

ChatGPT- A look into its Application and Implications

ChatGPT Friend or Foe?



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Abstract

ChatGPT, a conversational AI interface that utilizes natural language processing and machine learning algorithms, is taking the world by storm and is the buzzword across many sectors today. Given the likely impact of this model on different fields like education, research, medicine, healthcare, data science, programming, etc. through this article we seek to provide an overview of chatbots, ChatGPT, ChatGPT application, advantages, disadvantages, limitations, and some critical terms like trust and accountability of ChatGPT. This paper discusses the history of chatbots and ChatGPT, shows where ChatGPT has been implemented and how has it changed, Limitations and issues are also addressed, particularly around concerns about bias and plagiarism when using ChatGPT and so on.

Keywords: ChatGPT, education, healthcare, Data science, bias, plagiarism, ethics.

1. INTRODUCTION

Artificial intelligence has gradually increased over the past decade with the advancement of computing power and deep learning. With this, Open AI Inc. launched a generative pre-trained (GPT) model-based chatbot called ChatGPT[1]. ChatGPT is an advanced artificial technology-powered chatbot that has transformed the way people think, live, and behave in this era. Unlike any other search engine which provides the result of the question by giving multiple links similar to the question given like Google, Yahoo, etc. here, the chatGPT provides an immediate response to the question that has been given to it as instructions. Let’s start with a chatbot.

* 1. Chat-bot

Chatbots are software applications designed to interact with users on online platforms through text or text-to-speech methods, providing immediate responses that enhance the user experience in real-time. The story of chatbots dates back to the 1960s, when Joseph Weizenbaum, a computer scientist at MIT, set up ELIZA's first chatbot. By analyzing users' input and generating responses on preprogrammed patterns, ELIZA could simulate a conversation. It's been designed to resemble the therapist, answer questions, and provide empathetic responses to mimic a genuine conversation[2]. The development of chatbots over the year has evolved particularly with the advent of artificial intelligence and machine learning in the 1990s and 2000s. which resulted in the development of a more advanced chatbot that can understand and respond to natural language input in a more intelligent and human-like way. The general work-flow can be described by the figure below

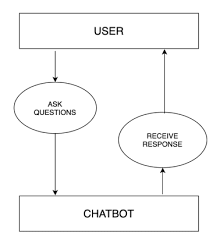


Figure 1: IRJETS. Photograph by Shravan, Mridula, Shreya, and Anala. [public access], via the journal. (https://www.irjmets.com/uploadedfiles/paper/volume2/issue\_7\_july\_2020/2518/1628083093.pdf)

1.2 Types of Chatbot

The chatbot can be of several categories and can be featured or made according to the necessity. Here are some of the chatbots that I found while researching it:

1. Rule-based chatbot:

This type of chatbot has a static response that has been set by the programmer and responds to the queries which exist in the database. These types of chatbots include buttons, and keywords to make users follow the predefined path. An example of this is the chatbot that can be found in customer service[3].

1. Artificially intelligent chatbot:

Chatbot which has the knowledge to develop themselves by learning the previous conversation and can interact with the user more freely are artificially intelligent chatbot. An example of this is Chat-GPT[3]

1. Hybrid Chatbot:

Those chatbots use both tree and Ai-based chatbot which can communicate with the user and also remains as designed by the developer[3]

1. Fun Generalist chatbot:

The chatbot has general knowledge and we can ask them directly like Siri, Cortana, Alexa, etc. which can solve the general problem like location, music, etc.[3]

1.3 Significance of Chatbot

Since, the advancement of technology the use of the chatbot has become one of the most important factors in some fields like customer service, marketing, and many others fields. Some of the key factors which make it truly useful are that it can operate for 24/7 hours with a fast response to the queries it gets which increases the user's satisfaction, it can also handle multiple conversations at once which makes them a cost-effective way to manage the users and saves a lot of time for the customer to get the help, by including artificial intelligence we can also create a more engaging and personalized experience for the users, it can collect the data which make it most compatible to collect the data from the user which can help to improve the business decision.

overall, chatbots are having a significant positive impact on businesses by increasing efficiency, reducing costs, and improving customer satisfaction. Chatbots are likely to become even more important in the future, as technology continues to advance.[2]

