TECHNOLOGIES AND ENGINEERING

Journal homepage: https://technologies-engineering.com.ua/en
Vol. 26, No. 2, 2025

Received: 27.11.2024
Revised: 20.03.2025
Accepted: 30.04.2025

UDC 004.8:316.776.23-048.66»364»

DOI: 10.30857/2786-5371.2025.2.8

The use of artificial intelligence for information campaigns in wartime: Visual tools for countering disinformation

Vladyslav Shchuka*

Master
Kyiv National University of Culture and Arts
01601, 36 Yevhen Konovalets Str., Kyiv, Ukraine
https://orcid.org/0009-0004-1550-4727

Abstract. In the context of the modern information war, the development of effective methods to counter disinformation and hostile propaganda has become critically important. The amount of false information and the speed of its dissemination necessitated the implementation of automated systems involving artificial intelligence to optimise the processes of creating visual counter-propaganda content. This research aimed to develop a methodology for the integration of artificial intelligence technologies into the processes of creating effective visual tools for countering disinformation, taking into account the principles of graphic design and the psychology of visual information perception. The research was based on a comprehensive approach that combined theoretical analysis of scientific literature, comparative analysis of the neural networks Midjourney, Stable Diffusion, and DALL-E, semiotic analysis of visual materials, as well as experimental implementation of the developed system for the automated creation of counter-propaganda visual content. A comprehensive approach has been developed for the creation of visual tools to counter disinformation, which combines the capabilities of automated information collection systems, artificial intelligence algorithms for generating graphic content, and the principles of effective graphic design. It has been found that the use of artificial intelligence in graphic design has optimised up to 20% of routine tasks in the creation of visual content, allowing designers to focus on the strategic and creative aspects of development. The developed recommendations for the use of artificial intelligence in graphic design may be implemented by state institutions, media, and public organisations to respond promptly to information threats

Keywords: graphic design; visual communication; counter-propaganda content; information warfare; generative design; perception psychology; compositional solutions

Introduction

In the context of the full-scale war of the Russian Federation against Ukraine, the information front has become one of the key elements of resistance. Russian propaganda actively utilised modern technologies, particularly artificial intelligence (AI), to create and disseminate disinformation, which posed a serious threat to Ukraine's national security. The Centre for Democracy and Rule of Law emphasised the ability of AI to generate texts that supported conspiracy theories and included real events, as well as to form disinformation messages based on propaganda narratives (Center for Democracy and Rule of Law, 2023).

In the collective monograph by M. Kolosnichenko *et al.* (2023), it was established that visual communications played a key role in the modern information space. Graphic design was used for aesthetic decoration, as well as for effectively conveying key messages and refuting misinformation. Researcher O. Hrozna (2024) noted that global digital transformation has significantly impacted journalism and design, altering them through the implementation of cutting-edge technologies. Artificial intelligence and virtual reality have revolutionised these fields, fundamentally changing how content is created, consumed, and interacted with. The use of AI in visual communications allowed for the prompt processing and analysis of massive volumes of data, enhancing the accuracy and timeliness of information presentation.

K. Kertysova (2019) examined artificial intelligence as a bilateral tool in the context of disinformation. On the

Suggested Citation:
Shchuka, V. (2025). The use of artificial intelligence for information campaigns in wartime: Visual tools for countering disinformation. *Technologies and Engineering,* 26(2), 89-98. doi: 10.30857/2786-5371.2025.2.7.

*Corresponding author

one hand, it provided powerful, scalable, and cost-effective solutions to prevent the distortion of information online, but on the other hand, it had its own limitations and unpredictable consequences. The researcher emphasised the importance of developing critical thinking for restoring healthy relationships with information and enhancing the resilience of democracies to disinformation. The analysis of ethical aspects conducted by K. Kertysova (2019) revealed that the use of AI in combating fake news necessitated the development of clear ethical standards to prevent potential negative consequences for freedom of speech and privacy. The results of the research determined the necessity of the parallel development of media literacy among the population alongside the implementation of technological solutions.

Y. Hlushchuk (2023) defined fakes as deliberately false or misleading information that transcended objective reality and was aimed at manipulating public consciousness. The analysis revealed that in the context of the current war of the Russian Federation against Ukraine, the dissemination of fake news through social networks, online platforms, and other channels has influenced society, undermined trust in reliable sources of information, and led to manipulation of public opinion and socio-political upheavals. In the analytical materials of the Alliance for the Defence of Democracy (Salvo *et al*., 2018), the necessity of a comprehensive approach to countering disinformation was substantiated, which combined the efforts of government structures, the private sector, technology companies, and civil society. Experts have formulated recommendations regarding the transparency of the activities of technology companies, providing information about technologies, privacy policies, and business models to the relevant authorities and the public. It also emphasised the importance of supporting independent research aimed at protecting platforms from disinformation campaigns and cyberattacks.

