GENERATIVE AI TOOLS IN WEB DESIGN

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Abstract:

Generative artificial intelligence (GAI) is a revolutionary branch of artificial intelligence that deals with the creation of new data based on samples from existing data. In the modern age, web design has become a key factor for the success of an online presence, and the application of GAI in this field opens the door to innovative approaches, content personalization, and improvement of user experience. It enables automatic content generation, personalization of user experience, and optimization of website performance.

The motivation to explore the application of GAI in web design stems from the need for more efficient, personalized, and innovative approaches to website design. Traditional approaches face challenges in terms of time, limited resources, and lack of personalization, while the application of GAI enables automation of design processes, generating dynamic content, and adapting to individual user needs.

This paper explores the possibilities of applying GAI in web design, highlighting its importance in the context of the modern digital environment. In this paper, we used the description method for GAI and its tools for web design. Then we developed two websites, one the classic way, and the second using GAI tools (ChatGPT, Canva, WixADI), and compared and evaluated their performances using a questionnaire.

Keywords:
Artificial Intelligence, Generative AI, Web Design.

INTRODUCTION

Generative Artificial Intelligence (GAI) refers to models or algorithms that create entirely new content, such as text, photos, videos, codes, data, or 3D renders, from vast amounts of data. Models "generate" new content by referencing the data and making new predictions. Seemingly contradictory, but in an era when technology continually redefines the limits of human creativity, GAI is emerging in different areas. AI systems can complement human creativity and develop innovative, inspiring works from art and music to content generation and design. However, realizing the full potential of GAI requires a thorough understanding of its concepts as a careful approach to design [1]. Generative AI differs from previous forms of AI or analytics because it can effectively generate new content, often in "unstructured" forms (for example, written text or images).

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DOI: 10.15308/Sinteza-2024-392-397

This research paper aims to anailyse the application of Generative Artificial Intelligence (GAI) in web design. This research stemmed from an interest in technological innovations and their impact on creative processes. Research explores how GAI can improve the ways of design and experience websites in today's digital age.

The first step of the research included an in-depth analysis of the basics of GAI, including an understanding of technological principles and available tools for application in web design. After that, the focus shifted to exploring the specific tools of GAI in web design, which included generating visual elements, textual content, and inspiring ideas.

We analysed the performance of various GAI tools such as Canva, ChatGPT, WixADI, and AI Art Generator in experimental test. This step aimed to evaluate the effectiveness and impact of these tools on the website design process. After experimental testing, a performance analysis of GAI tools compared to the traditional approach to web design that relies on HTML, CSS, and JavaScript technologies.

The last research step included evaluating the user experience through surveys and user feedback. This evaluation aimed to understand user attitudes towards websites created using GAI tools compared to the traditional approach.

Through this multidisciplinary approach, we explored new technological possibilities in the field of web design and gained a deeper understanding of the potential of GAI for improving creative processes. We hope that this research will benefit designers, developers, and researchers who want to use the potential of GAI in optimizing the process of designing websites and improving the user experience.

2. GAI - TECHNICAL BACKGROUND AND THE MAIN PRINCIPLES

Presently, two of the most used models in generative artificial intelligence stand out: generative adversarial networks (GANs) - technologies capable of generating visual and multimedia artifacts from both image and text input data, and transformer-based models - technologies like generative pre-trained transformers (GPT) language models that leverage internet-collected data to create textual content, ranging from web articles to press releases and notes [2].

According to [1] [3] [4], the main principles of GAI are:

- data-driven creativity - generative AI relies on vast datasets to mimic real-world patterns and styles, emphasizing the importance of curated and organized data.
- Neural network power - neural networks like generative adversarial networks (GANs) and recurrent neural networks (RNNs) play vital roles in generative AI, enabling the production of content and sequential data.
- feedback loop - iterative refinement through feedback loops allows continual improvement of AI-generated outputs.
- •creative constraints - establishing creative boundaries ensures that AI-generated content complements human innovation rather than replacing it.
- Ethical considerations - ethical standards guide the responsible development and use of AI-generated content to align with societal values.
- human-AI collaboration - productive collaboration occurs when AI augments human creativity rather than replacing it entirely.
- interpretable AI - understanding AI's decision-making processes fosters trust and enables fine-tuning the outputs.
- continuous learning - AI systems evolve, responding to changing trends, user feedback, and creative needs.
- user-centric design - prioritizing user experience ensures that AI-generated content meets users' preferences and goals.
- Innovation - generative AI encourages creativity and exploration, offering new possibilities for creative expression and advancement.

