**Chat GPT and its impact**

Dawa Sangmu Sherpa

Abstracts

Artificial intelligence (AI) and machine learning have been revolutionizing scientific research in recent years. As a result, chatbot technology has made significant strides in recent years, particularly with ChatGPT's emergence as a notable AI language model. This in-depth analysis explores ChatGPT's history, uses, major challenges. Before studying its numerous uses in fields including healthcare, and education, we first explore its history, development, and underlying technology. We also address various mitigation measures while highlighting the significant difficulties that ChatGPT confronts, such as ethical issues, data biases, and security risks. The paper also explores potential difficulties and ethical issues related to the application of ChatGPT in research, emphasizing the significance of finding a balance between AI-assisted innovation and human knowledge. The study discusses a number of ethical concerns with the current computing landscape and how ChatGPT can challenge such ideas. The biases and restrictions of ChatGPT are also present in this work. It is important to note that despite numerous controversies and ethical questions, ChatGPT has in a very short period of time gained amazing attention from academics, research, and enterprises.

Keywords

ChatGPT, Language model, GPT-3.5, Rule based AI, Conversational AI, Context understanding, Natural language processing

The development and study of intelligent hardware and software, often known as intelligent agents, is a key component of artificial intelligence's (AI) increasing integration into our daily lives. Various tasks, from manual labor to complex operations, can be performed by intelligent agents. A chatbot is a computer software that replies to questions and comments like a smart entity. The exchange may take place via voice message or text. Natural Language Processing enables any chatbot program to comprehend one or more human languages [1]. Chatbots are referred to as digital assistants, interactive agents, clever bots, and artificial conversation beings.

Alan Turing examined if a computer program could communicate with a group of people in 1950 without the participants recognizing that their interlocutor was artificial. Many people believe that the Turing Test is the inspiration behind chatbots. In 1966, the first chatbot with the name ELIZA was created. ELIZA returned the user's statements in the interrogative form, simulating the work of a psychiatrist. Despite its limited communication capabilities, it served as an inspiration for the creation of later chatbots [2].

(Adamopoulou and Moussiades, 2020a; Adamopoulou Eleniand Moussiades, 2020)

.

It made use of a template-based response mechanism and straightforward pattern matching. Although it had poor conversational skills, it was nonetheless able to perplex users at a time when they were not accustomed to talking with machines, which inspired the creation of other chatbots. A chatbot dubbed PARRY that was created in 1972 was an upgrade over ELIZA. The chatbot ALICE was created in 1995 and won the Loebner Prize, also known as the annual Turing Test, in 2000, 2001, and 2004. The title of "most human computer" was initially attained by this machine [1]. The core intelligence of ALICE is built on the Artificial Intelligence Markup Language (AIML), which enables developers to describe the fundamentals of chatbot knowledge.In 2001, chatbots like Smarter Child were created and made accessible through message services. The development of virtual personal assistants such as Apple Siri, Microsoft Cortana, Amazon Alexa, Google Assistant, and IBM Watson was the following development [2].

.

Chatbots can be classified using different parameters: the knowledge domain, the service provided, the goals, the input processing and response generation method, the human-aid, and the build method[1].

The GPT (Generative Pretrained Transformer) language model by OpenAI has a variation called ChatGPT. It is a sibling model to InstructGPT. It is intended to produce text responses that sound like human responses to user input in a conversational setting. With the help of a vast dataset of human conversations, ChatGPT was instructed to produce responses to a variety of themes and cues. The chatbot may provide responses in several languages and be utilized for customer support, content development, and language translation duties. It can be utilized in many different applications, including language translation software, chatbots, and customer service representatives. OpenAI ChatGPT is a cutting-edge language model that can produce natural and coherent text that can be mistaken for material authored by a human[3].

After OpenAI released its generative Pre-trained Transformer (GPT) model in 2018, work on CHATGPT began. ChatGPT has been improved from a model in the GPT-3.5 series that ended training in the first quarter of 2022. On an Azure AI supercomputing infrastructure, ChatGPT and GPT-3.5 were trained [intro chatgpt]. The GPT model's ability to produce responses to queries and conversations that resembled those of real people led to the creation of ChatGPT, a hybrid chatbot platform that combines GPT and NLP technology. The first chatbot platform, ChatGPT, combines GPT and AI-powered natural language processing to deliver more precise and human-like responses[1] [3].

