption of AI-powered visual content processing tools [11]. At the creative level, AI has been shown to possess capabilities in content generation and creative process support. AI technologies not only replicate artistic styles but also generate entirely new and unique visual solutions. Specifically, Creative Adversarial Networks (CAN), developed by Elgammal et al., enable AI systems to deviate from stylistic norms, producing original images that can be utilized in commercial and artistic design. The study examined successful applications of these technologies in advertising campaigns, such as Coca-Cola and Nike projects, where AI was employed to adapt marketing materials to the cultural characteristics of target audiences [12]. However, a critical challenge was identified: the necessity of creative oversight by designers. While AI can generate original solutions, it does not always account for context, brand identity, and the emotional aspects of visual perception, necessitating human intervention in the design process.

At the economic level, significant changes have been observed in the labor market structure and the costs associated with visual content production. According to a study by McKinsey & Company, the integration of artificial intelligence into graphic design has led to a 30–50% reduction in companies' content production expenses [13]. This effect is primarily due to decreased time requirements for design development, a reduced need for additional specialists, and the ability to automatically generate

multiple variations of a single image. An analysis of practical cases demonstrates that advertising agencies and brands leverage AI technologies to rapidly create personalized visual solutions tailored to different platforms and target audiences [14]. However, this shift is accompanied by changes in the role of designers, who must acquire new skills and adapt to an evolving market landscape.

At the technological level, the study identified that the advancement of AI tools contributes to their integration into professional design platforms and software. The study identified that companies such as Adobe, OpenAI, Runway, and Google DeepMind are developing new solutions that emphasize human-machine collaboration. Adobe Firefly, for instance, allows users to set image styling parameters, enabling controlled content generation through AI [15]. The findings suggest that most contemporary AI-powered design tools are not intended to replace designers but to assist them in visual content creation [16]. The rapid evolution of these technologies necessitates continuous skill development among design professionals.

At the social and educational levels, significant changes have been observed in the professional competencies required of designers. Modern educational programs are increasingly incorporating courses on the use of artificial intelligence algorithms in design [17]. According to research, the demand for skills such as programming, algorithmic thinking, and working with machine learning is growing, leading to a transformation in the designer's role. Prestigious academic institutions, such as MIT and Stanford, have initiated programs that explore the integration of AI technologies within the domains of digital art and graphic design. The collated data underscores the imperative to recalibrate educational standards to align with the evolving demands of the job market [18].

From an ethical and legal standpoint, the study has identified pivotal challenges pertaining to copyright issues and the accountability for AI-generated content. A salient concern pertains to the originality of AI-generated works and their legal protection. A review of scientific publications reveals

that AI technologies often train on datasets that include works by other creators, raising disputes over intellectual property rights [3]. A notable example is the legal cases involving generative models, where artists have sought protection for their original work against AI systems that reproduce stylistic elements [19]. These challenges underscore the urgent need for legislative frameworks to regulate the use of AI in design and to establish clear legal guidelines for ownership and authorship in AI-assisted creative processes.

The discussion of the obtained results indicates that the impact of artificial intelligence technologies

on graphic design is multifaceted and systemic, as shown in Table 1.

Functional changes related to automation create the foundation for integrating generative design methods, which in turn lead to economic shifts, which in turn drive the development of new technological solutions. Technological progress necessitates the adaptation of educational programs and the transformation of designers' professional competencies. Ultimately, this process gives rise to new ethical and legal challenges that require regulatory frameworks [20].

Table 1. Description of the levels of influence of artificial intelligence technologies on graphic design

Level of impact	Description	Examples	Challenges
Functional	AI automates routine tasks such as image retouching, background removal, and color correction, reducing time spent on manual work	Automated layout design, AI-powered image enhancement tools	Over-reliance on automation, potential job displacement
Creative	AI supports creativity by generating unique designs, adapting styles, and assisting in decision-making while still requiring human oversight	Generative Adversarial Networks (GANs) creating new ad concepts	Lack of true creativity, difficulty in aligning with brand identity
Economic	AI lowers costs in advertising design by reducing production time, minimizing the need for large design teams, and enhancing efficiency	Reduction in advertising production costs using AI-generated assets	Potential job market disruption, ethical concerns about AI replacing designers
Technological	AI integrates into design software (e.g., Adobe Firefly, Midjourney) to enhance user interaction, offering improved generative capabilities	AI-powered design assistants in platforms like Adobe and Canva	Continuous learning required to keep up with AI advancements
Social & Educational	AI-driven tools change skill requirements, making programming and algorithmic thinking essential for modern graphic designers	Integration of AI education in design curriculums	Traditional design education models may become outdated
Ethical & Legal	AI raises concerns over copyright ownership, fair use, and bias in AI-generated content, necessitating legal frameworks and ethical considerations	Legal disputes over AI-generated art and content ownership issues	Unclear legal frameworks for AI-created content, copyright issues

A comparison of the findings with existing literature suggests that the industry is currently transitioning towards a hybrid model of human-AI collaboration. The study demonstrates that modern AI technologies do not replace designers but rather complement their work, automating routine tasks while expanding creative possibilities. However, challenges remain, particularly concerning the regulation of AI applications, the protection of intellectual property rights, and the proper definition of

the human role in visual content creation. The study thus confirms the hypothesis of AI's multi-level impact on the graphic design of advertising materials, suggesting that AI technologies contribute to workflow optimization, enhance designers' creative capabilities, and transform the professional environment. However, for the effective integration of AI into creative industries, further research is needed. Future studies should thus focus on developing ethical and legal frameworks, adapting educational curricula,

and assessing the long-term consequences of AI-driven transformations in design.

Conclusion

This study developed a classification of artificial intelligence's impact on graphic design for advertising materials, encompassing eight key levels: functional, creative, economic, technological, social, educational, ethical, and legal. Each level reflects a specific stage in the transformation of the design industry under the influence of AI. The research revealed that modern tools such as Midjourney, DALL·E, Stable Diffusion, and Adobe Firefly significantly enhance the efficiency of design workflows by automating routine tasks and generating new creative possibilities. However, the integration of AI into professional practice requires systemic changes in labor markets, educational approaches, and legal frameworks. These findings highlight the complex, multifaceted role of AI in reshaping not only design methods but also the professional and ethical landscape of the industry. Thus:

1. A clear classification of AI's impact on graphic design was developed, covering eight levels – functional, creative, economic, technological, social, educational, ethical, and legal – each representing a distinct stage of industry transformation.

2. A comprehensive analysis of current AI tools (Midjourney, DALL·E, Stable Diffusion, Adobe Firefly) demonstrated their potential to automate routine design tasks, reduce production time and costs, and expand creative capabilities.

3. Key transformations in the professional environment were identified, including the shift toward algorithmic thinking and the growing demand for AI-related skills in design practice.

4. Educational gaps were revealed, underlining the need to update graphic design curricula with content on machine learning, algorithmic design, and AI ethics.

5. Legal and ethical issues were examined, particularly regarding authorship, copyright, and the use of datasets containing protected content, emphasizing the need for new regulatory mechanisms in generative design

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