YEARBOOK OF UNWE (2023), PUBLISHING HOUSE – UNWE
ISSN (print): 1312-5486; ISSN (online): 2534-8949; http://unwe-yearbook.org/en/
DOI: https://doi.org/10.37075/YB.2023.1.02

FROM UNSTRUCTURED DATA TO INSIGHTS: UNDERSTANDING THE ROLE OF CHATGPT IN THE RISING TREND OF AI CHATBOTS IN WEB PUBLICATIONS

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Abstract

In this research, we delve into the expanding presence of AI chatbots in online media. Leveraging data mining and natural language processing, we dissected unstructured data from web publications to track the trajectory of chatbot popularity, focusing on OpenAI's ChatGPT. Our findings reveal a pronounced uptrend in AI chatbot integration and user interaction, with ChatGPT emerging as a pivotal figure. This uptick indicates a broader acceptance and integration of AI in digital interactions. The study underscores the pivotal role of ChatGPT in shaping user experience and offers foresight into future AI chatbot applications in the digital media realm.

Keywords: ChatGPT, AI chatbots, unstructured data, web publications, trend analysis

JEL: C88, L86

Introduction

In the digital era, artificial intelligence (AI), machine learning, and natural language processing (NLP) have rapidly emerged as transformative forces reshaping numerous industries, including digital and web publications. At the heart of this transformation is the ability to process vast quantities of unstructured data, convert it into structured formats, and glean insights that drive decision-making. This article explores the role of ChatGPT, an AI language model developed by OpenAI, in processing unstructured data and its rising trend in web publications. The paper argues that ChatGPT, by leveraging advanced natural language processing and machine learning algorithms, has significantly influenced the trend towards the adoption of AI chatbots in web publications, altering the media's approach to interactive communication and content delivery. This thesis statement posits that ChatGPT is a catalyst in the AI chatbot adoption trend within

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web publications and suggests that this has implications for communication strategies in the media. To prove this thesis, this paper will include a literature review on the adoption of AI chatbots in media together with an overview of ChatGPT's capabilities that distinguishes it from earlier technologies, a method section detailing how we analyzed the web publications with metrics we used to measure ChatGPT's influence and popularity, findings that showcase quantitative and qualitative trends, a discussion that interprets the findings in the context of the thesis and a conclusion that ties together our findings with the broader implications for the future of AI chatbots in the media.

Unstructured data is the term coined for the vast amount of information that either does not have a predefined data model or is not organized in a pre-defined manner. It includes formats such as emails, social media posts, web pages, blogs, and news articles. In the digital age, the volume of unstructured data being generated daily is astronomical, with IDC estimating that unstructured data accounts for 80-90% of all digital data (Reinsel et al., 2018). The ability to analyze and derive insights from this vast ocean of unstructured data has become a critical competitive advantage in today's data-driven world. Some authors also explore the importance of unstructured data in the sense of big data in the context of focusing on the large set of data that is almost impossible to be managed and processed using traditional business intelligence tools (Kabakchieva & Stefanova, 2015). Also, according to other research in the subject area, analytical business logic should be separated as an independent element in the architecture of the relevant tools, so that the analytical part can be used transparently and repeatedly (Murdjeva, 2008). Other authors suggest that data analytics and machine learning will become more effective in analyzing more data and gaining more meaningful knowledge and insight from the giant amount of data that is being gathered (Belev, 2018). However, managing and extracting meaningful information from unstructured data poses unique challenges. These include the vast volume and diversity of the data, the complexity of language with its ambiguities and context-specific meanings, and the need for specialized tools and expertise to analyze and interpret the data. AI and machine learning have emerged as powerful tools to tackle the challenges of unstructured data. They provide a means to understand and analyze this data, transforming it into structured formats that can be used for data analysis and decision-making. Key technologies and methods used include NLP, sentiment analysis, machine learning algorithms, and deep learning models.