The ChatGPT working structure requires a smooth flow of information and knowledge. The ChatGPT system's many functioning and developing processes for addressing the regular requirements of the social structure are illustrated in Fig. 1. With the aid of Figure, various four steps are highlighted and explored. It began with conversations and exchanges, then involved gathering data and making comparisons. The process is finished by finding the reward model and updating it in the cloud data set after the database has been sampled. An organization called OpenAI is dedicated to advancing AGI for the benefit of humanity. OpenAI, which was established in 2015 by Elon Musk, Sam Altman, and others, has been at the vanguard of AI research, creating a number of ground-breaking models like GPT-2, GPT-3, and ultimately ChatGPT. The development of ChatGPT, based on the GPT-4 architecture, was made possible by OpenAI's continuous research and development efforts after the success of GPT-3[4].

ChatGPT is pre-trained utilizing a language modeling job on an extensive corpus of text-based information, including books, papers, and webpages. ChatGPT can effectively produce cogent and realistic responses in a conversation by learning the patterns and connections between words and phrases in natural language through pre-training [5].

Rule based chatbots are the most rudimentary type of chatbots. They are also known as basic chatbots or decision trees. The conversations are sometimes designed like a decision tree workflow where users can select answers depending on their use case. Sometimes, these types of chatbots are also specific terms but these are limited to typos and may not provide appropriate responses which can cause very frustrating customer experiences [mind titan].

A diagram of a chatbot

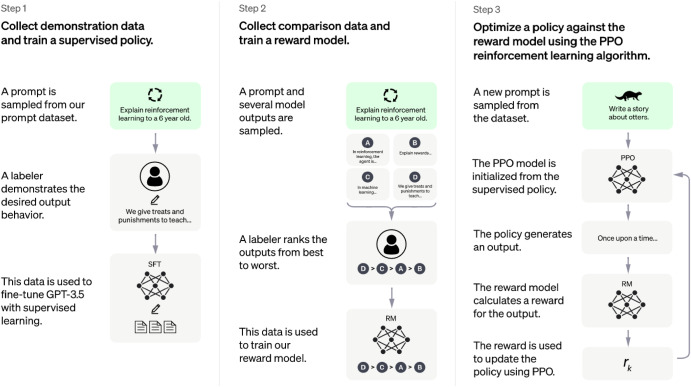
Description automatically generated

Whereas AI chatbots use the NLP technologies to understand the internet behind the question and solve the customers’ problem without any human assistance. The biggest difference between AI chatbots and rule-based chatbot is the usage of machine learning models that significantly increase the bot’s functionality as it can identify hundreds of different questions written by a human, leading to more insightful and dynamic thinking.

A group of icons on a white background

Description automatically generated

Working of Chat GPT



Step. 1

Gather a example data and train a monitored policy.

A prompt is first selected from the prompt dataset. The intended output behavior is displayed via a labeler. Using supervised learning, this data is used to improve GPT3.

Step 2

Gather comparison information and develop a reward model.

Second, samples from a prompt and multiple model outputs are taken. The outputs are ranked by a labeler from best to worst. The reward model is trained using this data.

Step 3

Utilize reinforcement learning to improve a policy in relation to the reward model.

The dataset is then sampled for a fresh prompt. The policy produces a result. A reward is determined by the reward model for the output. The proximal policy optimization (PPO) algorithm is employed with the incentive to update the policy [4].

Applications of Chat GPT

Beyond scientific study, ChatGPT has become a useful tool due to its adaptability and sophisticated natural language processing abilities. This section examines ChatGPT's wide array of applications, demonstrating its potential to revolutionize business, improve communication, and foster innovation.

