1. **Introduction**

Chat-GPT is a sibling of InstructGPT, which is specialized in providing elaborate answers based on any questions. This model utilizes a machine learning technique known as Reinforcement Learning form Human Feedback (RLHF).

(https://openai.com/blog/chatgpt)

On November 30th, 2022, an AI research and deployment company, OpenAI launched Chat-GPT, an extension of GPT-3 designed to engage in natural language conversations. It has been able to significantly attract the attention of the whole world for its natural and meaningful conversations with response to its user. This AI application has fundamentally changed the expectation and possibilities of artificial intelligence in many communities like software developers, writers, and students.

(We need to talk about ChatGPT: the future of AI and higher education)

1. **Development of Chat-GPT**

Chat-GPT is a large language model which is based on deep learning using a type of neural network called transformer. Deep learning is a subset of machine learning which makes use of its vast neural network to learn for the available data and provides its output or predictions. Large amount of text data is processed by Chat-GPT’s by utilizing attention mechanism of transformer architecture. Deep learning technique can understand the relationship or pattern between text and able to predict the required text making this AI application able to respond to the questions in human natural language.

(Deep learning in chat-GPT- a survey)

The technique of machine learning known as Deep learning is inspired from the structure and function of neural networks of human brain. It classifies various layers of neural networks, and each layer creates and represents a complex set of data. This method requires a lot of computing power and a large set of data.

(Deep learning in chat-GPT- a survey)

1. **Related Systems**

Chat-GPT is not only an AI application for generating text available on the internet. Some other AI applications like Chat-GPT are listed below.

1. Claude AI:

It is one of the best alternatives of ChatGPT which is significantly progressing towards modern AI technology. It can generate text like ChatGPT in comparison of common sense, creativity, and reasoning. But a huge limitation of Claude AI is that it is only available to US and UK residents.

1. Google Bard AI:

Bard AI, launched by google is a worthy alternative to ChatGPT. It is free to use and available world widely. This model of AI application does not use GPT language model but instead it is powered by PaLM 2 Large language model.

1. Perplexity AI:

It is an AI-powered search engine and chatbot which uses real-time information from websites and knowledge from AI model for giving most authenticate answers. As Chat-GPT has no access to the internet, this AI application can be a reliable alternative.

1. **Uses of Chat-GPT**

Chat-GPT has a significant impact on very important fields like education, entertainment, engineering, and personal development. As it is a text generating AI, it can be a great assistant for writing essays, emails, and other creative writings. It can be a great brainstorming tool for new projects, events, or personal goals. This AI tool can largely increase the speed of learning new topics and concepts through the explanation and summarization on any given text or books. Some important uses of chat-GPT in specific sectors are explained below.

1. Education

This AI model has a neural network which has been trained in a large set of text data, making it able to answer most of the topics in a very meaningful way. Using this tool in education and e-learning can play a significant role in the improvement of quality of education obtained by students. Students can get help from ChatGPT any time to clarify any doubts and concepts.

1. Content Generation

Chat-GPT is helpful in gathering ideas for articles, books, and other resources for starting any content generation activity. It can provide systematic formats for the related content and even generate content related to the topics. It can summarize any given text content and it can also provide meaningful and logical points of any related topics.

1. Software Development

This AI application is of great use in documenting and proper development of software. It can generate codes for common tasks which can speed up the development process and reduce minor work. It can provide proper reviews of codes and algorithms which can improve the overall performance of the software and prevent any future failures.

1. Language Translation

It can translate any given text in multiple languages in real-time. It can be helpful in helpful in various fields like travel and tourism, business communications, customer support and cultural exchange. This can greatly enhance e-learning and global marketing with no boundaries of language.

1. Medical

A huge dataset of chat-GPT can quickly answer any medical questions with high accuracy and reliability like an expert. It can also be used for any health care personalized advisor. Any health-related issues can be well known with available alternatives.

1. Research

It can be very supportive in any research activity from information gathering to any complex concept understanding. It provides accurate and reliable information by summarizing or elaborating as required by users.

1. **Limitations of Chat-GPT**

The remarkable achievements in Artificial Intelligence have revolutionized the way we imagine development of science and technology, communication, research, and medical improvements. Yet, with all these improvements AI applications like Chat-GPT have a huge number of limitations. Some of the limitations are listed below.