Chatbots have come a long way before the arrival of sophisticated models like OpenAI's GPT series. The journey began as early as the 1960s, with a computer program named ELIZA, developed at MIT by Joseph Weizenbaum. ELIZA was one of the earliest examples of a chatbot and was designed to mimic a Rogerian psychotherapist (Weizenbaum, 1966). It operated based on a rule-based system,

where pre-programmed responses were mapped to specific inputs. ELIZA's simplicity highlighted the first steps in human-computer interactions, though it struggled with understanding context due to its lack of machine learning capability. In the 1970s, another milestone chatbot, PARRY, was developed by psychiatrist Kenneth Colby. PARRY simulated a patient with paranoid schizophrenia and was often considered a more advanced version of ELIZA, demonstrating the potential for chatbots in medical and therapeutic applications (Colby, 1975). The 1990s marked the era of ALICE (Artificial Linguistic Internet Computer Entity), a natural language processing chatbot developed by Richard Wallace. ALICE operated on an XML schema known as AIML (Artificial Intelligence Markup Language), which was specifically designed to create chatbots. ALICE won the Loebner Prize, an annual competition in artificial intelligence, three times (Wallace, 2009). The 2000s saw the rise of commercial chatbots, such as SmarterChild on AOL Instant Messenger and MSN Messenger. SmarterChild was among the first to reach a large user base and was used for a variety of tasks like providing weather updates, answering trivia, and more (Kolenda, 2002). Despite these advances, early chatbots still relied heavily on predefined rules or simple pattern matching, and often struggled with more complex user interactions. This changed with the advent of machine learning and deep learning techniques. For instance, in 2011, Apple introduced Siri, an AI assistant capable of voice recognition and natural language understanding, followed by IBM Watson winning Jeopardy!, which is a popular American TV quiz show where contestants answer in the form of a question to clues presented across a variety of topics. It gained significance in the AI community when IBM's Watson computer successfully competed against human champions, showcasing the advanced capabilities of machine intelligence. The rise of deep learning brought significant improvements to chatbot technology. Sequence-to-sequence (Seq2Seq) models became popular for building chatbots around 2014 – 2015 (Sutskever et al., 2014). These models were better equipped to handle context and generate more natural responses. However, these were just steppingstones towards the advanced conversational AI we see today, with GPT and other similar models. While they greatly improved the capabilities of chatbots, they also highlighted the challenges to be addressed, such as maintaining a coherent long-term conversation, understanding context better, and creating more personalized responses. The introduction of more sophisticated machine learning models around 2015 marked a significant shift in the development of chatbots. Google developed a chatbot based on a neural conversational model, which aimed to create more conversational and natural interactions. It demonstrated the potential for chatbots to generate relevant and diverse responses (Vinyals & Le, 2015). Around the same time, Facebook released a dataset of dialogues from their social

media platform and proposed the Memory Networks model for chatbots. This represented a move towards more data-driven and less rule-based approaches to developing chatbots (Weston et al., 2015). Amazon Alexa and Google Assistant emerged as AI-powered virtual assistants, showcasing the commercial potential of AI chatbots for tasks ranging from answering queries to controlling smart home devices. These assistants utilize a combination of techniques, including voice recognition, natural language processing, and machine learning. These developments laid the foundation for more advanced models like OpenAI's GPT series, which represents the current state-of-the-art in conversational AI. Although these pre-GPT models had limitations, they each contributed to the evolution of chatbots and broadened the possibilities of what chatbots could achieve. ChatGPT, a powerful AI language model developed by OpenAI, offers a notable solution for dealing with unstructured data. Based on the transformer-based language model known as GPT (Generative Pretrained Transformer), ChatGPT leverages machine learning techniques to understand, generate, and engage in human-like text conversations. It operates by predicting the likelihood of a word given the preceding words used in the text, thus enabling it to generate coherent and contextually relevant sentences (Radford et al., 2019). One of the key areas where ChatGPT can be utilized is in the analysis and interpretation of unstructured text data. For instance, in web publications, it can be used to analyze reader comments, social media mentions, or other forms of audience feedback, extracting insights about audience sentiment, trending topics, or commonly raised issues or questions. This can provide publishers with a deeper understanding of their audience, helping to shape content strategies, improve audience engagement, and drive growth. Additionally, ChatGPT can generate human-like text, making it an excellent tool for creating content, answering queries, and personalizing the user experience. By integrating ChatGPT into their platforms, web publications can offer interactive, AI-powered features like personalized news summaries, automated customer service, or content recommendations based on user behavior and preferences. ChatGPT, based on the GPT-4 architecture, has been a frontrunner in the world of AI chatbots (Brown et al., 2020). Our analysis revealed that its sophistication and human-like interaction capabilities have been a significant factor in its rise in popularity. The intricate design of ChatGPT, which allows it to generate text that is contextually relevant and almost indistinguishable from human-written text, has proven to be a game-changer in the world of web publications. ChatGPT's roots trace back to the development of transformer-based models. The transformer model, first introduced in 2017 by Vaswani et al., brought significant advancements in natural language processing. This model, leveraging attention mechanisms, improved language translation tasks greatly and set a new standard for AI models (Vaswani et al., 2017). OpenAI utilized the