1.4 ChatGPT

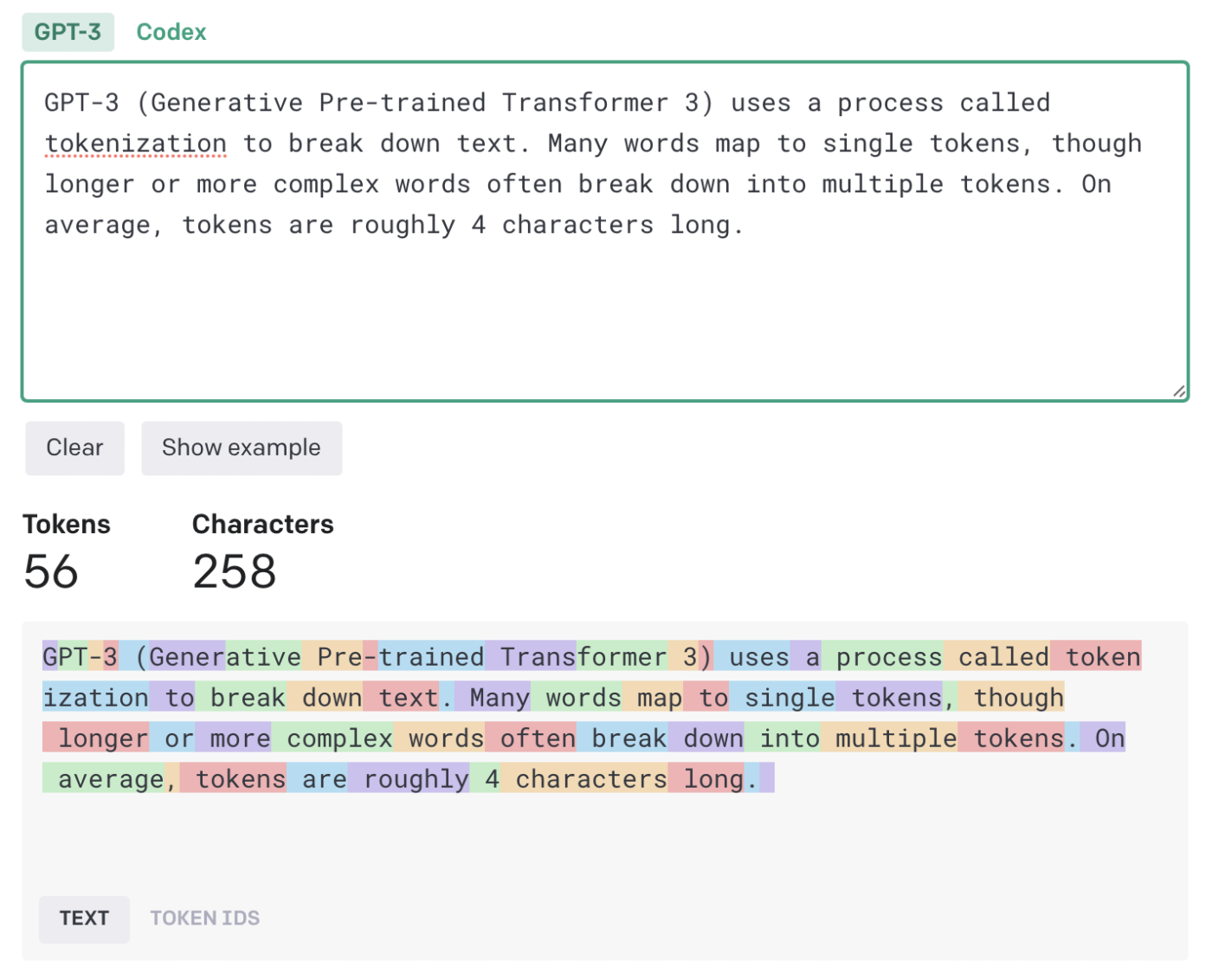
ChatGPT (Chat Generative pre-Trained Transformer) is created using the NLP (Natural Language Processing), aiming to best the field of a chatbot using Artificial intelligence which can understand and produce human-interactive speech/text[4]. This has been developed by a non-profit organization called Open AI and made an announcement/launched in November 2022. ChatGPT is a large language model based on the GPT-3 architecture. The development of chatGPT is part of Open Ai’s ongoing effort to advance artificial intelligence and natural language processing[5].

