



## CHATGPT: THE POWER OF AI

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**ABSTRACT** The word "ChatGPT" which became a famous buzzword in recent past on the internet, uses LLM (Large Language Model) Model to respond human like replies in a conversation. Scientists did lot of research in past decades to train the machines which can work like human so the dependence can be reduced on human for repetitive tasks. With the help of years of scientific research in AI (Artificial Intelligence) area, lot of smart machines like Industrial Robot, iRobot vacuum Cleaner, computer games, self-driving etc. have been built but the recent launch of AI based Chatbot i.e., Chatbot which can generate human like responses for any questions, is considered as next big achievement to build human like Robot. ChatGPT is built on GPT-3.5 family of large language model and on March 14th 2023, higher version of GPT family i.e. GPT-4 which is 10 times advanced than its predecessor, was released. In coming years, with continuous innovation we may see much more advanced version of AI chatbot which may talk to human, understand emotions and perform day-to-day tasks

## KEYWORDS :

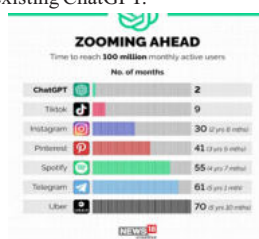
## INTRODUCTION

ChatGPT (Chat Generative Pre-Trained Transformer) is an artificial intelligence (AI)-powered revolutionary chatbot that grabbed everyone attention on Internet in past couple of months. Many celebrities are using or talking about it on the Internet. ChatGPT prototype version was launched at end of NOV'22 by a parent company OpenAI, a private company backed by Microsoft Corp and its final version, may have seamless possibilities over the next couple of years. Initially, this Organization 'OpenAI' was created as an open source, non-profit company but it has become a closed source as it is primarily controlled by Microsoft. The ability of ChatGPT's neural network, to mimic human like replies in a conversational manner which made it quickly famous. ChatGPT is built on top of OpenAI's GPT-3.5 family of Large Language Model (LLM) and also, uses reinforcement techniques.

ChatGPT seems to be one of the revolutions in Internet world? It may be possible that people may forget 'Google Search' in coming months. ChatGPT gives one concrete answer for any queries from preloaded data whereas Google search provides you varieties of detail from multiple web sources so many times provided detail from Google Search is not concrete and to the point answer. ChatGPT is spreading in every news as like wild fire in the forest. So far, Millions of people have downloaded the ChatGPT. ChatGPT has been built by OpenAI using the power of AI to serve School students, College students. Post the release of Chat GPT, OpenAI was valued at USD \$29 Billion.

ChatGPT filters on toxic content like making bomb, sexual content etc. Even though Chat GPT has long way to go. As of Q1 2023, tool has become so much popular that 13+M users are accessing it per day. It is pretty good in basic English writing like punctuation, basic grammar etc. and it is much better than most of the school students.

As per recent news from CNBCTV18.com, after the global launch of ChatGPT it took 2 months to add 100+ M users where other fastest growing applications took months/years to reach the same consumer base. Now, OpenAI has launched new pay-to-use version called "ChatGPT Plus" for a premium service, to cost \$20 a month. Premium version of GPT comes up with additional benefits like faster load times and access to GPT-4. The major change to GPT-4 is its ability to work with Images and video files and also, GPT-4 is 500 times more powerful than the existing ChatGPT.



## Figure 1: Fastest growing 100+ M customer base

Sources: www.cnbctv18.com published on Feb' 23

## USAGE OF AI POWERED CHATGPT

AI has great promise and capabilities but with that also comes with great danger to civilization and needs to be regulated, should be used responsibly. E.g., with the discovery of nuclear physics, you have nuclear power generation but also nuclear bombs. E.g., Use of ChatGPT in Colleges/Universities has got positive and negative side of it: 1-) As it is a powerful tool in adding knowledge to the people and going forward, it will become very, very useful. 2-) Negative side of it, by using ChatGPT many students have cracked a few examinations. Pros of ChatGPT:

- Preparation of Essay on given topic.
- Solve any Mathematical problems but we are able to see better result with GPT 4
- ChatGPT makes it faster and easier to learn new languages and concepts.
- Helping in Computer programming like Writing new Code, Debug existing code - Way of programming will also change with help of ChatGPT
- Journalism, law and translation will be badly affected by ChatGPT as it helps in translation
- Possibility of minimal error using self-learning technique and high availability
- GPT Libraries can be used to develop an application.