Healthcare and Medicine

Although interacting with patients is important for many aspects of healthcare, it is only occasionally necessary for the best possible care [6]. By offering specialized support to doctors and other healthcare workers, ChatGPT can enhance the quality of healthcare services. It can be utilized to create automated systems that offer medical personnel individualized recommendations and assistance [7]. ChatGPT helps healthcare professionals with clerical tasks including report creation and transcription of patient records. By using ChatGPT to automate these processes, healthcare providers can free up their valuable time to concentrate on other important tasks, such as patient care [6]. ChatGPT can be utilized in the healthcare and medical fields to assist medical professionals in making diagnoses by reviewing patient information, medical history, and symptoms. Create individualized treatment plans based on the needs and preferences of each patient. Synthesize, and summarize medical research to guide clinical practice based on evidence, offer patients medical details and guidance in a straightforward easy to comprehend format, and promote cooperation among healthcare providers by automating interactions as well as knowledge sharing [5].

Education/ Academics

ChatGPT can be used in the education and training industry to create personalized learning materials and lesson plans based on individual learner needs and preferences, offer real-time feedback and guidance to learners during the learning process, produce engaging educational content, such as quizzes, interactive exercises, and multimedia presentations, support teachers in grading assignments and giving students constructive feedback [5]. Academics may undergo a transformation thanks to ChatGPT. By offering individualized, interactive explanations for concepts, it can aid students in understanding those with which they are having difficulty. Teachers can save time and effort by using the AI-powered system to assist them in giving each student individualized feedback [7]. Staff members might focus on other vital responsibilities, such as ensuring that students have access to resources outside of the school when they need them, by avoiding having to perform the same chores repeatedly [4].

Additionally, ChatGPT can be used to grade homework, administer tests, and provide students feedback automatically. In addition to these, creative initiatives and materials can be created using ChatGPT. For instance, it can be used to develop engaging interactive games and exercises for pupils. It can be used to develop intelligent tutors that offer students individualized advice and feedback as they advance in their academic careers [7]. Overall, this new tool will improve teacher-student connections and classroom productivity, thus it would be a smart idea for any school to consider implementing it right away [4].

Content Generation

Chat GPT can be used in the fields of content creation and creative writing. It may create original narrative ideas and storyline outlines as well as character descriptions. By offering creative suggestions and writing ideas, it also helps writers get beyond writers’ block. The ability to automatically generate content for blogs, articles, social media platforms, etc. can be of great assistance to content creators[8]. It can be a useful resource for authors who are having trouble coming up with fresh concepts and creative writing. ChatGPT may offer writers with original and innovative writing prompts that can spark fresh thoughts and methods to writing by evaluating data on genres, themes, and story structures. ChatGPT can produce relevant and interesting natural language responses by analyzing data on the subject, tone, and style.

Software Development

Software development has been profoundly impacted by ChatGPT. It has enabled software developers to include natural language processing (NLP) capabilities into their programs, enhancing their usability and interactivity. Examples of NLP-based software that have gained popularity recently include chatbots, virtual assistants, and other conversational interfaces[7]. By examining data about the programming language, algorithms, and data structures, ChatGPT can be used to optimize code. ChatGPT can assist developers in enhancing the performance and efficiency of their code by spotting inefficiencies and suggesting fixes. By analyzing information about the programming language, code structure, and function needs, ChatGPT can help with code documentation. ChatGPT can assist developers in producing concise, understandable documentation by offering suggestions for guidelines and norms in code writing. ChatGPT can be used to help with debugging by examining information on the programming language, code layout, and error messages. ChatGPT can assist developers find and fix coding bugs more speedily by offering suggestions for debugging methods and strategies.

Business and Finance

In the commercial world, ChatGPT and generative AI have several uses. When marketers employ ChatGPT's features, businesses can create more decisive marketing campaigns, engage with their target audience, and achieve their marketing goals [8]. Customer service chatbots that can answer questions from clients, provide product suggestions, and complete transactions can be created using ChatGPT. System development using ChatGPT can help with investment management[9]. ChatGPT can assist companies and investors in making wise investment decisions by examining financial data and offering recommendations. Systems that can detect fraud and financial crimes can be created using ChatGPT. Financial institutions can avoid losses by using ChatGPT to examine transaction data and spot patterns that might be signs of fraud [10]

Benefits of Chat GPT

ChatGPT automates chats to help with efficiency. The lack of manual discussions makes it possible to save time and resources. ChatGPT may also produce responses quickly, enabling speedier dialogues[11].