The history of ChatGPT can be traced back to the year 2018 when Open AI released the first version of the GPT (Generative Pretrained Transformer Language) Model. GPT-1 has been a significant breakthrough in natural language processing by demonstrating the capability to generate coherent and contextually relevant text[4]. Then the company continued to improve GPT-3 model, which has been shown by releasing GPT-2 IN 2019 and GPT-3 in 2020. Among these GPT-3 is valued as the most advanced language model to date, having the ability to complete a large natural language task, including language translation, text completion, and question-answering. The beta version of GPT-3 API, which helped the developers to integrate the gp4-3 API to create a chatbot with an interactive user experience was released in June 2020. Then, the chatGPT which was released in 2021 is being used worldwide as a web application for free and being utilized by people to make their search easier.[5]

As we have seen other chatbot like, customer service, WhatsApp, and Facebook, these chatbot uses and follow the set of instruction given to them by the user. And other chatbots like gitaGPT provide a piece of information on only one specific topic like the one selected. But in the case of the chatGPT, it can provide the answer to any question that has been asked to it. It provides the accurate answer to the question that has been asked and also keeps track of the previous conversation which make the user interaction easy and makes it usable in many ways like fixing box, asking general knowledge question, writing content, and many more[6].

1.5 How chatGPT works?

ChatGPT works by trying to understand the prompt and then, based on its training it predicts what will be the best answer for the prompt given and shows the answer. About its training, the method involves giving the developing AI some guidelines before subjecting it to scenarios or providing it with a ton of data to formulate in order to create its own algorithms. It has been trained on roughly 500 billion tokens because of which this language model can easily assign meaning and predict follow-on text. Though larger or more complicated words sometimes decompose into numerous tokens, many words map to a single token. Tokens are typically four characters long. Although GPT-4's inner workings are unknown to Open AI, given how powerful it is, we may reasonably conclude that it was trained using the same dataset[6].

Figure 2: Zapier. Photograph by Harry Guinness (public domain), via the article. (https://zapier.com/blog/chatgpt-marketing-writing/)

All of these tokens were obtained from the massive data written by humans which include various things like books, articles, and other many documents and journals, and which were used to create a large dataset used to form a complex, multiple-layered and weighted algorithm deep learning neural network because of which chatGPT was able to learn pattern and relationship to text and got the ability to predict what comes next which makes responses like humans[4], [6].

But it doesn’t work on the sentence level so to further push its ability to respond to the different prompts, a method known as reinforcement learning with human feedback (RLHF) was optimized for the script. In general, humans built a comparison dataset with reward models (where more than one model response was graded by AI trainers) so that the AI could figure out which response was the best.[6]