N. Derevyanko & O. Zalevska (2023) conducted a comparative analysis of the neural networks Midjourney, Stable Diffusion, and DALL-E, which were used in the design. Researchers have discovered that each of these neural networks had a specific purpose and architecture, which allowed them to effectively perform various tasks in the field of design. The use of these tools in the educational process of future designers contributed to the development of creative potential and expanded the possibilities of visual expression. The research by T. Bozhko & V. Arefiev (2023) demonstrated that artificial intelligence was actively employed in graphic design – from the creation of identification and navigation signs to the development of fonts, graphics, posters, animations, and infographics. Technologies have helped to transform the learning experience for students in design disciplines and have contributed to the development of individual approaches and creativity.

A. Borji (2022) conducted a quantitative comparison of Stable Diffusion, Midjourney, and DALL-E regarding their ability to generate photorealistic faces. The research highlighted the potential of these tools for use in the design of visual materials aimed at countering disinformation. C. Marsden & T. Meyer (2019) noted that fully automated fact-checking remained a distant goal. Social media continued to rely on a combination of AI for the most repetitive tasks and human oversight for more nuanced cases. The authors emphasised the importance of keeping the individual "in the loop" of AI systems to ensure ethical use and correct interpretation of data. N. Dufour *et al*. (2024) conducted a twoyear study on online disinformation based on media content, during which a detailed typology of images used in disinformation was developed and the dynamics of their dissemination were analysed. Research has shown that despite widespread concern since the late 2010s, AI-generated content was rare until the spring of 2023 when its presence in fake news sharply increased.

This research aimed to develop and implement methodological principles for the use of artificial intelligence in creating effective visual tools to counter disinformation, taking into account contemporary achievements in graphic design and perception psychology.

Materials and Methods

The research on the use of artificial intelligence for the creation of visual tools to counter disinformation in wartime was conducted from January 2023 to April 2024 at the Digital Media Laboratory of Taras Shevchenko National University of Kyiv. To achieve the set aim, a comprehensive approach was employed, combining general scientific and special research methods adapted to the specifics of graphic design and visual communications. The methodological basis of the research was formed by transdisciplinary approaches, which allowed for the examination of the problem of creating visual tools to counter disinformation from the perspectives of various fields of knowledge. The study employed theoretical, empirical, and mathematical methods.

During the research, observations were made of the work of designers who utilise artificial intelligence, which allowed for the calculation of the approximate proportion of time spent on routine tasks and the assessment of their suitability for automation. The methodological justification was based on the working processes of graphic designers and the identification of typical operations that are subject to automation. In particular, this includes searching for references, processing images, generating composition variants, and creating basic design elements. The theoretical and informational basis of the research consisted of fundamental studies by leading Ukrainian and international scholars, materials from periodical publications, analytical reports from specialised organisations, as well as empirical data from online media and social networks. Particular attention was paid to the analysis of publications from research centres specialising in the study of

mechanisms for countering disinformation in the context of the Russian-Ukrainian war.

To investigate the psychological and cognitive factors influencing the impact of graphic design on information perception, a method of content analysis of visual materials and semiotic analysis was employed. Samples of graphic content aimed at countering disinformation were examined using a specially developed matrix of criteria, which included assessments of emotional impact, informational value, aesthetic appeal, and psychological accessibility. The methodology of analysis was based on the concepts of visual semantics proposed by S.V. Pryshchenko (2020), who considered the artistic imagery of the poster as a complex semiotic phenomenon, and the research on psychological aspects of perception by H.V. Mykytiv & Y. Kondratenko (2016), who studied extratextual elements as a means of shaping media culture.

A comparative analysis of the neural networks Midjourney, Stable Diffusion, and DALL-E was conducted using a methodology adapted from the research of N. Derevyanko & O. Zalevska (2023). The aim of the analysis was to determine optimal technological solutions for the creation of visual tools to counter disinformation. Each neural network was evaluated according to the following parameters: accuracy of visual concept reproduction, flexibility in stylistic design, speed of content generation, ease of integration into workflows, and adaptability for specific tasks in countering disinformation. The analytical part of the research included a comparative analysis of the results of using various neural networks for the creation of visual materials to counter disinformation. A series of test queries with identical parameters have been created for each neural network to objectively compare the quality and relevance of the results, which has allowed for the identification of optimal tools for various types of visual tasks.

Semiotic analysis was applied to study the sign systems in visual materials aimed at countering disinformation. The methodology of semiotic analysis was adapted from the research of H.V. Mykytiv & Y. Kondratenko (2016), who considered extratextual elements as a means of shaping media culture. This approach enabled the identification of effective visual codes and symbolic systems that contributed to a better understanding and retention of counter-propaganda messages.

