

ChatGPT: Applications, Opportunities and Challenges

Bibek Khadka¹, Rajita Aryal²

¹Undergraduate Student, Department of computer Engineering, Delhi Technical University, Delhi, India

²Graduate Student, Department of Information Technology, Ulster University London Campus, UK

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ABSTRACT: Artificial intelligence (AI) and machine learning have changed the nature of scientific inquiry in recent years. Of these, the development of virtual assistants has accelerated greatly in the past few years, with ChatGPT becoming a prominent AI language model. In this study, we examine the foundations, vision, research challenges of ChatGPT. This article investigates into the background and development of the technology behind it, as well as its popular applications. Moreover, we discuss the advantages of bringing everything together through ChatGPT and Internet of Things (IoT). Further, we speculate on the future of ChatGPT by considering various possibilities for study and development, such as energy-efficiency, cyber-security, enhancing its applicability to additional technologies (Robotics and Computer Vision), strengthening human-AI communications, and bridging the technological gap. Finally, we discuss the important ethics and current trends of ChatGPT.

KEYWORDS: AI, ChatGPT, GPT, OpenAI, NLP, IOT, Bot Engine.

I. INTRODUCTION

Over the past few years, language models have benefited greatly from the rapid development of Artificial Intelligence (AI) and Natural Language Processing (NLP), making them more accurate, flexible, and useful than ever before. The term “Generative AI” is used to describe a subset of AI models that can generate new information by discovering relevant trends and patterns in already collected information. These models may produce work in a wide range of media, from written to visual to audio. To analyze, comprehend, and produce material that accurately imitates human-generated outcomes, Generative AI models depend on deep learning approaches and neural networks. OpenAI’s ChatGPT is one such AI model that has quickly become a popular and versatile resource for a number of different industries. Its humanoid text generation is made possible by its foundation in the Generative Pre-trained Transformer (GPT) architecture. It has the ability to comprehend and

produce a broad variety of words since it has been training on an extensive amount of text data. Linguistic transformation, summarized text, and conversation production are just some of the applications that can benefit from its capacity to create natural-sounding content. ChatGPT can be trained to do a variety of activities, including language recognition, question answering, and paragraph completion. It’s also useful for building chatbots and other conversational interfaces. In a nutshell, ChatGPT is a robust NLP model that can comprehend and create natural language for a wide range of applications, including text production, language understanding, and interactive programs.

It is essential to ChatGPT’s function in promoting scientific research to comprehend its genesis and evolution. To clarify, the ChatGPT is not a Generative Adversarial Network (GAN) model but rather a linguistic model built on the GPT architecture, which is relevant here. GPT models are tailored to NLP activities including text production and language comprehension, as opposed to GANs, which are more commonly employed for activities including picture generation. The origins of ChatGPT lie in NLP, a subfield of AI that aims to teach computers to comprehend and produce human speech. The motivation behind developing ChatGPT was to establish a powerful and flexible AI language model that could help with a wide range of activities

The intersection of artificial intelligence (AI) and education is a realm of immense promise and potential, poised to reshape the landscape of learning in unprecedented ways. At the forefront of this transformation stands ChatGPT, a sophisticated AI language model capable of engaging in natural language conversations and generating human-like text. As educators, students, and institutions increasingly explore the integration of ChatGPT into educational settings, it becomes essential to recognize and navigate the intricate tapestry of opportunities and challenges that accompanies this revolutionary technology.

II. WHAT IS “CHATGPT”?

A chatbot is a software program that uses user input to simulate human-like interactions. The ChatGPT chatbot was created by San Francisco-based OpenAI. On November 30, 2022; the chatbot was made available for free public testing. Today, we will look at the GPT and attempt to figure out what it all means (Atuhaire, 2022). The Journal of India characterizes ChatGPT as a 'conversational' AI that would answer questions like a human—or so the promise and assumption goes. ChatGPT is an advanced chatbot based on OpenAI's GPT technology. It is capable of handling a broad variety of text-based requests, ranging from basic queries and replies to more complicated jobs (Lund, 2022). OpenAI's ChatGPT is a big language model designed as a conversational agent. ChatGPT, as a big language model, is trained on vast volumes of data (Azaria, 2022). For example, if you need assistance writing a message to a colleague, ChatGPT can quickly develop a meaningful and well-written letter. Similarly, if you need to address a problem with a colleague's productivity but don't know what to say, ChatGPT can help. ChatGPT, with its enormous data warehouses and efficient architecture, can even author dissertations on themes such as the usefulness of artificial intelligence. This is ChatGPT's distinct value for academic researchers.