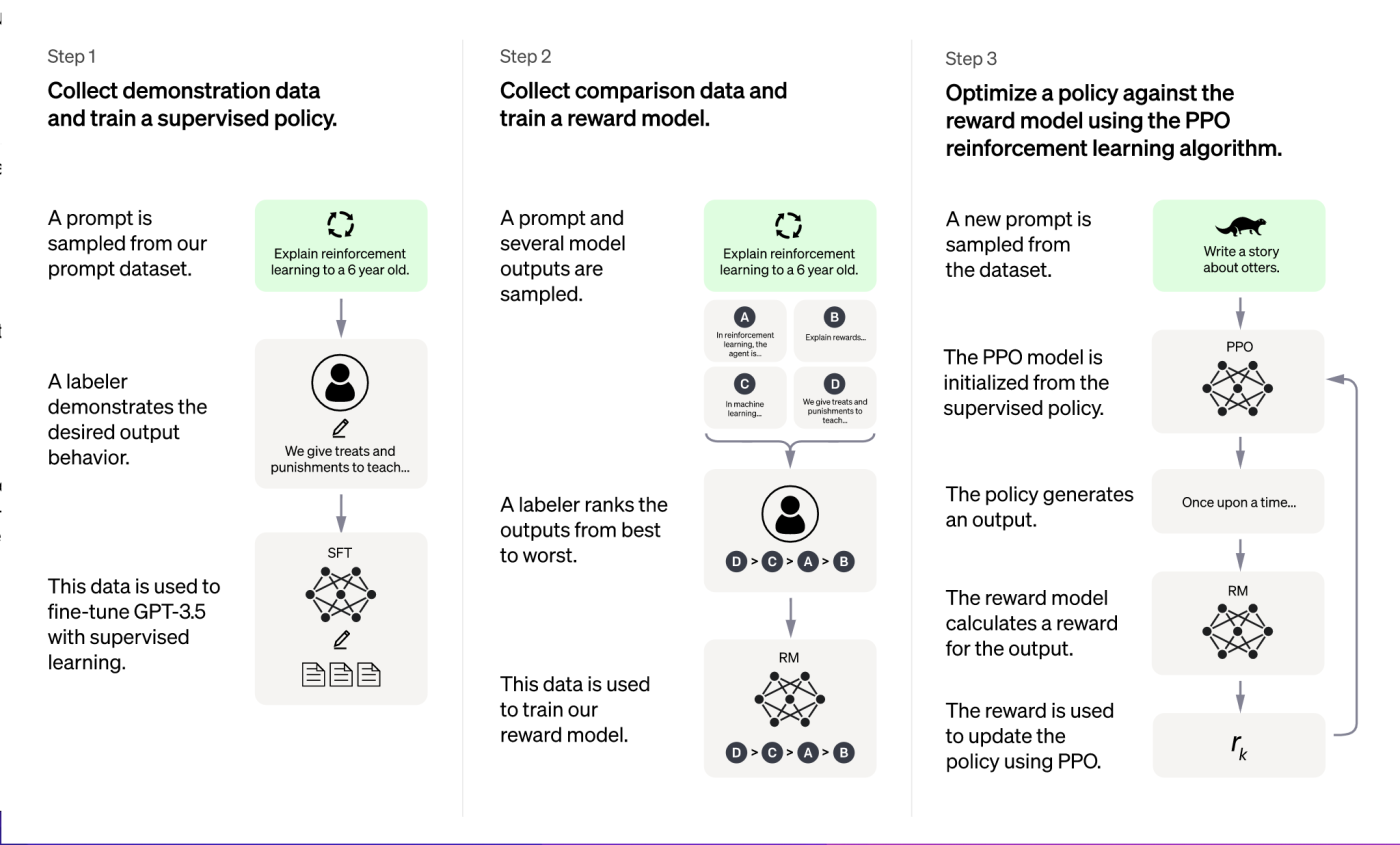


Figure 3: Medium. photograph by Renu Khandelwal (public domain), via the article. (https://arshren.medium.com/a-basic-understanding-of-the-chatgpt-model-92aba741eea1)

It has been trained on Azura AI supercomputing infrastructure. It’s a fine-tuned model in the GPT series which has completed training in early 2022.

Literature Review

Due to its simplicity, the use of chatGPT has risen widely which has brought both senses of usefulness and fear in some way. since the release of the chatGPT, it has already been analyzed and tested for the fields such as education, medicine, creativity, and many more in which it has shown remarkable success and some limitations it has been written and published in many journals and articles. Here is some application that chatGPT is being used.

ChatGPT in healthcare

[1] has done research on ChatGPT and they were able to observe that ChatGPT can be used in health care in many ways like to summarize the data of the patient which helps to gather clinical data of patients very fast viz. regular visit detail, allergies, diagnosis, and summarization of the diagram in a few sentences, can also help to understand the clinical notes by translating it to patient understandable versions. As of now google, Scopus, and PubMed are the search engine being used by researchers for research-related problems They somehow provide a short summary but chatGPT can narrate the information in a more precise manner. When asking a different question related to healthcare to ChatGPT. Similarly, research was done by [7] where it was looked at the capabilities and analysis of how will they perform in real-world scenarios. However,[1], [7] do not clearly state whether ChatGPT can really be trusted in healthcare where the things are too complex and important.