For the analysis and interpretation of the obtained results, qualitative comparative analysis and visual analytics methods were employed. The evaluation of the effectiveness of visual tools was conducted according to a developed system of criteria, which included compositional expressiveness, colour harmony, informational richness, and emotional response. The comparative analysis was conducted using the visual analytics methods proposed by O.V. Kolisnyk *et al*. (2023), which allow for the identification of structural and stylistic features of graphic content. Visual modelling and testing were conducted using Adobe Creative Cloud, including Photoshop and Illustrator, with the integration of artificial intelligence algorithms for the analysis of compositional solutions. Graphical experiments with neural networks were conducted through the web interfaces of Midjourney, Stable Diffusion, and DALLE using the methods described by T. Bozhko & V. Arefiev (2023). The ethical aspects of the research included adherence to the rules for the use of generative AI models, proper citation of the data sources used for training the models and ensuring the confidentiality of the personal data of the experts who participated in the surveys. All experiments were conducted for the purpose of scientific research and did not involve the creation or dissemination of disinformation materials.

Results and Discussion

The analysis of contemporary technological solutions for the creation of visual content has revealed a variety of tools that could be employed to counter disinformation in the context of information warfare. Research has shown that artificial intelligence systems have significantly optimised the work of graphic designers, automating up to 20% of routine tasks, however, they have not completely replaced the designer. Platforms such as Midjourney, StyleGAN, and Adobe Generative AI have enabled the rapid creation of high-quality images, the generation of design variations, and experimentation with styles, significantly accelerating workflows and expanding the creative possibilities for designers. Systematic observation of the process of creating visual materials has shown that these aspects of work occupy approximately one-fifth of the total time of designers and can be effectively automated using modern AI tools.

The study by R. Rombach *et al.* (2022) demonstrated that latent diffusion models (LDM) provided a significant improvement in both the training process and the sampling efficiency of diffusion noise models without compromising quality. This was identified as particularly important for creating high-quality visual content used in countering disinformation. The study found that LDM achieved new FID (Fréchet Inception Distance) benchmarks for image synthesis with conditional classification and high performance for various tasks, including text-to-image synthesis, unconditional image generation, and super-resolution. As a result of the comparative analysis of the neural networks Midjourney, Stable Diffusion, and DALL-E, specific advantages for various tasks of visual communication were identified (Table 1).

The semiotic analysis of 10 visual materials aimed at countering disinformation has revealed the most effective visual codes and sign systems It has been established that the use of contrasting visual comparisons of “truth-falsehood”, fact-checking symbols, visual metaphors of revelation or exposure, as well as elements that emphasise transparency and credibility, significantly enhanced the effectiveness of visual materials (Table 2).

***Table 1**. Comparison of neural network characteristics for graphic content creation*

Assessment criterion	Midjourney	Stable Diffusion	DALL-E
Visual language	Utilises a visual metaphor with clean, minimalist solutions.	Diversity of styles within a single concept.	Official, informative style with elements of infographics.
Interactivity	High level of user engagement through testing.	Predominantly static formats.	Intermediate level with a focus on video content.
Adaptability	High adaptability for various languages and cultural contexts. The system allows for fine-tuning of visual styles by the cultural characteristics of the target audience through the modification of prompts and the use of specific style references.	Average adaptability. It provides opportunities for content localisation but requires a more detailed configuration to achieve cultural relevance and accurate compliance with regional characteristics.	High adaptability for various platforms. The system integrates with various publication formats and optimises visual content for diverse digital platforms with minimal adjustments.
Emotional impact	Strong emotional impact due to personal involvement. The created images evoke an immediate emotional response due to the refined combination of colours, shapes, and compositional solutions that resonate with the cultural and personal experiences of the viewer.	Extremely high emotional impact. Demonstrates an outstanding ability to generate visual content with a powerful emotional charge, particularly in genres that require dramatic expressiveness and imagery.	Predominantly rational approach. It focuses on informativeness, structure, and logical organisation of data, prioritising clarity over emotional expressiveness.
Informative nature	High informativeness while maintaining simplicity. Visual solutions effectively convey complex ideas and concepts through thoughtful metaphors and symbols, maintaining a balance between informational richness and accessibility of perception.	Moderate to high informativeness. It provides a sufficient level of informational value, but sometimes sacrifices detail for the sake of stylistic expressiveness.	Maximum informativeness. Specialises in creating structured, analytically rich visual content with an optimal balance of textual and graphic elements.