## Cons of ChatGPT:

- Remembers what the user said earlier in the conversation
- Limited knowledge of world and events after 2021
- May occasionally produce biased content
- ChatGPT provides information based upon diverse range of trained data.
- May occasionally produce wrong answer for mathematical problem
- Costly affair
- May disbalance structure of our society and may lead to job losses
- Due to offensive content, entire application needs to be blocked rather than a specific web page. With Google Search Engine, it is possible to block specific Web page due to offensive content.

## HOW DOES IT WORK?

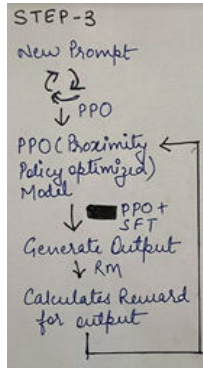
ChatGPT tool is mainly built on top of pre-trained Large Language Model (LLM) of GPT-3.5 family. Earlier Large Language Models, such as GPT-3, were trained on vast amount of text data but these models had following problems:

- Lack of desired output as per human expectation: Model is unable to generate expected output in a human understandable format.
- Model's misalignment Issues: Core techniques like Next-token-prediction and Masked-language-modeling are used for training

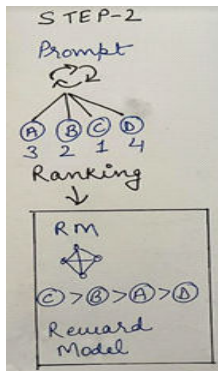
the language models. In the first approach, the model is given a sequence of words (or “tokens”) as input and is asked to predict the next word in the sequence but these techniques had lot of alignment problems.

To mitigate model's misalignment issues, the specific technique is used to train the model is known as Reinforcement Learning from Human Feedback. This technique is primarily consisting of three steps:

**1. Supervised Fine-Tuning (SFT) Step:** Pick up a pre-trained model that is fine-tuned on a relatively small amount of data curated by labelers in order to train a supervised fine-tuning (the SFT model) that generates desired outputs from a selected list of responses.



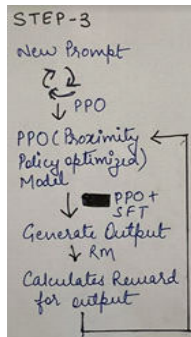
**2. The Reward Model (RM) Step:** Labelers are asked to score from best to worst on a relatively large number of the SFT model outputs, this way creating a new dataset consisting of comparison data which is used to train a new model on this dataset (size of this dataset is 10x bigger approximately), is referred to as the reward model (RM).



**Proximal Policy Optimization (PPO) Step:** Reinforcement learning is applied to reward the RM model and to further fine-tune using PPO model and improve the SFT model.

Step 1 can occur only once where as steps 2 and 3 can be iterated continuously.

What sets this technology apart is that it continues to learn while guessing what the next word should be, constantly improving its understanding of prompts and questions to become the ultimate know-it-all.



**DEVELOPMENT OF AI**

In the early 1950s, John McCarthy who is one of the "founding fathers"

of artificial intelligence, along with Alan Turing published the research paper related to machine learning. John McCarthy co-authored the document that coined the term "artificial intelligence" (AI). Turing suggested why can't machine learn like humans by using the concept & available information in order to solve problems and improve themselves.

Over the years, AI has started gaining attention across the nations and by 1955, first self-learning AI based game was introduced. In 1961, first time AI based robot “Unimate”, was introduced at General Motors assembly line and in past half century, industrial robot became common at manufacturing plants in different countries. Up to the year of 2004, AI was primarily used at major lab and university classrooms. The commercialization of AI has started post 2005 when faster processing of large volume data was possible to train Model or program. With the rapid advancement of complex developments in AI over the last 20 years. You can see home assistant AI in our households, like Google Assistant and Siri, robotic vacuum cleaner and in fact, the use of AI powered program being used at Medical to detect and diagnosis the cancer. In the modern world, robots are becoming intelligence to perform same job which humans used to perform like serving the food at restaurant to the customers and the self-driving cars on our roads. With continuous innovation using machine learning, shows no signs of slowing down.

**HOW TO INTEGRATE GPT APIs WITH APPS**

There are multiple ways to connect with GPT language model but there is one of the techniques which can be used by programmers to access GPT libraries via a programming language. To integrate GPT libraries with your existing application, API Secret key is needed for authentication. API Secret Key can be generated by going to <https://platform.openai.com/> URL and then visit API Keys Page. Click “Create new secret key” button and copy the key and save it safely. API Key should not be shared with others, OR expose it in the browser OR other Client-side code.