ChatGPT in education

[4] has done research on ChatGPT and found that ChatGPT has been fed with billions of data from different books, articles, and news because of which it has all sort of information that make it the best source for searching if the student is stuck in any kind of question whether it’s related to history, general knowledge, science and many more. ChatGPT has also been tested by giving multiple exams like law and medicine in which it has shown remarkable success and was not able to score fully.[5] also did the same research and pointed out the positive and the negative impact of ChatGPT in the education sector. [4], [5] This both journals has not clearly proved by what means they can prove that they can be really they can be really bad or good for this society

ChatGPT in Data Science

[8] has researched ChatGPT and observed that Using ChatGPT, data scientists have the ability to automate various stages of their workflow, including data cleaning and preprocessing, model training, and interpreting results. Additionally, ChatGPT has the capacity to analyze unstructured data, such as consumer feedback, social media data, and online reviews, enabling the discovery of new insights and the enhancement of decision-making procedures. Data scientists can concentrate on more sophisticated duties like creating prediction models and improving data visualization by automating data analysis and natural language processing. Since it is so simple to use, a thorough understanding of mathematics, computer science, or artificial intelligence is no longer necessary in order to create answers to real-world issues. As a result, ChatGPT has the potential to transform the field of data science, making it more accessible, efficient, and effective by improving data analysis, predictive modeling, and language translation.

ChatGPT in programming

[8] has researched ChatGPT and observed that For programmers looking to advance their knowledge or those needing help with coding issues, ChatGPT can be an invaluable resource. In fact, ChatGPT makes it possible for people with no programming experience to write usable code. By explaining and showing examples of programming principles like grammar, data structures, algorithms, and more, ChatGPT can be useful. For example, chatGPT can answer any question asked by the programmer like: what is DFS? ChatGPT will give a clear and concise answer, along with an example code snippet as shown below:

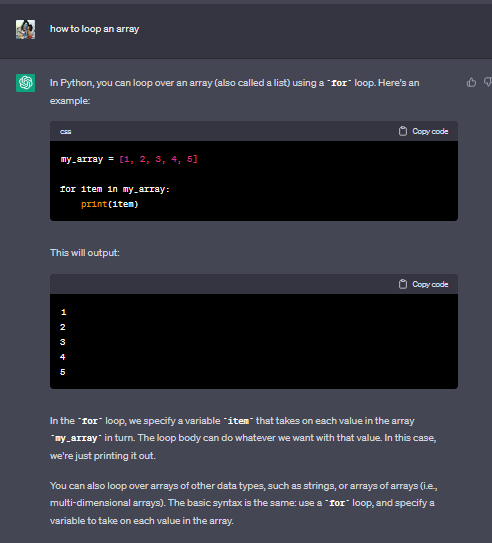


Figure 4: Asking a question to chatGPT for programming.

Pros and Cons

As the chatGPT is coming with us at a fast pace and being used for different proposes, it also has its Pros, cons, and limitation which is very important to note down so let us discuss them.

Pros of ChatGPT

ChatGPT has been a very useful AI product because of the various factors like:

1. Diversity: ChatGPT has the ability to provide an accurate and extensive answer to the most asked question from different topics or fields, which makes it useful for diverse applications.
2. Response speed: ChatGPT provides immediate and fast responses to all kinds of user queries, and confusion which eliminates a long time of researching on the internet.
3. Stability: Since ChatGPT is a language model it is not affected by factors such as emotions, and stress because of which it can provide accurate answers consistently.
4. Scalability: ChatGPT has the ability to handle multiple users at the same time frame which makes it the most efficient to use and cost-effective solution for many fields like customer support and many others.
5. Multilingual: ChatGPT has the ability to give the answer in many different languages like Nepali, English, Spanish, and likely 100 more languages.
6. Memory record: ChatGPT has the capacity to memorize or collect a previous conversation which makes it very useful to use in many cases like debugging, solving confusion, etc.

Cons of ChatGPT

As ChaGPT has pros it is similarly bound with multiple cons and on them, some are listed below.

Privacy: ChatGPT collects the data of our conversation which can even be personal information.

Data Dependencies: ChatGPT can only give the answer to the queries that have been trained on, which limits its capacity to give the best answer for the queries it has not been trained on.

Lack of emotional intelligence: ChatGPT is not able to provide sensitive responses.

Bias: Since ChatGPT is trained on various data it can be biased based which can lead to a discriminatory answer to some questions.

Limitations of ChatGPT

ChatGPT is been quite popular in use and has also shown some limitations while the generation answer ChatGPT also can generate incorrect information in some contexts, it may also provide harmful or biased based content since it does not have the capability to think or have emotional intelligence while giving the answer to the queries. Since the free version of ChatGPT which most people are using now while producing answers, it says that it has only limited knowledge after the year it was launched i.e., 2021. It requires accurate or managed queries to give the appropriate answer since the same word or sentence can have multiple meaning it is unable to compile those queries as the user ask. ChatGPT provides the answer in high detail which are not always necessary.