Another key component of ChatGPT is fine-tuning, which enables programmers to customize the model for certain tasks or domains. ChatGPT can produce more precise and pertinent responses by training the model on a smaller dataset that is specific to the application being used. Using ChatGPT as the base, fine-tuning enables developers to produce extremely customized solutions.

Businesses can free up resources and deliver a more individualized customer experience by promptly and accurately responding to customer inquiries using ChatGPT. Contrary to conventional AI solutions, ChatGPT uses a large-scale pre-trained language model that enables it to answer customer questions fast and accurately and produce responses that sound natural[9].

Compared to manual chats, ChatGPT can produce responses that are more accurate. This is due to the fact that it has been trained on a sizable dataset of interactions, enabling it to recognize the context of a conversation and produce pertinent responses.

Using a deep learning-based artificial intelligence (AI) architecture, the ChatGPT Improved Accuracy (CGA) model is a potent natural language processing (NLP) system that generates accurate and insightful discussions. With the help of a pre-trained model from OpenAI's GPT-3, CGA can produce plausible and interesting conversations based on input [12].

For companies that rely on customer support chatbots, ChatGPT, a unique language generation model created by OpenAI, has the potential to dramatically cut expenses. One of ChatGPT's primary advantages is its capacity to produce real-time, human-like responses, which can lessen the need for expensive human customer support employees.

Biases of ChatGpt

Like other AI language models, ChatGPT is subject to a variety of biases, including language bias, ideological bias, and biases based on factors such as gender, race, and culture. These biases are a result of the model's training data, which includes internet content created by people. The nature of the training data can potentially lead to the emergence of other biases, including attentional, format, and commercial biases. In this section, we are going to discuss briefly about the biases of ChatGPT[13].

Since ChatGPT is trained primarily using internet-based data, it might be biased in favor of cultures, languages, or viewpoints that are more widely represented online. As a result, the information that the AI model produces might not adequately represent the variety of human experiences or languages. Due to biases in the training data, ChatGPT might unintentionally reinforce racial and gender prejudices. For instance, the model can link occupations or roles to genders or races, reinforcing preconceptions that already exist. By reflecting the predominate ideas or opinions revealed in its training data, ChatGPT may display ideological bias. This may result in the creation of material that is biased in favor of political, social, or economic ideologies, either reaffirming preexisting prejudices or producing an imbalanced representation of various viewpoints [4].

Limitations of ChatGPT

Significantly reflecting the predominate ideas or opinions revealed in its training data, ChatGPT may display ideological bias. This could result in the creation of information that favors certain political, social, or economic ideas, thereby reaffirming prejudices already present or producing an uneven representation. Inherent biases in its training data, inadequate or obsolete information, and difficulty determining factual accuracy are just a few of ChatGPT's drawbacks [11]. The approach also has problems with conversational context, ethical reasoning, contextual awareness, and producing visual content. Additionally, ChatGPT could have trouble responding to improper queries, adjusting to user competence, and giving customized response from various angles

[4].

The generated content from ChatGPT can occasionally be verbose or overuse phrases, which makes it seem repetitive or unnatural. The model's output may be sensitive to minute variations in input wording, producing replies that are inconsistent or content that is not consistently detailed. As it is based on the patterns and relationships it has discovered from its training data rather than a thorough comprehension of the topic matter, ChatGPT may produce content that is inaccurate or misleading. Questions that call for a subtle knowledge of context or those that are ambiguous may be difficult for ChatGPT to handle. In certain circumstances, the model might produce material that seems convincing but does not specifically address the user's objective[13]. As a language model, ChatGPT can find it challenging to participate in moral or ethical reasoning. Without adequate human oversight, it might produce content that is morally dubious or does not uphold ethical standards, rendering it unsuitable for some purposes [14].

Challenges of Chat GPT

Despite the fact that ChatGPT has demonstrated to be a helpful instrument for advancing scientific research, it is crucial to understand and address the challenges and ethical issues posed by its use. This section looks into these concerns and considers ChatGPT's potential in the field of science [4], [12], [13].