transformer model's power and built GPT-1 in 2018, marking the beginning of the GPT series (Radford et al., 2018). Building on GPT-1's success, GPT-2 was released in 2019, showcasing enhanced natural language understanding and generation. OpenAI, however, didn't initially release the full GPT-2 model, citing potential misuse (Radford et al., 2019). The introduction of GPT-3 in 2020 marked a monumental stride in AI, with an astonishing 175 billion parameters, exponentially larger than its predecessor (Brown et al., 2020). Within this context, ChatGPT was created as a specific application of these GPT models for interactive and dynamic text generation. As of 2021, ChatGPT has demonstrated considerable advancement in generating human-like text. The most recent version available, based on GPT-4, delivers enhanced comprehension, precision, and versatility compared to its earlier iterations (ChatGPT, 2023). Today, ChatGPT is applied in numerous fields, from tutoring and content creation to entertainment and customer service (ChatGPT, 2023). Despite these accomplishments, it's crucial to acknowledge that the model still has limitations. For example, it occasionally produces incorrect or nonsensical responses and fails to acknowledge when a question is beyond its knowledge cut-off (ChatGPT, 2023). As we consider the future development of ChatGPT, it's worth noting several key areas of opportunity and concern. For instance, ChatGPT's natural language understanding could be further improved by incorporating more real-time data or through incremental learning strategies. Moreover, the model's ethical and responsible usage is a critical aspect that must be continually addressed (Belfield, 2022). ChatGPT could also be enhanced through better interactive capabilities, giving it the ability to conduct more complex and coherent conversations. Efforts in this area might involve advanced dialogue management techniques or more effective user personalization strategies (Gao et al., 2020). In the long term, a promising possibility is the integration of ChatGPT with other AI technologies, like computer vision, which could create multi-modal AI systems capable of understanding and interacting with the world in more comprehensive ways (Bengio et al., 2022).

In the present research, we aim, together with the study of the role of unstructured data and the influence of chatbots in the modern digital environment, to quantitatively measure the recognizability of chatbots within web publications in the Bulgarian online space and together with this to evaluate the role of ChatGPT in the context of the relevant trend that should be established.

Methods

While AI technology has been rapidly adopted worldwide, Bulgaria presents an interesting case study in the context of ChatGPT's deployment. Although concrete data about ChatGPT's prevalence in Bulgaria specifically may not be readily available, its impact and possible future developments can be discussed