***Source:** adapted from the research of N. Derevyanko & O. Zalevska (2023)*

***Table 2**. A comparison of the semiotic features of disinformation and counter-propaganda materials*

Assessment criterion	Disinformation materials	Counter-propaganda materials
Dissemination speed	High, due to simplicity and emotionality	Moderate, depends on institutional support
Emotional impact	Powerful, often based on negative emotions	Varies from emotional (Russia's Hunger Games) to rational (NAD)
Resilience to critical analysis	Low, easily refuted upon detailed examination	High, especially in the presence of a factual basis
Resource intensity	Low, especially with the use of AI	High, requires professional design and research
Adaptability	High, responsive to changes in the information environment	Moderate, requires time to develop strategies
Long-term impact	Low, forms short-term reactions	High, contributes to the formation of resilient narratives
Media literacy development	Absence or negative impact	Positive, especially in educational formats
Plausibility for the target audience	High among vulnerable audiences, low among media-literate audiences	High when supported institutionally
Semiotic complexity	Low, employs simple binary oppositions	High, especially in metaphorical campaigns
Technological innovativeness	High, actively employs AI	Moderate, employs comprehensive design solutions

***Source:** author's development*

The analysis of the practice of Brand Ukraine (n.d.), which is engaged in countering disinformation, has revealed effective strategies for the use of visual means. In particular, the campaign Russia's Hunger Games was analysed, which employed metaphorical visual solutions to expose manipulations regarding the food crisis (Fig. 1).

The experience of using dramatic visual contrasts to demonstrate the consequences of information manipulation proved to be particularly valuable (Fig. 2). The Nations Against Disinformation campaign utilised an interactive "Distortion Test" that visualised the process of distorting reality under the influence of disinformation, allowing users to experience this effect firsthand.

A comparative analysis of the disinformation materials disseminated on social media was also conducted during the research (Fig. 3). It has been found that such materials often exploited emotional triggers, employed simplified binary oppositions, and utilised manipulative visual techniques.

***Figure 1**. First sample of counter-propaganda material*
***Source:** Brand Ukraine (n.d.)*

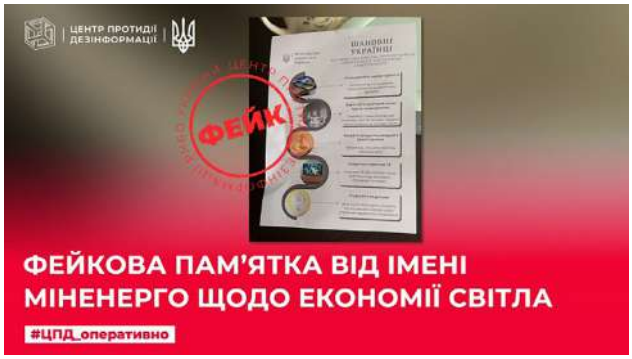

***Figure 2**. Second sample of counter-propaganda material*
***Source:** Center for Countering Disinformation (n.d.)*

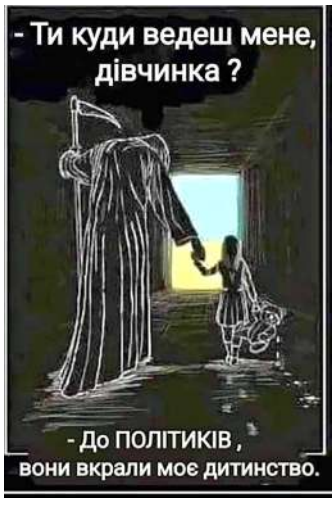

***Figure 3**. First sample of disinformation material*
***Source:** taken from the Facebook platform*

Particularly dangerous are materials created using AI that appear sufficiently convincing for uncritical perception but contain characteristic signs of artificial generation (anatomical anomalies, perspective distortions) (Fig. 4).

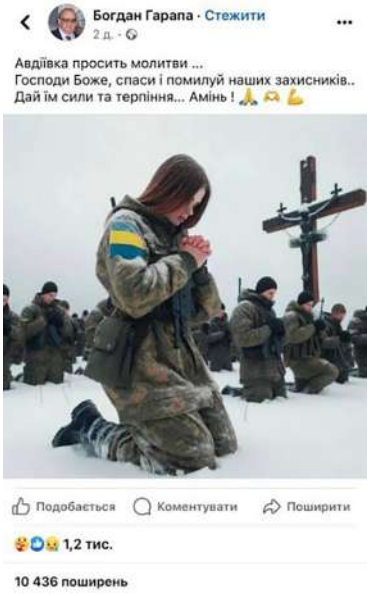

***Figure 4**. Second sample of disinformation material*
***Source:** taken from the Facebook platform*

The experimental implementation of the developed system for the automated creation of visual materials to counter disinformation has significantly improved the efficiency of graphic designers compared to traditional approaches. The quality of the materials, assessed according to the criteria of informativeness, visual appeal, and persuasiveness, remained at a high level.

The proposed technological conveyor for the automated creation of visual content to counter disinformation included the following stages:

1. Collection of information from specified media resources and social networks through RSS aggregation (Really Simple Syndication).
2. Analysis of the collected data using artificial intelligence algorithms to detect potential disinformation and its key narratives.
3. Generation of counter-propaganda content using large language models.
4. Creation of visual content using generative AI models under the guidance of a designer.
5. The dissemination of created material through social networks using automated mailing systems.