III. HOW DOES IT WORK?

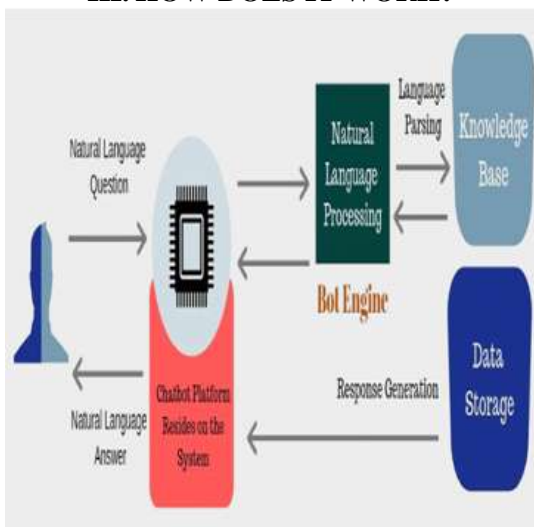


Figure 1: How ChatGPT work ?

"ChatGPT model employs Reinforcement Learning from Human Feedback (RLHF), employing the same approaches as InstructGPT, but with subtle variations in the data gathering arrangement," according to OpenAI. We used

supervised fine tuning to train an initial model: human AI trainers offered dialogues in which they played both sides- the user and an AI assistant. We provided the trainers with model-written ideas to assist them in composing their replies. This new conversation dataset was combined with the InstructGPT dataset, which was converted into a dialogue format. To build a reinforcement learning reward model, we required to gather comparison data, which comprised of two or more model replies graded by quality. We gathered this information by recording talks between AI trainers and the Chatbot. We chose a model-written phrase at random, sampled various potential completions, and had AI trainers score them. We may use Proximal Policy Optimization to fine-tune the model using these reward models. This method was repeated numerous times."

IV. MOTIVATIONS & CONTRIBUTIONS

ChatGPT was developed on top of the Transformer architecture to solve some of the shortcomings of earlier sequence-to-sequence models for natural language processing. Strong language models like OpenAI's GPT series, which comprised GPT-2 and GPT-3, the versions that came before ChatGPT, were made feasible by this creative architecture. ChatGPT is based on the GPT-3.5 architecture, which is an enhanced version of OpenAI's GPT-3 model. Despite having fewer variables, GPT-3.5 still generates good results in several NLP domains, including machine translation, text creation, and language understanding. ChatGPT can produce answers to user queries that eerily like those of a human since it was trained on an enormous corpus of text data and refined with the aim of producing conversational replies.

The primary goals of this work are:

- To introduce ChatGPT's roadmap and future prospects.
- To explore ChatGPT's potential to improve communication between humans and AI.
- To talk about ChatGPT's noteworthy features, well-liked applications, and ethics.
- To assess the benefits of integrating ChatGPT and IoT to bring everything together.
- To draw attention to ChatGPT's current research problems and trends.

V. BACKGROUND & FOUNDATIONS

OpenAI, a leader in AI innovation, created the ground-breaking models GPT-2, GPT-3, and eventually ChatGPT.

Following the success of GPT-3, OpenAI continued its research and development work, ultimately leading to the creation of ChatGPT, which is built on the GPT-4 architecture. Because ChatGPT is designed for conversational tasks, it performs better than GPT-3 in terms of response creation, contextual comprehension, and consistency [10]. Following the publication of GPT-3, OpenAI continued to do research and development, which ultimately lead to the creation of ChatGPT, which is based on the GPT-4 paradigm [9]. ChatGPT is designed with conversational activities in mind; it performs better than GPT-3 in terms of coherence, response generation, and contextual comprehension. Phrases, paragraphs, and entire papers in natural language are all produced by GPT models in a logical and human-like manner. GPT models need to be pre-trained on enormous amounts of text data before they can function successfully on later tasks like text classification and question answering. During

unsupervised pre-training, an enormous corpus of text data—including material from websites and textbooks—is used to train the model without the addition of tags or comments [16]. The next word in a text sequence is predicted by the GPT model by looking at the words in the training data that came before it. This is referred to as a language modeling work in the field of NLP. Through training on a large amount of text data, the model learns to identify and generalize language tendencies, such as syntax, vocabulary, and logic. After pre-training on a smaller labeled dataset, the GPT model may be adjusted on a single downstream job by adjusting its weights and biases to better fit that particular work. For example, if text categorization must be done later, the model may be trained to identify which label best fits a certain input text segment. The chronology of GPTs from the first version (GPT-1) to the most recent version (ChatGPT) is displayed in Fig. 2.



Figure 2: The evolution of GPTs from version 1 (GPT-1) to version 4 (ChatGPT)

1. GPT-1:

2018 saw the release of the GPT programming language's first version to the general public. The system's core is built on the Transformer Neural Network architecture, which is suited for natural language processing (NLP) applications including machine translation and language modelling. GPT-1 can anticipate the next word in a sequence since it has pre-trained on a large amount of text data. Even with its comparatively small collection of 117 million parameters, GPT-1 demonstrated the efficacy of pre-training on substantial text volumes [10]. It could be tailored for certain jobs like post-training emotion analysis and language translation. The remarkable success of GPT-1 on a range of NLP tasks underscores the need of pre-training on large text datasets for improving language understanding, as the text points out.