To access GPT APIs, following details are needed:

- API Endpoints
- Request Type (GET/POST)
- Request body with required input parameters
- Header will contain API key detail

Here is the sample request/response and endpoint detail:

**Endpoint:**

POST <https://api.openai.com/v1/completions>

**Request:**

Before sending the request, set up Authorization type as “Bearer Token” and place Secret API Key value.

```
{
  "MODEL": "BABBAGE",
  "PROMPT": "SAY HELLO WORLD!!!",
  "MAX_TOKENS": 7,
  "TEMPERATURE": 0
}
```

**Response:**

```
{
  "ID": "CMPL-76SOGEUUWVJ1DJ141OJVIRUCMA5H",
  "OBJECT": "TEXT_COMPLETION",
  "CREATED": 1681775094,
  "MODEL": "BABBAGE",
  "CHOICES": [
    {
      "TEXT": "\n\nTHE FIRST THING YOU NEED",
      "INDEX": 0,
      "LOGPROBS": NULL,
      "FINISH_REASON": "LENGTH"
    }
  ],
  "USAGE": {
    "PROMPT_TOKENS": 4,
    "COMPLETION_TOKENS": 7,
    "TOTAL_TOKENS": 11
  }
}
```

For detailed documentation on how to use different type of Model

APIs, can be referred from <https://platform.openai.com/docs/api-reference/introduction> website.

### JOURNEY FROM GPT-3 TO GPT-4: A COMPARISON

Let us take a closer look at the journey of most advanced AI algorithm. Here is the major difference in terms of capabilities and performance:

GPT-3.X	GPT-4
Single Model i.e., Mainly trained on text data.	GPT-4 is "multimodal", i.e., it works with text, Images and videos.
It has 175 billion parameters.	It has 100 trillion parameters, more than GPT-3.
GPT-3 primarily focus on text so can't describe the image.	GPT-4 can easily understand and describe the content of an image.
GPT 3.x has a token limit of 4,000 (equals to 3,125 words).	GPT-4 has a token limit of 32,000 (equals to 25,000 words)

### FUTURE OF ChatGPT

It is war of AI where companies are building smarter chatbot like Google has recently released its chatbot 'Bard' ahead of schedule, Another Chinese Internet search giant Baidu has revealed that it will launch AI (Artificial Intelligence) chatbot similar to ChatGPT soon. As per recent report, Beijing based Baidu has been investing heavily in AI technologies, in cloud services, Chips etc whereas Microsoft Corp has invested \$1 billion in San Francisco based OpenAI. Other Market Giants like Amazon and Snapchat is also releasing its own AI powered chatbot. Amazon is also investing heavily in Generative AI.

Recently I learnt from one of the news channels, one Google Engineer has launched his own version of AI-chatbot known as 'GitaGPT'. This Chatbot brings "Wisdom of Bhagavad Gita" to the modern world. By using GPT APIs, many other AI based Chatbots are getting launched each day.

No one can predict the future of AI technology as it has been continuously evolving from many years. From the invention of industrial robot to ChatGPT, all these are great examples of AI. Over the last two decades, AI has been aggressively used in every sectors like startup of human less and cashless supermarket stores, AI based self-learning board games and to find best connection between stations while traveling through London tube is the also the finest example of AI based neural networks. ChatGPT AI based chatbot has got great potential and in next 5 to 6 years, we can fully matured version.

As of today, ChatGPT doesn't provide Real time information but in future, it could be enhanced to provide real time information. Current version of ChatGPT provides human like responses based upon stored large amount of data.

In the coming years, having ChatGPT in your mobile will be like a having scholar along with you all the time. We may see advanced version of chatbot which may learn human emotion and talk like human version.

ChatGPT interactions with MS Search Engine like Bing and Edge browser to create new way to browse the web. Users will be able to chat to Bing like ChatGPT, asking questions and answers in natural language. Use of AI powered Bing search engine can help in preparing Itinerary for any trip and can prepare summary of trip in any language and can translate it to any language. In short, future versions of ChatGPT will have much more advanced features including speech recognition form instead of text-based dialog.

As we know that the current version of ChatGPT is built on GPT 3.5. With the release of new GPT-4 which is going to be 500 times more powerful than the existing ChatGPT. GPT-4 would be multimodal, which would allow the AI to translate a user's text into images, music, and video or vice-versa and this will assist in saving time, effort and money at Call Centre or IT enabled organizations. By the use of Generative AI, many new AI based tools are being launched like runwayml.com (Online video editing tool), Tome (AI Story teller & Content Builder tool), Poised (AI-Powered Communication Coach), Sembly (AI-Powered Meeting notes preparation tool, can be used for Zoom call), Midjourney (AI Art generator), Synthesia (AI Video generator tool) etc.

In short, GPT APIs can be plugged-in with other tools to create customize solutions for customer support, knowledge management and much more.

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