An important outcome of the research was the development of recommendations regarding optimal approaches to prompt formulation for generative AI models aimed at creating effective visual content to counter misinformation in wartime conditions.

The author's research has shown that the effectiveness of AI-generated visual materials directly depends on the quality and structure of the prompts. The most successful prompts followed a clear structure: a precise description of the genre and format (e.g. informational poster, explanatory infographic, counter-propaganda poster); specification of the visual style (minimalist design, photorealistic

collage, graphic illustration); description of the colour scheme (with particular attention to the psychological impact of colours); compositional layout (placement of elements and focal points); the core message (a clearly articulated counter-propaganda statement); and factual basis (real data used to refute disinformation).

For instance, an effective prompt for creating material aimed at exposing manipulation around the food crisis might read as follows: Create an information poster in A3 format in a minimalist style using a contrasting colour scheme (yellow and blue as the main colours, red for accents) The composition should divide the poster into two parts: the left shows the actual statistics of Ukrainian grain exports, while the right displays the manipulative statements of Russian propaganda with a clear visual marking of "FAKE". Include a visual metaphor of weighing scales, with the factual side outweighing the disinformation. Include the actual export figures for 2023. In contrast, less effective prompts were marked by a lack of clear structure, overly vague language, and the absence of a factual foundation, such as: Create a nice poster about the fakes regarding Ukrainian wheat. Brightly and convincingly.

The analysis of the results of working with various types of prompts showed that the more details and structural elements the prompt contained, the more accurate and effective the generated visual material proved to be. In particular, several elements were found to be especially important in prompts intended for the creation of counter-propaganda content: emotional tone of the content – specifying in the prompt the need for a balance between emotional impact and rational argumentation yielded better results than focusing solely on either emotional appeal or factual information; cultural context – adapting the content to the cultural background of the target audience by including instructions in the prompt to use recognisable cultural symbols and visual codes significantly improved relevance and resonance; technical specifications – including details such as size, format, and intended distribution channel (e.g. social media, print materials, outdoor advertising) in the prompt facilitated better adaptation of the content to the specific medium; duration of impact – indicating in the prompt whether the material was intended for short-term or long-term impact influenced the selection of expressive techniques and the level of content detail.

An additional significant outcome was the identification of a synergistic effect from the combination of various neural networks for the creation of complex visual materials. Indeed, the combination of Midjourney's capabilities for creating the visual foundation, Stable Diffusion for stylistic adaptation, and DALL-E for informational elements allowed for the production of more layered and effective visual solutions. Based on the conducted analysis, a comprehensive methodology for the integration of artificial intelligence technologies into the processes of creating counter-propaganda materials has been developed. The methodology includes:

1. The algorithm for automated detection of potential disinformation is a systematic monitoring of the information space using machine learning to identify typical patterns of manipulative content.

2. The model for generating counter-narratives involves the development of strategies for refutation that are specific to each type of disinformation, using large language models.

3. The system of automated visualisation of counter-narratives – the transformation of textual rebuttals into visual content using generative AI models, taking into account the psychological aspects of perception and the semiotic characteristics of visual communication.

4. The mechanisms of evaluation and optimisation are analytical tools for assessing the effectiveness of created materials and enhancing the quality of future content.

An important component of the methodology was the development of principles for the interaction between artificial intelligence and the designer, where AI acts as an extension of creative capabilities rather than a replacement for human creativity. Within the framework of semiotic analysis, three key strategies of visual resistance to disinformation were identified, all of which can be effectively implemented using AI technologies: the strategy of contrast – visually opposing truthful information and disinformation with clear labelling (e.g. verified/refuted, fact/fake); the strategy of narrative deconstruction – visually breaking down manipulative narratives into their constituent parts to expose their falsity or manipulative nature; the strategy of emotional recoding – transforming negative emotions triggered by disinformation into constructive responses through the use of visual metaphors and symbols.

The obtained results confirm the conclusions of A. Borji (2022) conducted a comparative analysis of generative models and identified various capabilities for creating visual content. This research has expanded these conclusions by focusing on the specifics of applying these technologies to counter disinformation, particularly in the context of the graphic design of informational materials. Graphic design and visual communications are particularly important tools in information confrontation, as they allow for the rapid and effective delivery of key messages to the target audience. As noted by T.H. Dibrova *et al.* (2018), the primary advantage of visual communication is the speed of their perception and the immediate response of consumers to communication signals. While textual information is perceived sequentially and requires significant cognitive resources for processing, visual messages are processed by the brain holistically and considerably faster. According to a study by MIT (Potter *et al*., 2014), the time taken to perceive a quality graphic image is approximately 13 milliseconds, which is 60,000 times faster than the perception of a text message with equivalent informational content. In the context of information overload for the modern media consumer, such speed of perception becomes a decisive factor for effective communication.