Comparison with other AI chatbot

Along with ChatGPT, there are some other AI chatbots in the market such as Open Ai’s GPT-2 and GPT-3, Google’s BERT, and Facebook’s Roberta.

One of the key advantages of ChatGPT is that about its flexibility and easiness to use. ChatGPT is being used for tasks like summarization, translation, and answering the question which can be fine-tuned for a wide range of natural processing tasks, with adjustment on model architecture.

When the ChatGPT was tested in terms of performance with the other AI chatbots by Microsoft research, it was found that ChatGPT was faster in tasks like summarization and paraphrasing than other AI chatbots including GPT-3 and BERT.

Although ChatGPT has impressive capabilities, it may be constrained by its dependence on extensive training data. Although it is possible to optimize the model on smaller datasets, its effectiveness could be restricted in comparison to other models intended for low-resource environments, such as Google's ALBERT.

Here, the below table shows the comparison of the language model for natural language processing.

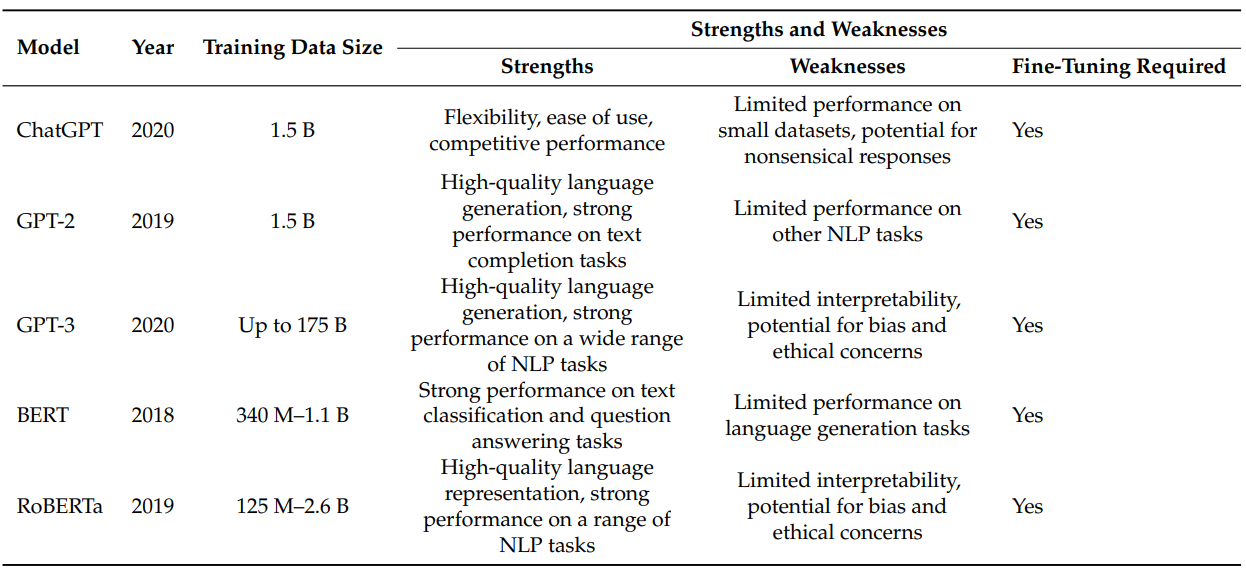


Figure 8: table by Hossein Hassani, Emmanuel Sirmal Silva (open Access). Via journal. (https://doi.org/10.3390/bdcc7020062)

Performance issue of chatGPT

ChatGPT is a chatbot that has been designed to generate a large amount of natural language text. But there is various factor that can affect its performance which includes:

Since ChatGPT requires significant computational resources to generate the responses so, if the hardware is not powerful enough it can have performance issues.

The low networks can affect ChatGPT to respond quickly to user input.

The model's performance may be impacted by the caliber and diversity of the data used to train it. It's possible that ChatGPT won't be able to produce correct or pertinent responses if the training data is skewed or lacking.

The queries given by the user can be poorly structured which can make ChatGPT difficult to understand and generate the response.

These are some factors that can cause performance issue.