1. Quality control: ChatGPT can produce high-quality text, but it can also produce responses that are unsuitable or of low quality. Continuous monitoring, training, and improvement are necessary to guarantee that ChatGPT continually produces high-quality text.
2. Reliability and accuracy: Although ChatGPT has demonstrated extraordinary proficiency in producing writing that appears human, it occasionally generates inaccurate or deceptive information. Maintaining the integrity of scientific research depends on the quality and dependability of AI-generated content.
3. Real-Time Responses: ChatGPT can generate text in real-time, but it occasionally takes a while to answer. For many applications, ChatGPT's speed and responsiveness must be improved.
4. Privacy Concern: Data protection and privacy issues are brought up by the fact that ChatGPT has access to a significant amount of user data. To guarantee that user data is protected and utilized responsibly, laws and regulations must be developed.
5. Generalization: ChatGPT is frequently trained on huge datasets, which can result in overfitting and make it challenging to generalize to new or unexplored data. New training methods and procedures must be created in order to increase ChatGPT's generalization capacity.

Ethical Concerns

1. Transparency and accountability: Upholding accountability for the results of AI-assisted research and ensuring transparency in such research are essential to preserving trust among the scientific community and the general public.
2. Data security and privacy: As AI is used increasingly frequently for data processing and analysis, worries regarding data security and privacy are becoming more common. It is crucial to ensure sensitive data is protected and that data is used ethically.
3. Privacy and security: ChatGPT can be utilized for handling private communications, financial information, and other sensitive personal information. As a result, it's critical to make sure that this information is safeguarded, kept private, and maintained secure.
4. Responsibility and accountability: As ChatGPT gains strength and popularity, it's critical to determine who is accountable for the choices and actions the model makes. This covers matters like who is in charge of the data needed to train ChatGPT, who is liable for the output produced by the model, and who is in charge of any unfavorable effects of employing ChatGPT.
5. Misuse and abuse: ChatGPT can be used for criminal acts like disseminating false information, creating fake news, and assuming the identities of others. In order to ensure that ChatGPT is utilized properly and ethically, it is crucial to address these risks. The use of sophisticated language models like ChatGPT for the production of spam, fake news, deepfake content, or cyberbullying is not prohibited. Putting in place security measures like content filtering, user authentication, and monitoring can help lower the possibility of malicious use. Additionally, building a strong community of users, researchers, and developers that are devoted to the ethical use of AI can be extremely important in preventing abuse.
6. Human-like interactions: ChatGPT can produce text that is identical to text produced by humans, which poses concerns about whether users are aware they are talking with a machine and whether such deception is morally acceptable.
7. Fairness and bias: ChatGPT, like any artificial intelligence model, is subject to bias if its training data contains bias. Due to this bias, people or groups of people may experience unjust outcomes, particularly in the job, healthcare, and criminal justice systems.

It is imperative that developers, researchers, and the larger AI community take a proactive stance in addressing these ethical issues. We can ensure that AI language models like ChatGPT are created and applied properly, maximizing their advantages while avoiding potential risks, by working together to detect, comprehend, and address potential difficulties [14] [15], [16].

Conclusion

ChatGPT has demonstrated significant promise in enhancing effectiveness, promoting collaboration, and spurring creativity in a variety of applications and scientific research fields. The field of scientific research has already benefited much from ChatGPT, and it has the potential to change even more in the future. Researchers can properly use AI's power to expand human understanding and knowledge by tackling the difficulties and ethical issues raised by its use. By overcoming these obstacles, ChatGPT and other conversational AI models will perform better, be more useful, and provide a better user experience, increasing their usefulness across a range of applications and sectors. Numerous improvements to generative AI have been made by ChatGPT, including enhanced contextual awareness. ChatGPT is more adept at simulating human-like interactions because it can comprehend the context of a discussion and produce pertinent responses, improved language generation. ChatGPT generates writing that is intelligible, contextually relevant, and grammatically correct thanks to its sophisticated language creation capabilities. ChatGPT's adaptability across different industries can be increased by customizing it for particular tasks or domains. Because ChatGPT supports many languages, it may serve a variety of user bases and international applications. However, in order for ChatGPT to assist in forming intelligent, various ethical difficulties must be handled.