In summary, these principles guide the interaction between artificial intelligence and human creativity, fostering collaboration and innovation in the creative process.

3. GAI AND WEB DESIGN – ANALYSIS OF TOOLS

Web design is a generally accepted term for the various skills, standards, and disciplines in creating a website. Web design is the planning and development of a website.

This process includes information architecture, user environment, page structure, navigation, layout, colors, fonts, and images. All this combines with the principles of design for creating a website that meets the goals of the owners and designers. The GAI automates and advances many aspects of Web design, including:

- Creating user interfaces (UI): to generate various UI designs based on a set of requirements, such as the purpose of a website, target audience, and desired style. It can save designers a significant amount of time and effort.
- content generation: to generate various types of content for websites, such as blog posts, product descriptions, and landing pages.
- Search Engine Optimization (SEO): to generate meta titles, descriptions, and other SEO-friendly elements for websites. It can help websites rank higher on search results pages (SERPs), making them more visible to potential visitors [5] [6] [7] [8] [9].

We analyzed free GAI tools that can help the web design process: Canva, ChatGPT, WixADI, and AiArt-Generator.

3.1. CANVA

Canva has been a part of the workflow of many web designers for years and has become popular among users worldwide due to its ease of use and wide range of features. This tool uses artificial intelligence to generate numerous design elements, such as logos, infographics, magical design, magical deletion, magical replacement and editing, social media posts, presentations, and more. One of the most powerful features is Canva's magic design tool, which allows you to create custom templates on the brand from the uploaded image. Also, an AI assistant generates written content from a text prompt. It helps make presentations, adding a copy of a website, or simply creating headlines for social media graphics [10].

3.2. ChatGPT

Creating Web content with the help of ChatGPT implies the use of generative artificial intelligence to produce various types of content, including textual, interactive, and informative material. ChatGPT has a variety of roles, such as tutor, content creator, or even a collaborative partner to create ideas and concepts for Websites. This approach enables faster generation of content and a wide range of possibilities in website creation [11].

3.3. WIXADI

WixADI is an artificial intelligence web development tool that generates complete web pages in a few steps, thanks to an advanced AI assistant. It answers a few questions about the user's business and design preferences. Then, it produces a fully functional website with complete pages, integrations, and branded results in just a few minutes. It is a powerful tool for those with limited time or design skills to create a website that is attractive, functional, and capable of launching an online store. The main features of WixADI: are creating webpages with no design experience, highly customizable, 100% mobile-friendly, built-in SEO features, and creating text using AI [12].

3.4. ARTAIGENERATOR

The AI Art Generator is a software tool that uses generative artificial intelligence and acts as a creative tool that allows users to explore a wide area of artistic expression by manipulating different input parameters. Through unsupervised learning, the model learns to decipher and imitate the subtle nuances of various genres, which makes it possible to generate unique and original works of art. It can adapt to multiple styles, from classical to contemporary, providing users with a dynamic and engaging artistic experience [13].

4. A CASE STUDY

The author has a task for the final exam to re-design its web design project from 3rd semester, but now using GAI tools. The project theme was a Web application about art. The author used the first three GAI tools for the design of the website and the last one for content creation. We evaluate this experience from both sides, developers, and users. The site map is in Fig. 1. Screenshots of sites are in Fig. 2, and sites [14] [15] [16] and questionary [17] are available.

It gave us an insight into the performance results of GAI tools used in Web design. Through applying tools such as Canva, ChatGPT, WixADI, and AI Art Generator, we explored many aspects of the design process, including the speed, functionality, and aesthetics of the created Web pages.