Analysis

The analysis section of this research paper focuses on analyzing the use of ChatGPT in different fields especially in education, healthcare, research, and programming variables. The research is done by reading several research papers which results that the ChatGPT has many factors like ethics, trustworthiness, and accountability issues to look into which are been described detailed below:

Ethical issues

Ethical issues are typically related to the question of right or wrong and they require individuals to make decisions based on their moral and ethical principle. In the same way, everyone has their own opinion regarding the use of ChatGPT. In light of this, ethical considerations must be taken into account.

Like ChatGPT in education, article publishing, and, research, presents that the continuous use of ChatGPT can encourage plagiarism, and cheating, bring laziness among the users, and being prone to bias biased information. Not only this the ChatGPT can give random inaccuracy and vagueness on the topic based on experience. And also, the output created by ChatGPT is opinion based without any reference. But research state that ChatGPT can be very useful for a minor problem that could have taken a lot of time to find and solve it.

Data scientists may find ChatGPT training to be a useful tool, but it's critical to make sure that the technology is created and applied in an ethical and moral way. Universities may contribute to ensuring that the next generation of data scientists has the abilities and understanding required to utilize the technology in a responsible and ethical way by including ChatGPT training in data science programs in a way that emphasizes ethics and integrity.

ChatGPT-produced research articles could be viewed as unoriginal and harmful. The training data and coding process of language models like GPT-3, which are typically drawn from big web-based datasets, have been shown in a number of studies to have a bias with regard to gender, color, ethnicity, and the presence of disabilities. When these models are utilized to produce academic research, hidden and unintentional prejudice may be spread, unintentionally perpetuating the bias.

In conclusion, the ethical issue that can be caused are like biased-based content that we get from it, since ChatGPT gives a response based on the training data which can be inaccurate and unreliable which can lead to false information while integrating with ChatGPT we may give some of our personal information which raises concern for data privacy and security, the ChatGPT can be used for a malicious purpose such as engaging in a cyber-attack, false news, etc.

Trust Issue

Trust comes from the thing where we believe that I am not doing anything wrong. So, with the increase of ChatGPT the trust from the people regarding the originality of the works is been going out.

In education, there can be the case where the exact answer for the question can be found but there are also question which can be more based on humor in which ChatGPT cannot be the best or can create the answer without caring the biased environment and also when the student start to use it there can be question that Has he done the answer by himself since ChatGPT will take the creative and thinking part from the user making it dull and being dependent in it. so, is ChatGPT a good impact in the education field?

As, we know that the technology is gradually increasing day by day and the ChatGPT has only got the limited amount of data like some advance topic or updated topic is asked it says it does not have the knowledge of it since it was developed in September 2021 so, ChatGPT can not be always used for the changing technology which is being updated day by day and which is need to be used frequently. So, there might be an issue trusting ChatGPT for providing the latest data related query.

Accountability issue

A situation where there is a lack of accountability, transparency, or consequences for decisions made by an individual or group is referred to as an accountability issue. Since ChatGPT operates based on algorithm and data, accountability issue can rise when it produces biased-based or harmful responses as it produces response to the data it was trained on or when it fails to take into account ethical considerations such as privacy, fairness, or accuracy.

An accountability issue can arise, for instance, if ChatGPT generates responses that support harmful stereotypes or discriminatory attitudes, or if it offers false or misleading information. Furthermore, ChatGPT may be viewed as lacking accountability if it disregards the moral and legal requirements for data security and privacy.

Since ChatGPT is an AI chatbot it is still being developed to make it more accurate, to improve or break the limits and the consequence that it has now.

Conclusion

In conclusion, this article presents you with a concise account of the chatbot, ChatGPT, and how ChatGPT is influencing every aspect of the work environment, education, or any other field. The detail shared in this article clearly states how powerful a tool is ChatGPT which can assist any user with any difficulties regard to questioning and answering. ChatGPT has the potential to revolutionize the old way of searching stuff in search engines like Chrome.

Finally, it is demonstrated that ChatGPT is pushing the envelope and causing people to realize the full impact and influence that AI will have on everything that employs technology, from education to work in the field. I also believe that ChatGPT has the potential to take a very important role in the future. Either it is used in education, healthcare, science, medicine, etc. as long as it is being used with the considering of the ethical issue in the appropriate manner. And also, to not let someone fully depend on it there should be some sort of principle followed so that it does not ruin the creativity and humor of the users.

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