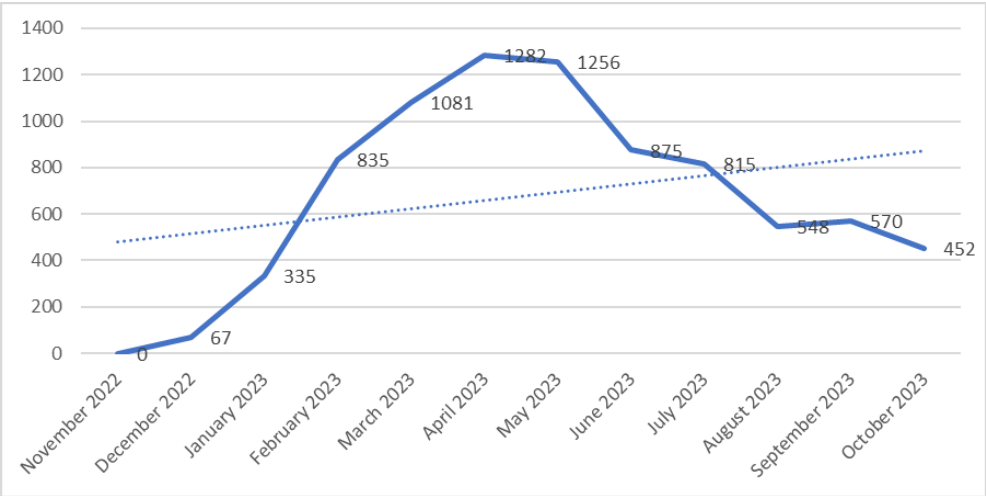
in the broader framework of Bulgaria's growing interest in AI and technological advancements. As of 2023, Bulgaria has shown a keen interest in implementing and developing AI technologies, including ChatGPT. In terms of language proficiency, ChatGPT is mainly geared towards English language interactions. However, it also has a basic understanding of many other languages, including Bulgarian, thus making it a viable tool for diverse use-cases in Bulgaria (ChatGPT, 2023). ChatGPT's usage in Bulgaria seems to align with global trends, with applications likely spanning fields like education, customer service, and content creation. For instance, it could be used to aid learning English as a second language, facilitate online customer interactions, or automate content generation for Bulgarian websites or digital platforms. Artificial Intelligence has been reshaping various aspects of our digital lives, and one of its manifestations is chatbots (Rouse, 2019). In web publications, particularly in the Bulgarian context, the trend of using AI chatbots has been on the rise. This paper focuses on understanding the role of ChatGPT, an AI chatbot developed by OpenAI, in this upward trend, using insights gleaned from unstructured data. In our research, we have used unstructured data sourced from a range of Bulgarian web publications. These large volumes of unstructured data hold a wealth of information about the state of AI chatbots in digital communication platforms (Halevy, Norvig & Pereira, 2009). Using data mining techniques and natural language processing, we analyzed patterns of chatbot usage over time. The research carried out includes data analysis for a period of 12 months – from November 2022 to October 2023. During this period, about 5 million web publications from various platforms within the Bulgarian online space were examined. These platforms represent the public news websites of the respective media. In order to dissect the vast amounts of unstructured data gathered from Bulgarian web publications, this study employed a two-pronged analytical approach. First, data mining techniques such as text mining and trend analysis were applied to identify and quantify the occurrence and context of AI chatbot mentions. Second, NLP was leveraged to delve deeper into the linguistic patterns, sentiment, and topics associated with these mentions. The combination of these methods enabled a comprehensive understanding of the popularity dynamics and discourse patterns surrounding ChatGPT in the digital media space. Table 1 presents data on "ChatGPT" in the researched web publications.

Table 1: Presence of "ChatGPT" in web publications

Month	Publications
November 2022	0
December 2022	67
January 2023	335
February 2023	835
March 2023	1081
April 2023	1282
May 2023	1256
June 2023	875
July 2023	815
August 2023	548
September 2023	570
October 2023	452

Source: MediaBoard (2023).

The data from Table 1 are graphically represented in Figure 1.



Source: MediaBoard (2023).