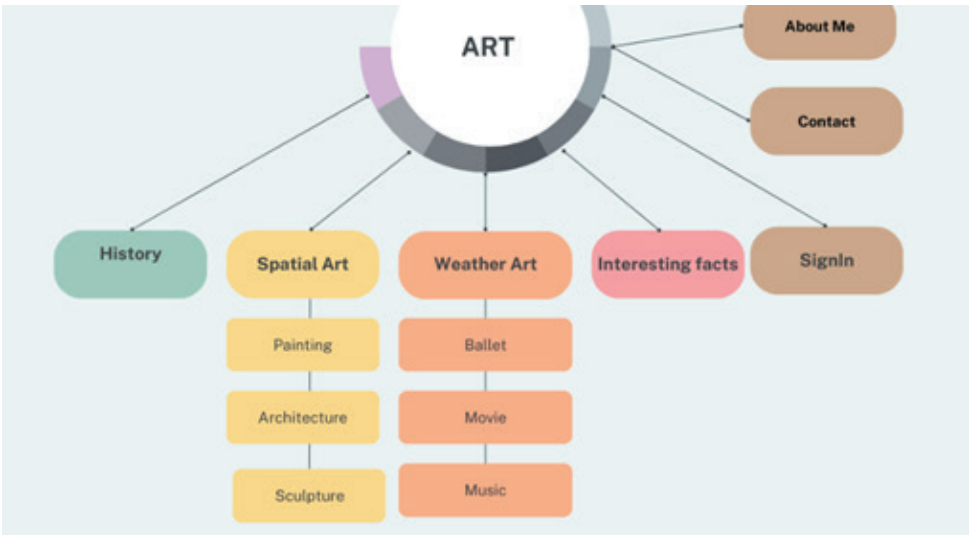

Figure 1. The site map.

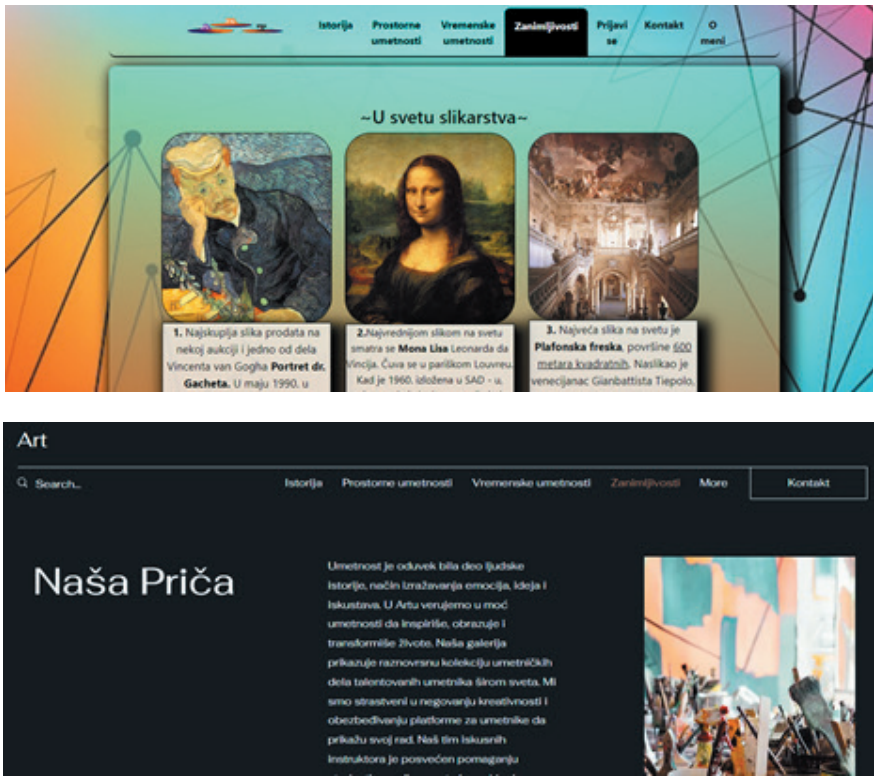

Figure 2. Screenshots of sites 1 and 2, respectively.

First, using Canva to generate visual elements such as logos and graphics is noticeable to speed up the design process, making it easier to create eye-catching Web pages. ChatGPT generated the text content and inspirational ideas, adding originality and diversity to the created content.

Furthermore, the WixADI tool stands extremely helpful in creating complete Websites without deep technical knowledge. It has enabled faster and more efficient website development, especially for beginners and those with less experience. Although the AI Art Generator is not directly related to Web design, it can inspire the creative elements on the pages, contributing to aesthetics.

Analysis of the effectiveness of GAI tools:

- Canva: Rapid generation of visual elements
- ChatGPT: Generating text content and ideas.
- WixADI: Creating complete websites.
- AI Art Generator: Inspiration for Creative Elements

We did a comparative analysis of the performances of each tool with the traditional approach in Web design, which relies on HTML, CSS, and JavaScript technologies. We observed differences in loading speed and responsiveness. For example, loading Web pages created through the WixADI tool was faster and more efficient, while responsiveness to different devices was significantly better in comparison manually developed Web pages. It takes 5-10 seconds to load a hand-developed Web page, while a Web page created through the WixADI tool takes 2-5 seconds. The responsiveness of a Web page created through the WixADI tool is 90% (customizable for each device), while the responsiveness for hand-developed Web pages takes time to gain a good knowledge of HTML and CSS technologies, and the responsiveness of the currently hand-made Web site is about 50%, it is not adaptable for mobile devices.

