

ChatGPT- is it really a super bot? will it change the ground state of this working environment?

ChatGPT Friend or Foe?



Univesity of Northampton

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Abstract

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

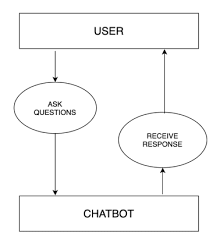


Figure 1: IRJETS. Photograph by Shravan, Mridula, Shreya, and Anala. [public access], via the journal. (https://www.irjmets.com/uploadedfiles/paper/volume2/issue\_7\_july\_2020/2518/1628083093.pdf)

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

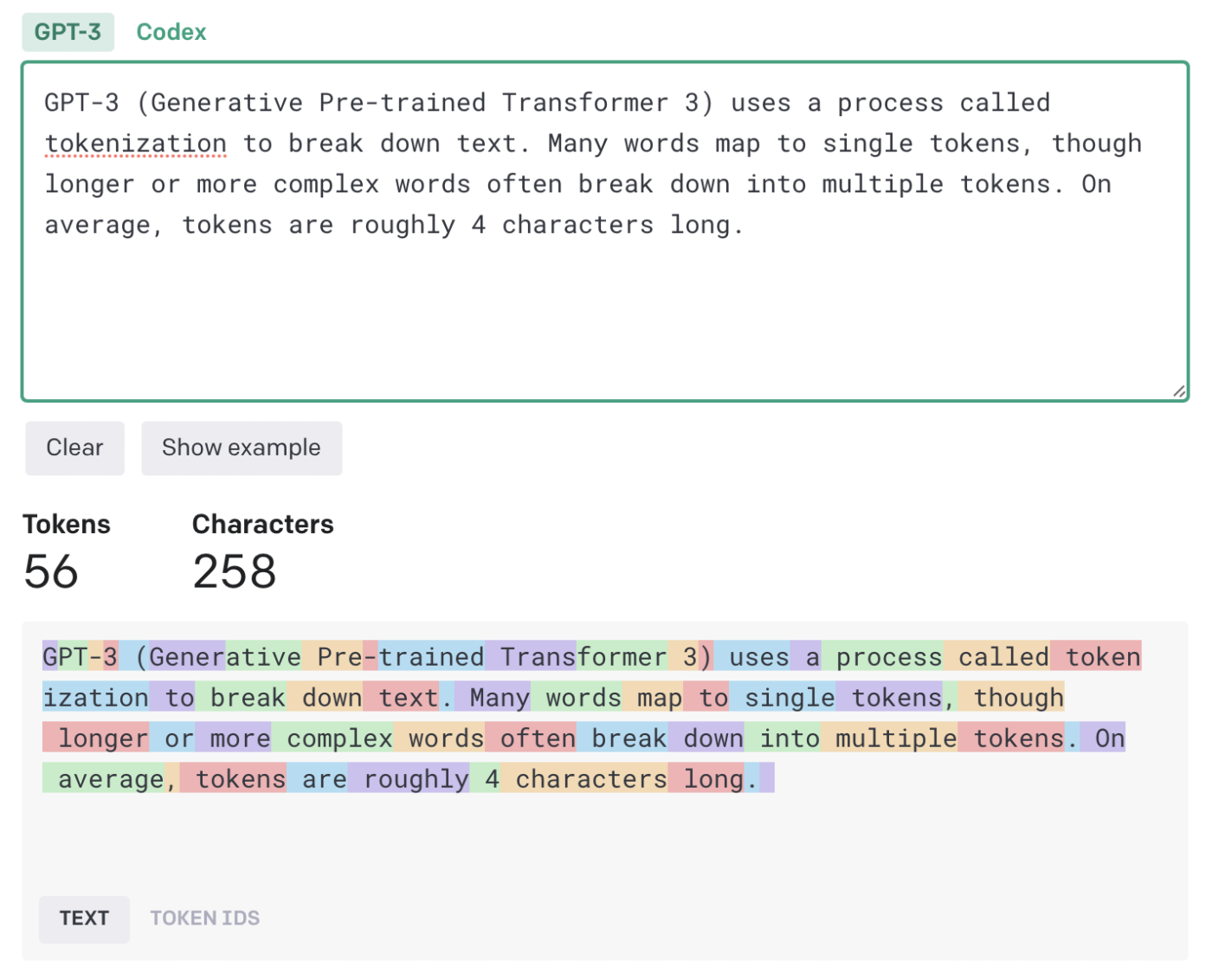
ChatGPT (Chat Generative pre-Trained Transformer) is created using the NLP (Natural Language Processing), aiming to best the field of a chatbot using Artificial intelligence which can understand and produce human-interactive speech/text[4]. This has been developed by a non-profit organization called 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[5, 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[5], [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]