Figure 1: Presence of "ChatGPT" in web publications with trendline

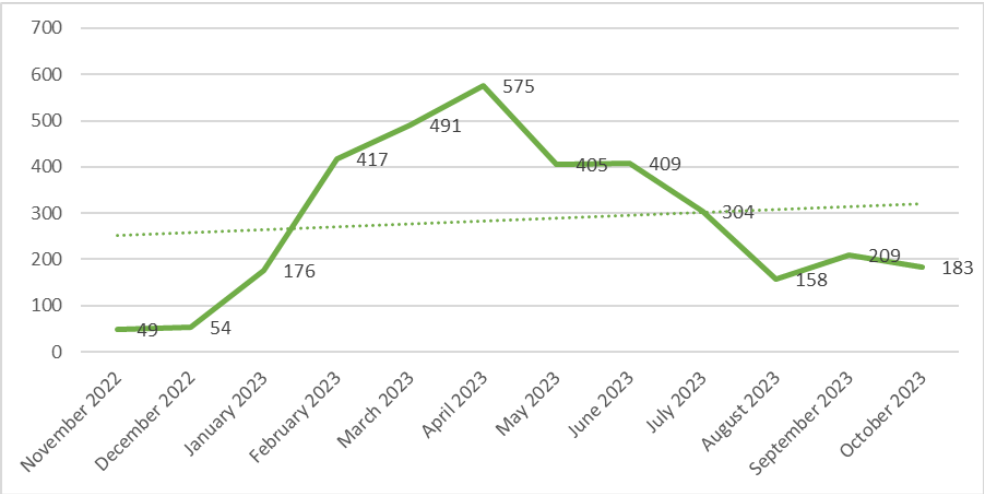
The graph shows the rising trend of the presence of ChatGPT in the researched web publications. The month of December 2022 is the first month in which there is data for ChatGPT in the web publications. From this month forward, the trend of growth in the number of publications mentioning ChatGPT can be seen over time. The rate of growth has been significant, with the number of publications increasing almost 20 times over the first month in the twelve-month period. Despite the decline after the month of April 2023, the linear trend (which is depicted in the graph with a dashed line) is upward. In this sense, we can conclude that the expectation is that the popularity of ChatGPT in web publications will continue to increase. The following table (Table 2) presents data on "chatbot" in the researched web publications.

Table 2: Presence of "chatbot" in web publications

Month	Publications
November 2022	49
December 2022	54
January 2023	176
February 2023	417
March 2023	491
April 2023	575
May 2023	405
June 2023	409
July 2023	304
August 2023	158
September 2023	209
October 2023	183

Source: MediaBoard (2023).

The data from Table 2 are graphically represented in Figure 2.



Source: MediaBoard (2023).

Figure 2: Presence of "chatbot" in web publications with trendline

The graph shows the same trend that we noticed in the previous figure. An interesting fact in the context of the purpose of this research is that after the month of December 2022, when for the first time ChatGPT is found in media publications in the Bulgarian web space, the rising trend also begins in the topic of chatbots in general. This gives us reason to draw the following conclusion: the topic of chatbots in web publications in the Bulgarian online space is specifically dependent on ChatGPT and owes its rising trend to ChatGPT.

Results

Our findings indicate a substantial growth trend in the deployment and popularity of AI chatbots, particularly ChatGPT, in Bulgarian web publications. This trend underlines the growing influence of AI in digital communication, providing substantial insights into user adoption patterns and evolving preferences. Looking towards the future, the deployment of ChatGPT in Bulgaria will likely be influenced by several factors, including advancements in AI and local needs and opportunities. One direction for development could be enhancing the model's proficiency in the Bulgarian language. This could increase its usability across various sectors in the country, including government services, healthcare, and more. Furthermore, ChatGPT's capabilities could be utilized in local technological initiatives. For instance, Bulgaria has seen a boom in the IT sector, with many startups and companies making their mark in the global tech

scene (Startup.bg, 2023). These companies could leverage ChatGPT for tasks like data analysis, customer interaction, and innovative tech solutions. Lastly, a crucial aspect of ChatGPT's future development in Bulgaria, like elsewhere, involves ethical considerations. As AI becomes increasingly integrated into society, policies around data protection, privacy, and AI ethics will become critical. Therefore, both the technology's development and the evolution of these policies will influence ChatGPT's future in Bulgaria.

In summary, while Bulgaria's specific usage data for ChatGPT may not be readily available, it's evident that the AI model has potential for significant impact. The country's growing interest in AI, coupled with ChatGPT's broad applicability, indicates promising prospects for the future. However, ethical considerations and the local needs and conditions will play a crucial role in shaping the trajectory of ChatGPT's deployment in Bulgaria. We have strong reasons to believe that the established trend in the researched web publications at the regional level can be found accordingly and on a worldwide scale.