The identified optimisation of designers' workflows by 20% due to the use of AI correlates with the data presented in the study by S.S. Gerenko (2023), which also noted the ability of artificial intelligence to enhance the effectiveness of design solutions while maintaining the need for human oversight and creative direction. The author's conclusions regarding the structure of effective visual materials for countering disinformation align with the research of O.V. Kolisnyk *et al.* (2023), which identified that Midjourney is a powerful tool for generating design graphics. However, unlike this study, the author has found that the most effective are not individual generative models, but their combined use with subsequent professional refinement.

The results of the analysis conducted by Y.I. Siuiva (2024) indicated that machine learning algorithms trained on large datasets identified fake news based on linguistic, semantic, and contextual features of the text with high accuracy. The main approaches identified were naïve Bayes classifiers, logistic regression, decision trees, random forests, support vector machines, and deep learning (Siuiva, 2024). According to the research by L. Graves (2018), fully automated fact-checking has remained a distant aim. Social media continued to employ a combination of AI for the most repetitive operations and human oversight for the analysis of more complex cases. Particularly emphasised was the necessity of maintaining human control in AI systems to ensure ethical use and correct interpretation of data (Graves, 2018). The study by J. Bullock & M. Luengo-Oroz (2019) demonstrated that using the pre-trained AWD-LSTM model, it is possible to easily generate texts in the style of speeches by political leaders at the UN's General Assembly, which confirmed the potential risks of abusing such technologies.

M. Kryzhnia (2023) in her research emphasised the dual nature of AI, which can both assist in countering disinformation and be used to create it. The authors' results confirm this thesis, demonstrating that the ethical responsibility for the use of AI in the design of counter-propaganda materials lies with the designer. However, unlike M. Kryzhnia, the author has developed specific recommendations for the ethical use of AI in creating effective visual materials. The articles of I.M. Tsidylo & C.E. Sendra (2023) examined the use of Midjourney as a methodological innovation in the training of future designers. This research complements the findings, demonstrating the practical application of this and other generative models in the context of information warfare and countering disinformation. C. Marsden & T. Meyer (2019) emphasised the importance of keeping the human "in the loop" of AI systems to ensure ethical use and correct interpretation of data. These results confirm this thesis, demonstrating that the most effective materials were those created as a result of collaboration between the designer and AI systems, rather than a fully automated process. In contrast, W. Liu & R. Bezuhla (2024) demonstrated that artificial intelligence plays a key role in image generation in design, as it is capable of not only automating individual stages of visual design but also refining outcomes, supporting the creative process, and influencing aesthetic decisions.

Particular interest lies in comparing current findings with the research of K. Kertysova (2019), who considered AI as a bilateral tool in the context of disinformation. This outcome confirms her thesis regarding the potential of AI for both the creation and countering of disinformation; however, it focuses specifically on developing methodological approaches for harnessing this potential within graphic design. N. Dufour *et al.* (2024) noted the rapid increase in the amount of AI-generated content in fake news since spring 2023. The current study confirms this trend and proposes specific approaches to countering this threat through visual communication methods. O. Hrozna (2024) in her research emphasised that global digital transformation has significantly impacted journalism and design. The present study expands its conclusions, demonstrating how these transformations can be utilised to counter disinformation through visual tools.

Unlike the studies considered, the author's study offers a comprehensive methodology for the integration of artificial intelligence technologies into the processes of creating visual tools for countering disinformation, which takes into account technological aspects and psychological factors of perception of visual information, as well as semiotic features of communication in the context of information warfare. The results support the conclusion that the optimal use of AI technologies for designing visual tools to counter disinformation requires: a clear understanding of the psychological mechanisms of visual information perception; the ability to formulate effective queries to generative models; professional evaluation and refinement of the generated content; integration of the created materials into comprehensive information campaigns.

Conclusions

The conducted research on the use of artificial intelligence for the creation of information campaigns in wartime, particularly visual tools for countering disinformation, has led to the following conclusions. It has been established that modern artificial intelligence technologies significantly expand the capabilities of graphic design in the context of creating counter-propaganda materials. Generative models, such as Midjourney, Stable Diffusion, and DALL-E, have enabled the optimisation of up to 20% of routine tasks in the creation of visual content, allowing designers to focus on the strategic and creative aspects of development. However, as the research showed, the most effective approach turned out to be a hybrid one that combined automation through AI with professional refinement of materials by designers. A comprehensive methodology for the integration of artificial intelligence technologies into the processes of creating visual tools for countering disinformation has been developed. The proposed methodology included algorithms for the automatic detection of potential disinformation, the generation of relevant counter-narratives, and their visualisation using

generative models. An important element of the developed methodology was the recommendations for the formation of effective prompts for generative models, which took into account the psychological aspects of the perception of visual information and the semiotic characteristics of communication in the context of information warfare.