References

[1] E. Adamopoulou and L. Moussiades, ‘Chatbots: History, technology, and applications’, *Machine Learning with Applications*, vol. 2, p. 100006, 2020, doi: https://doi.org/10.1016/j.mlwa.2020.100006.

[2] L. Adamopoulou Eleni and Moussiades, ‘An Overview of Chatbot Technology’, in *Artificial Intelligence Applications and Innovations*, L. and P. E. Maglogiannis Ilias and Iliadis, Ed., Cham: Springer International Publishing, 2020, pp. 373–383.

[3] E. Adamopoulou and L. Moussiades, ‘An Overview of Chatbot Technology’, in *Artificial Intelligence Applications and Innovations*, I. Maglogiannis, L. Iliadis, and E. Pimenidis, Eds., Cham: Springer International Publishing, 2020, pp. 373–383.

[4] P. P. Ray, ‘ChatGPT: A comprehensive review on background, applications, key challenges, bias, ethics, limitations and future scope’, *Internet of Things and Cyber-Physical Systems*, vol. 3, pp. 121–154, 2023, doi: https://doi.org/10.1016/j.iotcps.2023.04.003.

[5] A. Haleem, M. Javaid, and R. P. Singh, ‘An era of ChatGPT as a significant futuristic support tool: A study on features, abilities, and challenges’, *BenchCouncil Transactions on Benchmarks, Standards and Evaluations*, vol. 2, no. 4, p. 100089, 2022, doi: https://doi.org/10.1016/j.tbench.2023.100089.

[6] M. Sallam, ‘ChatGPT Utility in Healthcare Education, Research, and Practice: Systematic Review on the Promising Perspectives and Valid Concerns’, *Healthcare (Switzerland)*, vol. 11, no. 6. MDPI, Mar. 01, 2023. doi: 10.3390/healthcare11060887.

[7] D. Kalla, ‘Study and Analysis of Chat GPT and its Impact on Different Fields of Study’, 2023. [Online]. Available: www.ijisrt.com

[8] C. Cox and E. Tzoc, ‘ChatGPT Implications for academic libraries’, 2023.

[9] A. Shaji George, A. Hovan George, and Asg. Martin, ‘Partners Universal International Innovation Journal (PUIIJ) A Review of ChatGPT AI’s Impact on Several Business Sectors’, 2023, doi: 10.5281/zenodo.7644359.

[10] M. A. Alafnan, S. Dishari, M. Jovic, and K. Lomidze, ‘ChatGPT as an Educational Tool: Opportunities, Challenges, and Recommendations for Communication, Business Writing, and Composition Courses’, *Journal of Artificial Intelligence and Technology*, vol. 3, no. 2, pp. 60–68, 2023, doi: 10.37965/jait.2023.0184.

[11] J. Deng and Y. Lin, ‘Frontiers in Computing and Intelligent Systems The Benefits and Challenges of ChatGPT: An Overview’.

[12] J. Deng and Y. Lin, ‘The Benefits and Challenges of ChatGPT: An Overview’, *Frontiers in Computing and Intelligent Systems*, vol. 2, no. 2, pp. 81–83, Jan. 2023, doi: 10.54097/fcis.v2i2.4465.

[13] W. Hariri, ‘Unlocking the Potential of ChatGPT: A Comprehensive Exploration of its Applications, Advantages, Limitations, and Future Directions in Natural Language Processing’, Mar. 2023, [Online]. Available: http://arxiv.org/abs/2304.02017

[14] D. Mhlanga, ‘Open AI in Education, the Responsible and Ethical Use of ChatGPT Towards Lifelong Learning’. [Online]. Available: https://ssrn.com/abstract=4354422

[15] Z. N. Khlaif, ‘Ethical concerns about using AI-generated text in scientific research’. [Online]. Available: https://ssrn.com/abstract=4387984

[16] M. Liebrenz, R. Schleifer, A. Buadze, D. Bhugra, and A. Smith, ‘Generating scholarly content with ChatGPT: ethical challenges for medical publishing’, *The Lancet Digital Health*, vol. 5, no. 3. Elsevier Ltd, pp. e105–e106, Mar. 01, 2023. doi: 10.1016/S2589-7500(23)00019-5.