The test included a user experience rating from 18 people of different profiles. The nine testers were software engineering students. Testing provided helpful insights about their attitude towards generated content. The testers did a survey containing links to sites and several questions.

The responses included ratings of functionality, design, user interaction, content, responsiveness, and performance, with ratings in the range of 1 to 10, with 1 denoting the lowest score and 10 being the highest rating. The first site included manually developed Web pages, while the second site represented Web pages created through the WixADI tool. Users are also allowed to give their opinions about both sites. (Fig. 3).

The first site included manually developed Web pages, while the second site represented Web pages created through the WixADI tool. Users are also allowed to give their opinions about both sites. The results showed that web pages created using GAI tools received more positive ratings in loading speed, responsiveness, and aesthetics. However, some users have noticed limitations in customizing the design in certain situations.

These results can serve as the basis for further analysis and direction of future research in this area. The application of GAI tools provides several advantages, including speed, adaptability, and the ability to generate creative ideas. Nevertheless, there are disadvantages, such as limitations in customizing the design or a lack of personalization.

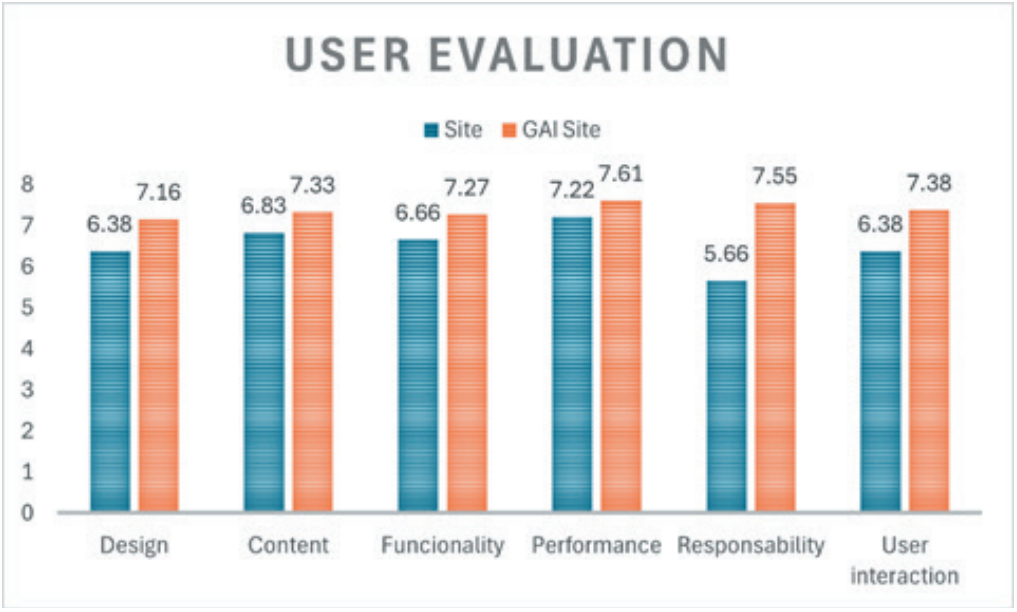

Figure 3. The results of questionary about both sites features.

5. CONCLUSION

The conclusion of the research highlights the main findings obtained through thorough analysis. The research process, which encompasses the basics of GAI analysis, experimental testing, and user experience evaluation, provided a deeper insight into the potential of these technologies to advance the creative processes in website design.

The results indicate the significant impact of GAI tools such as Canva, ChatGPT, WixADI, and AI Art Generator on the website design process. Experimental studies have shown how these tools can effectively generate visual and textual elements, making it easier for designers and developers to work. Compared to the traditional approach to web design, GAI tools bring numerous advantages in speed, adaptability, and creativity. Based on performance analysis, GAI tools can be a more effective and helpful option in certain website design situations. Nevertheless, choosing the tool is caused by individual needs and specifics of each project. Customer experience evaluation further confirms the significant role of GAI in improving customer engagement and satisfaction. Through this multidisciplinary approach, the research has provided valuable insights to designers, developers, and researchers, pointing to the potential of GAI to optimize the website design process and improve the user experience.

Finally, these studies lay the foundation for further development of GAI tools in web design, focusing on improving adaptability, personalization, and impact on the user experience. This research paves the way for a new wave of innovation in digital design, promising potential benefits for all participants in the web content creation process.

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