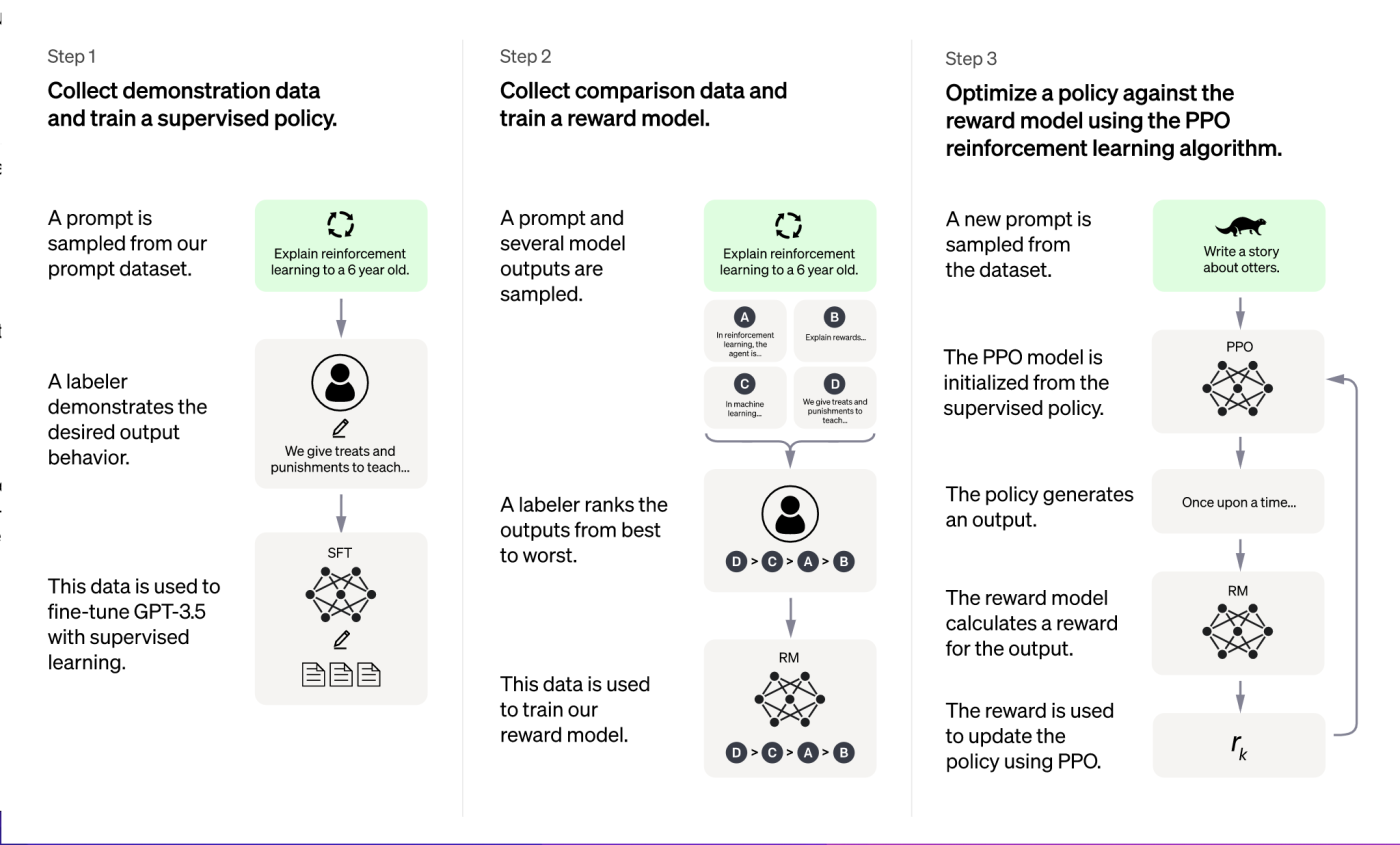


Figure 3: Medium. photograph by Renu Khandelwal (public domain), via the article. (https://arshren.medium.com/a-basic-understanding-of-the-chatgpt-model-92aba741eea1)

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

chatGPT has been 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.

ChatGPT in education

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. It also helps in things like summering the lesson, explaining the question in moa re detailed way, solving math problems, etc.

ChatGPT in Data Science

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

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:

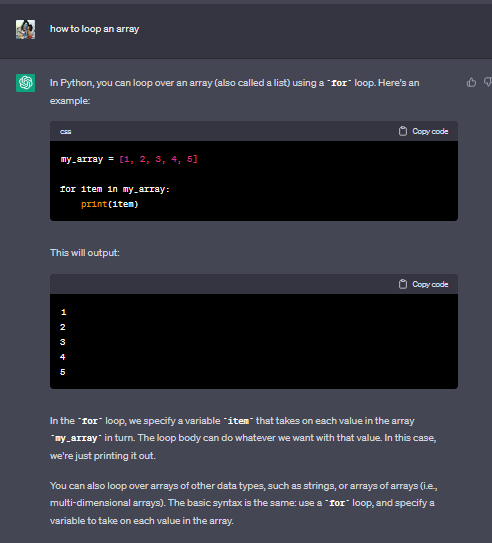


Figure 4: Asking a question to chatGPT for programming.

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.

Implementation of ChatGPT

ChatGPT has been used for various purposes and in multiple scenarios which have been used and described below,

