WILL CHATGPT REPLACE PROGRAMMERS?

Lucian LUPAN[1*], Mihail MIHALACHI[1], Andrei BERCO[1]

[1]*Department of Software Engineering and Automation, Group FAF-221, Faculty of Computers, Informatics and Microelectronics, Technical University of Moldova, Chisinau, Republic of Moldova*

*Corresponding author: Lucian Lupan, lucian.lupan@isa.utm.md

Abstract. *The field of natural language-modelling has recently experienced a breakthrough with the introduction of ChatGPT. Since it's capable of writing code based on a prompt, it's only natural for us, computer science students, to worry about the prospect of AI replacing programmers in the near future. Whilst there are already several articles regarding this matter, our research paper's objective is to analyze the issue from a student's perspective and estimate the impact it will have to on the programming industry. We have also considered the possibility of ChatGPT being a helpful tool for programmers that would boost productivity by studying its limitations and advantages/disadvatages, comparing it to Google Search. Finally, we concluded that despite being capable of answering coding questions, ChatGPT will not be replacing programmers. However, with the recent release of GPT-4, further research is required to analyze the improvements over the previous model.*

Keywords: *automation, coding, language models, natural language programming, pseudocode.*

Introduction

ChatGPT is a large language model developed by OpenAI that can engage in natural language conversations on a wide range of topics. However, the AI is much more than a simple chatbot - it's a breakthrough in human-machine interaction. With the ability to generate natural language responses to a wide range of topics, it can engage in conversations, answer questions, and even generate content like essays or stories. ChatGPT has been trained on an enormous amount of data, enabling it to understand the nuances of language and provide intelligent responses. Its potential applications are endless, ranging from customer service to education, thus it's only natural that programmers are using it to automate a wide range of tasks to make their work easier. Since it's capable of answering programming questions, it begs the question – will ChatGPT replace programmers?

Limitations of ChatGPT

Before delving too far into our topic, it's important to note that ChatGPT has several limitations. First and foremost, we need to understand the AI was pre-trained on a large corpus of text data (including code repositories) using state-of-the-art deep learning techniques, and it's capable of predicting the next word or sentence in the text [1]. Because it's sometimes forced to predict, despite not knowing the right answer, and the fact that its knowledge is limited to 2021, the accuracy of the responses can be erroneous sometimes: for instance, when asked how many times Argentina won the World Cup, the answer was wrong, as knowledge has yet to be updated [2]. Also, since it's based on data, not human intelligence, it struggles with understanding context, thus some sentences may sound coherent, but fail to provide erudite responses. Besides that, the AI is not trained in emotional intelligence, meaning it's not capable of generating a proper answer to emotinally complex prompts [3]. Lastly, it's important to note that ChatGPT requires a lot of computational power to operate - the costs averaging to $100,000 per day [4]. Even though it's innovative in the field of natural language-modelling, it's imporant to know and understand the limitations before using it.

Drawbacks of ChatGPT

Like any other software, users have encountered several issues whilst using ChatGPT. Even if the chatbot is getting more popular day by day, there are still lots of technical issues that remain unfixed. The problems range from limitations imposed on the chatbot to generating completely bogus information, all while sounding confident in its choice of words. The most noticeable problem lies in its inability to generate accurate content, either because of the AI being unfit to interpret and adjust to unique queries, or due to operating on outdated information. StackOverflow, a famous Q and A website for programming questions, forbade the use of ChatGPT responses, due to generating buggy answers. "The primary problem is that while the answers that ChatGPT produces have a high rate of being incorrect, they typically look like they might be good and the answers are very easy to produce" [5]. Another drawback of the AI is that its responses are too formal, lacking sarcasm, analogies, and humor, making the text sound robotic. Lastly, the chatbot sometimes only summarizes information and doesn't give a full answer, which can be a critical issue when requiring a more complex prompt. As an example, when asked about a specific school or university topic, it doesn't generate a detailed prompt, but only a short summary. To conclude, ChatGPT is a groundbreaking tool for helping people with their studies, work process or just maintaining a conversation; however, that doesn't mean it's perfect - it has lots of issues that need to be addressed [6].

The Potential Impact of ChatGPT on the Programming Industry.

As ChatGPT is capable of answering coding questions, it can be considered a helpful tool for programmers. As a state-of-the-art language model, it has the potential to impact the industry in several ways. One significant impact could be in the field of natural language programming, where AI could be used to develop more intuitive interfaces for programming languages. By using natural language queries, developers could interact with their code more easily, potentially reducing the time and effort required to write and maintain software. Additionally, ChatGPT could be used for code generation, code completion, among other tasks, making the process of programming faster and more efficient. However, it's important to note that the AI will only create simple programs. If you ask the chatbot to do something complicated, such as creating a sophisticated game or business application, they will admit their weakness and tell you that the task is currently beyond their capabilities. Nonetheless, as with any technological advancement, there may be potential drawbacks, such as incorrect answers and inability to fully debug a code. It is crucial to recognize and address these concerns and ensure that AI technologies could be improved for a better future impact on the programming industry [7].