1. Limited Understanding of Training Data:

Every response generated by ChatGPT is based on the data patterns it has recorded during training phases. It can generate inaccurate or biased answers if any queries or questions conflict with limitation of trained data it has. If the trained data has no specialized information about the topic asked by user, then chances are high that the generated response is low in accuracy. This AI tool is trained in large set of data which is impossible to supervise for filtering any kind of inaccuracies or misconceptions ultimately reducing the efficiency and accuracy of response.

1. Missing concept of emotional intelligence:

There is no concept of emotion in every response generated by ChatGPT. It only predicts possible words in well-organized sentences or paragraphs with statistical value it has in data set during training phases. This limitation of missing emotional intelligence makes this tool unable to contribute to proper mental health issues and emotional supportive counseling.

1. Limited Flexibility:

It is only limited to specific types of conversations where responses can be easily predicted and does not have any kind of complexity. The conversations where it required some critical thinking with complex calculation or evaluation of previous responses can more inaccurate and inefficient. Such conditions can arise in some situations like if users ask to find problems in complex mathematical calculations, chess gameplay with chat-GPT, and complex programming problem identifications. This tool is largely behind in such areas of critically analyzing and complex calculation for finding appropriate responses.

1. Lack of creativity or innovation:

There is huge gap between the creativity or innovation between ChatGPT and human beings. It can only produce permutations and combinations of trained data it has, completely unable to learn beyond this limitation. Creativity and innovation only arise after having a deep and conceptual understanding of a specific topic. In the case of such chat AI assistant learning is limited to improving the statistical value of words for predicting best response for users which is very far from true creativity or innovation.

1. Hight cost:

ChatGPT requires huge computational power, and it consumes huge amounts of energy. As mentioned above, this AI application is powered by neural network called transistor which consists of billions of parameters that need high processing power for its best utilization. Such technology requires powerful GPUs which can be very expensive. Along with power and energy, infrastructure has a significant role in increasing the cost as it requires proper hardware, networking, and maintenance.

1. **Area of improvements**

While Chat-GPT has changed the perspective of Artificial Intelligence in day-to-day use, there are some more expectations that need to be improved. Some of the recommendations for areas of improvement of this AI tool are listed below.

1. Natural language Understanding (NLU)

Chat-GPT should have more advance NLU that can improve its capacity of understanding and generating conversation or responses more like human natural language. It can result in more accurate, contextual relevance and sensible answers. As the capacity of NLU increases it should be able to handle more complex queries and complex calculations with proper continuation in a single prompt. Depending upon the people they used to ask questions for simple answers, conceptual clearance or deeply discuss the topic. Currently, these responses generated by this AI tool have no place for such criteria may be solved with more advanced NLU.

1. Optimized Conversation Progress

There should be significant improvement in conversational continuation of this AI tool, especially if the required answer has some complex queries or calculations. Many incidents have shown that Chat-GPT fails to satisfy users in activities like problem solving in some specific programming language and the problem is completely new. It should also have a logical flow of conversation because one conversation has a foundation upon another. Optimized conversation progress ensures that the current response is relevant to previous one.

1. Place for Emotional Intelligence

It should be able to understand the clues of human emotion based on provided queries. It requires recognition of human emotions for generating the response accordingly. After finding the emotions such as joy, frustration, sadness, or excitement the response it generates should differ in different situations.

1. Improved knowledge representation

This AI tool should be improved in the ability to store, access, and properly utilize a wide range of diverse information that is more accurate and reliable, ultimately representing improved knowledge. It should generate responses that reflects deep understanding of specific topic that maintains its reliability and accuracy. Every response it generates should have proper foundation of facts and figures verifying the information from multiple sources. It should be able to classify misinformation present in the set of information used for training its neural network or the vast users queries, that can contribute to better knowledge representation.

1. Voice recognition

It should have a proper ability to accurately understand and interpret spoken language. The previous versions of Chat-GPT had less natural language processing capacity of users provided in prompt, but the current version has ability of NLU, voice recognition is the future expectation. It can be more efficient and less time consuming with integration of voice recognition, and it also benefits disabled persons. Chat-GPT is more likely to be used as a virtual assistant rather than just AI chat bot if it has an ability of voice recognition.

1. Access internet for current information

Chat-GPT has no access of internet, every response it generates is based on the vast textual information previously trained making it disable to answer questions which needs information of current time. Access of internet can increase the information of current events, achievements, developments, and trends that can generate more relevant response to users. It can cross verify the user queries and information it has.