ChatGPT can be used for solving coding problems like

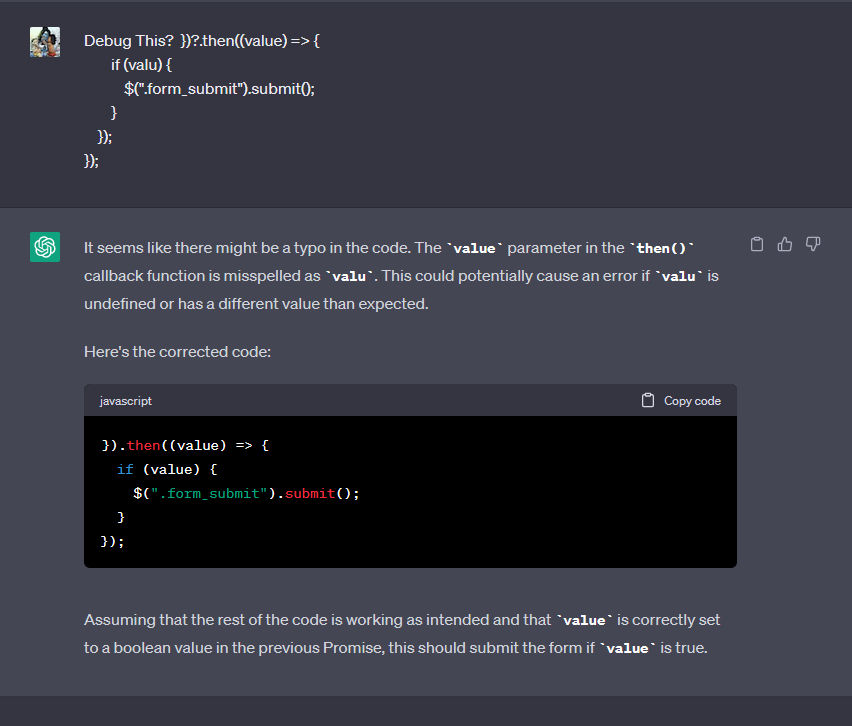


Figure 4: Asking ChatGPT to solve programming error

In this image, the ChatGPT is been given a code to fix the error and as seen it provides the reason why we got the error and also provides the solution to it.

ChatGPT solving Mathematics Problem

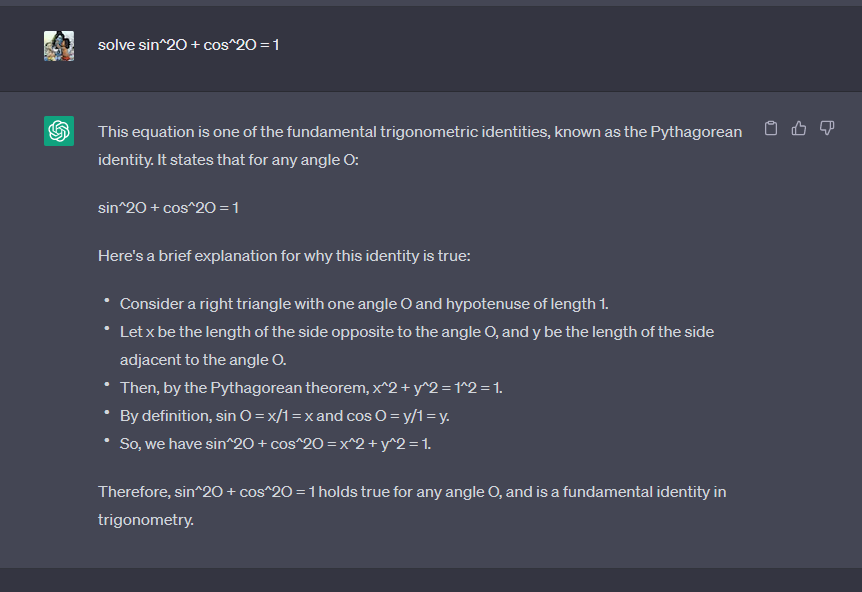