ChatGPT vs Google: Pros and Cons

Much like Google, ChatGPT uses natural language processing and machine learning to understand and respond to user queries. However, instead of generating a list of web pages from its enormous web library for the user, the AI analyzes the information and sends an appropriate response based on the prompt. For example, instead of having to search for the code yourself, you could ask the chatbot to generate code snippets and integrate them into the program to test for errors, leading to a potential time save by the programmer. It's also important to note that in 2021, Google also introduced Google LaMDA, their breakthrough conversation technology. Even if it was firstly announced in 2017 and is based on the same engine as ChatGPT, GPT – 3, Google LaMDA has not been launched yet [8]. To make full use of either of the search engines as a programmer, it's important to understand the pros and cons, as well as their use cases *Tab. 1* [9]. However, there are some cons associated with the chatbot and Google Search Engine *Tab. 2*. To conclude, ChatGPT and Google have their own perks, both being capable of fulfilling a programmer's requests - ultimately, however, it's every programmer's choice as to which tool may suit their needs better.

Table 1

The pros between using ChatGPT and Google

ChatGPT Pros	Google Pros
ChatGPT uses a very effective and reliable way of implementing natural language processing, understanding the required task.	Google allows users to use voice search, which can be more effective and faster than typing the required task.
The developer can input the code as a prompt and ask ChatGPT to change a portion of it.	Moreover, Google is giving results in the most-suitable form — text, images, videos, QnA, products, etc., providing a more desirable solution for users.
ChatGPT offers flexibility for programmers to choose the language of the choice. For instance, developers can ask to write code in Python, C/C++/C#, JavaScript etc.	As an internet search engine, Google is offering multiple options to choose from for the search results, giving the user the possibility to choose the most fitting answer.

Table 2

The cons between using ChatGPT and Google

ChatGPT Cons	Google Cons
The code generated is based on specific patterns and structures present in training data, meaning it usually will not be flexible enough to meet specific requirements of the project.	As with ChatGPT, the code found on internet may be just a general example, so the programmer will spend more time on modifying it to fit the requirements of the project.
Usually, the user must re-generate the response to get the code he needs, as the first attempt might fail due to the servers being overloaded (especially during peak hours). Thus, writing a basic code with ChatGPT might be more time-wasting than writing it yourself.	The majority of the code took from Google either has some bugs or doesn't fully suit the user's needs, which will require the programmer to spend time adjusting the code to his own requirements.
Security of the code is weak, as the generated code is not rigorously tested for security vulnerabilities, as it may give the hackers a full access to private functions which receives confidential data from users, such their names and private data, and send users data from company's database.	The security of the code may be weak, because it is found in open-source and may be easily used to break the product by hackers by leaving them a backdoor to your source code, private functions and confidential information (passwords or entire databases).

Conclusions

All things considered, it becomes quite obvious that ChatGPT will, in fact, not replace programmers. Instead, its use case will tend more towards helping programmers out with questions/bugs, as a conveninent alternative to the google search engine. In this regard, it can be linked to the impact of the industrial revolution in the 18th century [10]. It changed how people worked by partially automating a chunk of their workload, thus increasing productivity and wages drastically. Instead of replacing programmers, it's far more likely that ChatGPT and other AI language models will impact the programming industry by assisting the work of developers, potentially increasing their workflow and easing the stress of debugging. One disadvantage, however is that this change might standardize the way future programmers think, which could result in the decline of critical thinking skills, a crucial ability for determining how a problem should be approached. Instead of relying on ChatGPT to solve our issues, we should try to learn to understand the root of the problem on our own, so that we can avoid them in the future.

References:
1. ChatGPT website. [online]. [accessed 04.02.2023] Available: https://chat.openai.com/chat
2. OpenAI's ChatGPT Update Brings Improved Accuracy. Data Still Limited To 2021. [online]. [accessed 17.02.2023] Available: https://www.searchenginejournal.com/openai-chatgpt-update/476116/#close
3. MARR B., Limitations of ChatGPT. [online]. [accessed 11.02.2023] Available: https://www.forbes.com/sites/bernardmarr/2023/03/03/the-top-10-limitations-of-chatgpt

4. Operational costs of ChatGPT. [online]. [accessed 11.02.2023] Available: https://indianexpress.com/article/technology/tech-news-technology/chatgpt-interesting-things-to-know-8334991/

5. ChatGPT generated text is banned from StackOverflow. [online]. [accessed 17.02.2023] Available: https://meta.stackoverflow.com/questions/421831/temporary-policy-chatgpt- is-banned

6. Top 10 Disadvantages of ChatGPT content. [online]. [accessed 21.02.2023] Available: https://www.analyticsinsight.net/top-10-disadvantages-of-chatgpt-content/

7. OpenAI. (2021). GPT-3 powers the next generation of apps [online], [accessed 14.02.2023] Available: https://openai.com/blog/gpt-3-apps

8. AARON L., JON M., Google Bard vs. ChatGPT: which is the better AI chatbot? [online]. [accessed 27.02.2023]. Available: https://www.digitaltrends.com/computing/google-bard-vs-chatgpt-which-is-the-better-ai-chatbot/

9. SHIVBHADRASIBH G., ChatGPT vs Google: Is ChatGPT Going to Replace Google? [online]. [accessed 04.03.2023]. Available: https://meetanshi.com/blog/chatgpt-vs-google/

10. Historical Trends. Early industrialization. [online]. [accessed 04.03.2023] Available: https://www.britannica.com/topic/productivity/Historical-trends