The semiotic analysis of visual materials has revealed the most effective visual codes and sign systems for countering disinformation. These include: contrasting visual comparisons of "truthfalsehood", symbols of fact-checking, visual metaphors of revelation or exposure, as well as elements that emphasise transparency and credibility. The findings have practical value for the development of a design system of visual tools for countering disinformation. The experimental implementation of the developed system for the automated creation of visual materials for countering disinformation has demonstrated a significant improvement in operational efficiency compared to traditional approaches while maintaining a high quality of materials, which confirms the effectiveness of the proposed methodology and its potential for widespread adoption in the practice of information campaigns. The conducted research has both theoretical and practical significance. From a theoretical perspective, the research expands the understanding of the role of artificial intelligence in contemporary design practices and its potential to counter misinformation. From a practical standpoint, the developed recommendations and methodological approaches can be directly implemented in the work of design studios, media organisations, and state institutions engaged in countering disinformation.

The prospects for further research lie in the development of specialised software solutions that integrate the identified approaches to the automated creation of visual tools for countering disinformation; the study of the long-term effects of visual counter-propaganda campaigns; and the investigation of adaptive design systems that automatically adjust to different target audiences and cultural contexts. The development of educational programmes for designers, aimed at the effective use of artificial intelligence to counter disinformation, deserves special attention, taking into account both the technical and ethical aspects of this activity.

Acknowledgements

None.

Funding

None.

Conflict of Interest

None.

References

[1] Borji, A. (2022). *Generated faces in the wild: Quantitative comparison of Stable Diffusion, Midjourney and DALL-E 2*. doi: 10.48550/arXiv.2210.00586.

[2] Bozhko, T., & Arefiev, V. (2023). Neural networks as a graphic design tool. *Bulletin of KNUKiM. Series in Arts*, 48, 125-135. doi: 10.31866/2410-1176.48.2023.282475.

[3] Brand Ukraine. (n.d.). *Russia's famine games*. Retrieved from https://brandukraine.org.ua/uk/projects/golodni-igri-rosiyi/.

[4] Bullock, J., & Luengo-Oroz, M. (2019). Automated speech generation from UN General Assembly statements: Mapping risks in AI generated texts. In *International conference on machine learning AI for social good workshop* (pp. 1-5). Long Beach. doi: 10.48550/arXiv.1906.01946.

[5] Center for Countering Disinformation. (n.d.). Retrieved from https://cpd.gov.ua.

[6] Center for Democracy and Rule of Law. (2023). *Disinformation and artificial intelligence: Invisible threat to modernity.* Retrieved from https://cedem.org.ua/analytics/dezinformatsiya-shtuchnyi-intelekt/.

[7] Derevyanko, N., & Zalevska, O. (2023). Comparative analysis of neural networks Midjourney, Stable Diffusion, and DALL-E and ways of their implementation in the educational process of students of design specialities. *Scientific Bulletin of Mukachevo State University. Series "Pedagogy and Psychology"*, 9(3), 36-44. doi: 10.52534/msu-pp3.2023.36.

[8] Dibrova, T.H., Solntsev, S.O., & Bazherina, K.V. (2018). *Advertising management: Theory and practice*. Kyiv: Kyiv Polytechnic Institute named after Igor Sikorsky.

[9] Dufour, N., *et al*. (2024). *AMMeBa: A large-scale survey and dataset of media-based misinformation in-the-wild*. doi: 10.48550/arXiv.2405.11697.

[10] Gerenko, S.S. (2023). *Artificial intelligence in graphic design: Challenges and perspectives*. (Doctoral dissertation, Kyiv National University of Culture and Arts, Kyiv, Ukraine).

[11] Graves, L. (2018). Understanding the promise and limits of automated fact-checking. *Factsheet,* 1-8. doi: 10.60625/risj-nqnx-bg89.

[12] Hlushchuk, Y. (2023). Fakes as a pressure tool in war conditions: Specifics of application and perception. *Scientific Papers of Vernadsky National Library of Ukraine*, 67, 96-107. doi: 10.15407/np.67.096.

[13] Hrozna, O. (2024). Technological innovations in online media: The role of artificial intelligence and virtual reality in content transformation. *Information Technologies and Learning Tools*, 1(15), 102-112. doi: 10.20535/2522-1078.2024.1(15).302843.