Figure 5: Asking ChatGPT to solve math question

In this image, we can see that ChatGPT has clearly answered the question of the math that was asked of it.

ChatGPT giving history answer

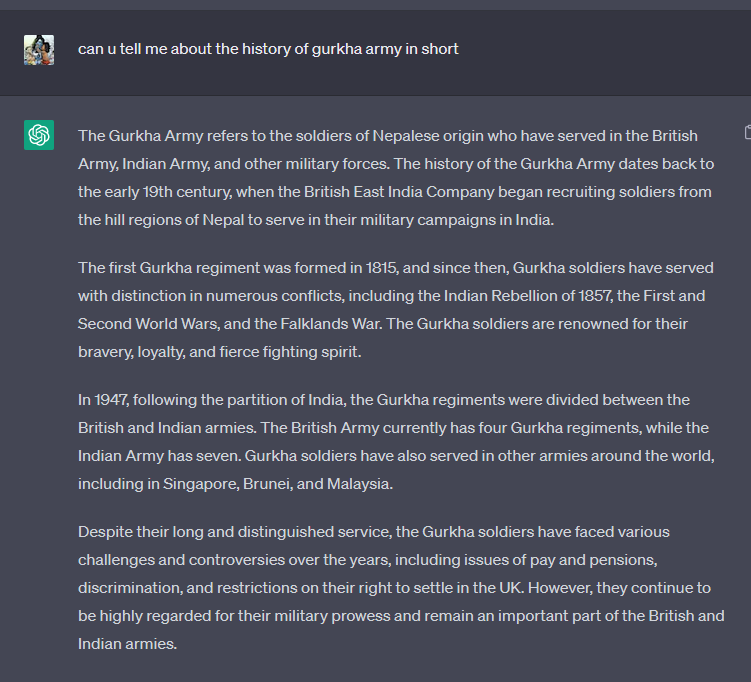


Figure 6: Asking ChatGPT to solve history question

As seen ChatGPT knows and provides a detailed and focused answer to the question about the history.