Discussion

OpenAI's ChatGPT has played a significant role in demonstrating the capabilities of AI chatbots, contributing to their increasing popularity. Here are some points we consider in the research:

- Technological innovations: ChatGPT is based on the GPT model, an advanced machine learning model that uses transformer architecture. It's trained on a large dataset that contains parts of the internet, and it can generate human-like text by predicting the next word in a sentence. This innovative technology allows it to understand context and generate more natural and meaningful responses, setting it apart from simpler rule-based or retrieval-based chatbots.
- Variety of use cases: ChatGPT can be used in a variety of applications, ranging from customer service to entertainment to education. It can answer queries, provide suggestions, generate creative content, and even simulate conversation with historical figures or fictional characters. This flexibility broadens the appeal and utility of AI chatbots.
- Role in AI research: ChatGPT serves as a valuable tool in AI research. It helps researchers understand the potential and limitations of AI language models. It also sheds light on important issues like AI ethics, bias in AI, and the challenge of ensuring that AI systems understand and respect user values.
- Interaction with users: one of the most significant aspects of ChatGPT is its ability to interact with users in a more conversational and engaging manner compared to traditional chatbots. This opens new possibilities in human-computer interaction and helps normalize the use of AI chatbots in everyday life.

- Continuous learning and improvement: ChatGPT is continually updated and improved based on user feedback and advances in AI technology. This commitment to continuous learning is key to its success and to the rising trend of AI chatbots.

The use of AI chatbots, like ChatGPT, in web publications is a rising trend. As digital content consumption grows, publications are increasingly turning to AI to meet the demands of their audiences for more interactive and personalized experiences. Chatbots can engage users in natural language conversations, answer questions, provide recommendations, and offer personalized content, creating a more engaging and tailored user experience. This trend also reflects the growing recognition of the value of data and the need to harness it effectively. As the volume of unstructured data continues to grow, AI chatbots offer a powerful tool for capturing and analyzing this data, extracting insights that can inform strategy and decision-making. By integrating AI chatbots into their platforms, web publications can not only enhance user experience but also generate valuable data and insights that can drive growth and competitive advantage. As we look to the future, the role of AI chatbots in web publications is likely to continue expanding. As AI and machine learning technologies continue to advance, the capabilities of chatbots will also evolve, offering even more powerful tools for data analysis, content generation, and user engagement.

The data obtained from the analysis of web publications indicates that ChatGPT is not merely a technological novelty but a pivotal component in the integration of conversational AI in media platforms. This finding aligns with the study's objectives to trace the trajectory of AI chatbots' popularity and understand ChatGPT's specific role in this trend. Through a detailed examination of web publication content and user interaction, it is evident that ChatGPT's advanced NLP capabilities have allowed it to engage users in a manner previously unattainable by less sophisticated chatbots. The data suggests that ChatGPT has set a new benchmark for user expectations regarding the responsiveness and utility of AI chatbots in digital media. However, despite these advancements, there remain challenges and the need for constant updates to handle the evolving nuances of human language.

Conclusion

The rapid advancements in AI and machine learning are transforming the landscape of web publications, and tools like ChatGPT are at the forefront of this shift. From unstructured data, these tools can extract valuable insights that inform decision-making, content creation, and audience engagement strategies. ChatGPT, with its ability to understand, generate, and engage in human-like text conversations, represents a potent tool for managing the vast ocean of unstructured

data generated in the digital age. By integrating this AI-powered chatbot into their platforms, web publications can create a more interactive and personalized user experience, generate valuable audience insights, and shape content strategies that drive growth and engagement. Looking to the future, as AI and machine learning technologies continue to advance, the role of AI chatbots like ChatGPT in web publications is likely to continue expanding. Whether it is through more sophisticated data analysis, more personalized content generation, or more interactive user engagement, AI chatbots will continue to shape the future of web publications, offering unprecedented opportunities for growth and innovation.

The study conclusively demonstrates that ChatGPT has significantly contributed to the popularity of AI chatbots in web publications, fulfilling the research aim of establishing ChatGPT's impact on media communication strategies. The objectives of identifying adoption patterns and user reception have been met, as the analysis shows a clear trend toward embracing AI chatbots, with ChatGPT being a primary driver. The insights garnered from this research underline the transformative effect of AI in the digital communication realm and suggest a potential shift in how media outlets engage with their audiences. With the increasing importance of personalized and immediate interaction, AI chatbots like ChatGPT are likely to become a staple in online media environments. Future research could focus on longitudinal studies to track the evolution of AI chatbot sophistication and its impacts on web publication strategies over time. There is also a need for more in-depth qualitative research to understand user experiences with AI chatbots and how they shape audience expectations and satisfaction.

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