[14] Kertysova, K. (2019). Artificial intelligence and disinformation: How AI changes the way disinformation is produced, disseminated, and can be countered. *Security and Human Rights*, 29, 55-81. doi: 10.1163/18750230-02901005.
[15] Kolisnyk, O.V., Mykhailova, R.D., Beregovyi, O.S., Vlasiuk, V.V., & Kurovska, D.V. (2023). Midjorney Neural Network as a tool for generating design graphics. *Art and Design*, 1(21), 106-115. doi: 10.30857/2617-0272.2023.1.10.
[16] Kolosnichenko, M.V., *et al.* (2023). *Graphic design in information and visual space*. Riga: Baltija Publishing.
[17] Kryzhnia, M. (2023). Artificial intelligence in creativity and at war. About opportunities, risks and copyright. *Suspilne Culture*. Retrieved from https://suspilne.media/culture/426576-stucnij-intelekt-u-tvorcosti-ta-na-vijni-pro-mozlivosti-riziki-ta-avtorske-pravo/.
[18] Liu, W., & Bezuhla, R. (2024). Comparative analysis and collaborative innovation of parametric generation and aigc. *Art and Design*, 4, 22-32. doi: 10.30857/2617-0272.2024.4.2.
[19] Marsden, C., & Meyer, T. (2019). *Regulating disinformation with artificial intelligence: Effects of disinformation initiatives on freedom of expression and media pluralism*. Brussels: European Parliamentary Research Service (EPRS). doi: 10.2861/003689.
[20] Mykytiv, H.V., & Kondratenko, Y. (2016). Non-textual elements as a means of forming media culture of readers of popular science journals. In *Actual problems of media education in Ukraine and the world: Collection of abstracts of reports of the international scientific-practical conference* (pp. 50-53). Zaporizhzhia: Zaporizhzhya National University.
[21] Potter, M.C., Wyble, B., Hagmann, C.E., & McCourt, E.S. (2014). Detecting meaning in RSVP at 13 ms per picture. *Attention, Perception, & Psychophysics*, 76, 270-279. doi: 10.3758/s13414-013-0605-z.
[22] Pryshchenko, S.V. (2020). Visual semantics and artistic imagery of the poster. *Culture and Modernity,* 1, 97-103. doi: 10.32461/2226-0285.1.2020.221344.
[23] Rombach, R., Blattmann, A., Lorenz, D., Esser, P., & Ommer, B. (2022). *High-resolution image synthesis with latent diffusion models*. doi: 10.48550/arXiv.2112.10752.
[24] Salvo, D., Fly, J., & Rosenberger, L. (2018). Policy blueprint for countering authoritarian interference in democracies. *The German Marshall Fund of the United States (GMF)*. Retrieved from https://www.gmfus.org/publications/asd-policy-blueprint-countering-authoritarian-interference-democracies.
[25] Siuiva, Y.I. (2024). *Artificial intelligence technologies in the practice of detecting fake news*. (Master's thesis, National University of Kyiv-Mohyla Academy, Kyiv, Ukraine).
[26] Tsidylo, I.M., & Sendra, C.E. (2023). Artificial intelligence as a methodological innovation in the training of future designers: Midjourney tools. *Information Technologies and Learning Tools*, 97(5), 203-214. doi: 10.33407/itlt.v97i5.5338.

Використання штучного інтелекту для створення інформаційних кампаній в умовах війни: візуальні інструменти протидії дезінформації

Владислав Щука
Магістр
Київський національний університет культури і мистецтв
01601, вул. Євгена Коновальця, 36, м. Київ, Україна
https://orcid.org/0009-0004-1550-4727

Анотація. В умовах сучасної інформаційної війни критично важливим став розвиток ефективних методів протидії дезінформації та ворожій пропаганді. Кількість неправдивої інформації та швидкість її поширення вимагали впровадження автоматизованих систем із залученням штучного інтелекту для оптимізації процесів створення візуального контрпропагандистського контенту. Мета полягала у розробці методології інтеграції технологій штучного інтелекту в процеси створення ефективних візуальних інструментів протидії дезінформації з урахуванням принципів графічного дизайну та психології сприйняття візуальної інформації. Дослідження базувалося на комплексному підході, що поєднував теоретичний аналіз наукової літератури, порівняльний аналіз нейромереж Midjourney, Stable Diffusion та DALL-E, семіотичний аналіз візуальних матеріалів, а також експериментальне впровадження розробленої системи автоматизованого створення контрпропагандистського візуального контенту. Розроблено комплексний підхід до створення візуальних інструментів протидії дезінформації, який поєднав можливості систем автоматизованого збору інформації, алгоритмів штучного інтелекту для генерації графічного контенту та принципів ефективного графічного дизайну. Виявлено, що використання штучного інтелекту в графічному дизайні оптимізувало до 20 % рутинних завдань при створенні візуального контенту, дозволяючи дизайнерам зосередитись на стратегічних і творчих аспектах розробки. Розроблені рекомендації щодо використання ШІ у графічному дизайні можуть бути впроваджені державними інституціями, медіа та громадськими організаціями для оперативного реагування на інформаційні загрози

Ключові слова: графічний дизайн; візуальна комунікація; контрпропагандистський контент; інформаційна війна; генеративний дизайн; психологія сприйняття; композиційні рішення