ChatGPT for entertainment

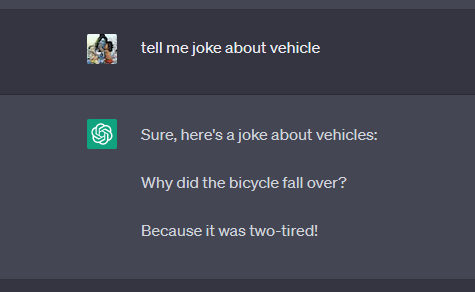


Figure 7: ChatGPT with a joke

As seen in the image ChatGPT can provide jokes or any other questions that have been asked of it.

As seen above, the ChatGPT can be implemented to solve or ask any kind of queries that we have, we may not find what exactly We are looking for by will probably find a solution or idea close to it but in most cases, it provides the best answer.

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.

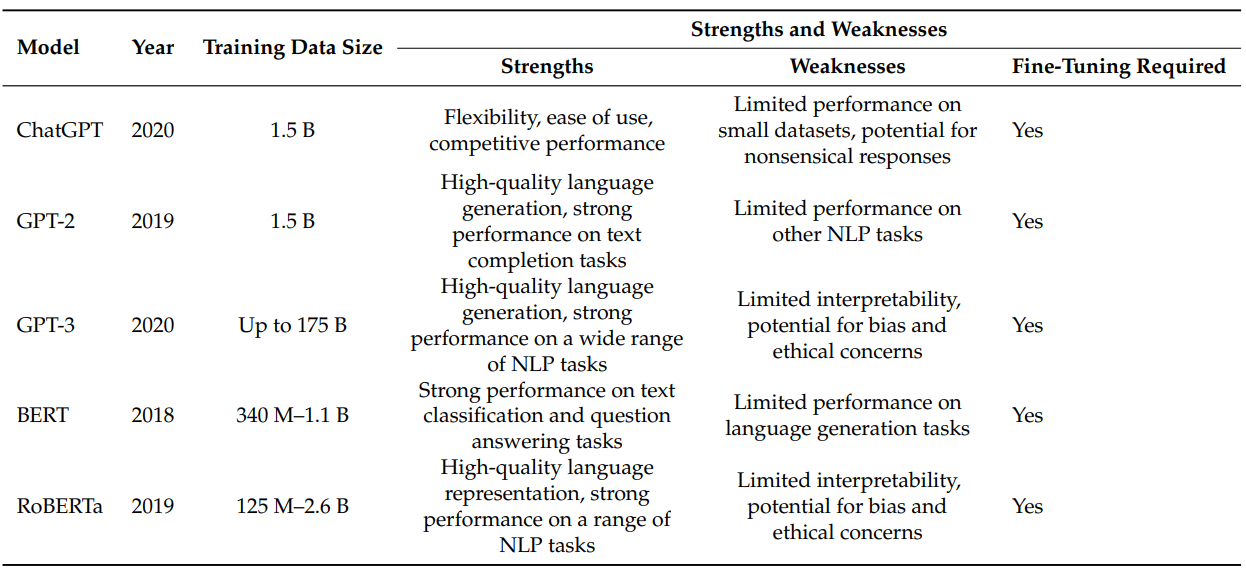


Figure 8: table by Hossein Hassani, Emmanuel Sirmal Silva (open Access). Via journal. (https://doi.org/10.3390/bdcc7020062)

Performance issue of chatGPT

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