2. GPT-2:

When it was released, it was one of the best language models available, a significant improvement over GPT-1. It had one and a half billion parameters. GPT-2 was given data from a

vast corpus of textual resources, including books, articles, and internet content, after undergoing pre-training with a language modeling task. Similar to GPT-1, this model was designed to infer the next word in a text by examining the word that came before it [10]. In contrast, GPT-2 produced text sequences that were longer, more coherent and shown more generalizability across activities and situations. After initial training, GPT-2 may be improved for several downstream tasks, including as question answering, emotion analysis, and text categorization

3. GPT-3:

With 175 billion parameters, it is more significant and efficient than its predecessor, GPT-2. GPT-3 was trained on a vast corpus of text data, including books, journals, and web content, using a language modeling job. GPT-3 can produce natural-sounding language and do tasks like text categorization, sentiment analysis, and question answering because it was trained on a large amount of text data. The variety of linguistic components it acquired during pre-training is thought to be responsible for its ability to generalize to various

tasks and environments[9]. In addition, GPT-3 has few-shot and multi-task learning capabilities that let it pick up new tasks quickly and with little training data. The book focuses on useful applications including content creation, language translation, chat bots, and GPT-3 code development. It also presents ChatGPT, which uses reinforcement learning and natural language understanding to deliver intelligent and customised responses in conversations based on patterns and connections found in natural language. ChatGPT has been pre-trained on an extensive text dataset [2].

4. GPT-4

OpenAI just launched it, and it features significant improvements in the scalability of deep learning. This new model is an all-encompassing multidimensional linguistic framework that generates textual outputs based on inputs such as text and images. Even though GPT-4 may not be as skilled as humans in everyday scenarios, it has demonstrated human-level proficiency on a range of professional and academic levels. For instance, in testing on a virtual legal examination, it has achieved a score in the top 10% of participants, in contrast to GPT-3.5 [10]. While there is still room for improvement in terms of factuality, steering ability, and adhering to the constraints, GPT-4 reached its highest level of efficiency after five months of incremental alignment with the help of OpenAI's adversarial evaluation program and ChatGPT [9].

Language translation, text generation, emotion evaluation, and question answering are just a few of the numerous NLP tasks where GPT models have shown themselves to be state-of-the-art operators. The literature has discovered several practical uses, including material production, customer assistance, and chatbots.

VI. METHODOLOGY

A mixed-methods study technique was used to thoroughly examine ChatGPT's educational opportunities and obstacles. This method involves gathering primary data through surveys and interviews with educators, students, and professionals in the field of artificial intelligence in education, in addition to doing a thorough evaluation of the body of current literature.

- **Systematic Literature Review:** The goal of the systematic literature review was to offer a solid framework for comprehending the level of information today about ChatGPT's effects on education. During the search procedure, credible web sources, academic databases,

scholarly publications, and conference proceedings were consulted. Various keywords and search terms were utilized to locate pertinent publications released between 2015 and 2023, such as "ChatGPT in education," "AI in education," "virtual tutors," and "AI ethics." The review covered reports and articles that examined the opportunities and challenges related to artificial intelligence (AI), namely ChatGPT, in educational environments. It also included both qualitative and quantitative investigations.

- **Primary Data Collection:** Primary data was obtained through surveys and interviews in order to supplement the information obtained from the literature analysis and offer a more nuanced perspective. The following steps made up the main process of gathering data:

1. **Survey Development:** To collect both quantitative and qualitative data, a systematic survey questionnaire was created. The survey was thoughtfully designed to answer important research questions about instructors' and students' experiences using ChatGPT in the classroom. Questions about perceived advantages, difficulties, moral dilemmas, and ChatGPT's overall effect on education were answered.

2. **Distribution of the Survey:** A broad sample of instructors and students from K-12 and higher education institutions received the survey. To achieve a large and representative answer pool, the dissemination was done through academic institutions, online platforms, and professional networks.
3. **Interviews:** In addition to the surveys, educators and authorities on the use of AI in education were the subjects of semi-structured interviews. The purpose of these interviews was to offer in-depth qualitative insights into the opportunities and difficulties associated with using ChatGPT in diverse educational contexts. The interviews were audio-recorded, written down, and examined for recurring themes and viewpoints.

VII. FUNCTIONS OF CHATGPT: BEYOND PERSPECTIVE

ChatGPT's advanced and adaptable design makes it suitable for a broad range of natural language processing tasks. It can revolutionize human-machine interaction in a number of ways, including context-specific awareness, linguistic generation skills, task flexibility, multinational competence, scalability, nonexistent-shot and several-shot training, and capability enhancement [7]. The

following explains ChatGPT's most important features.

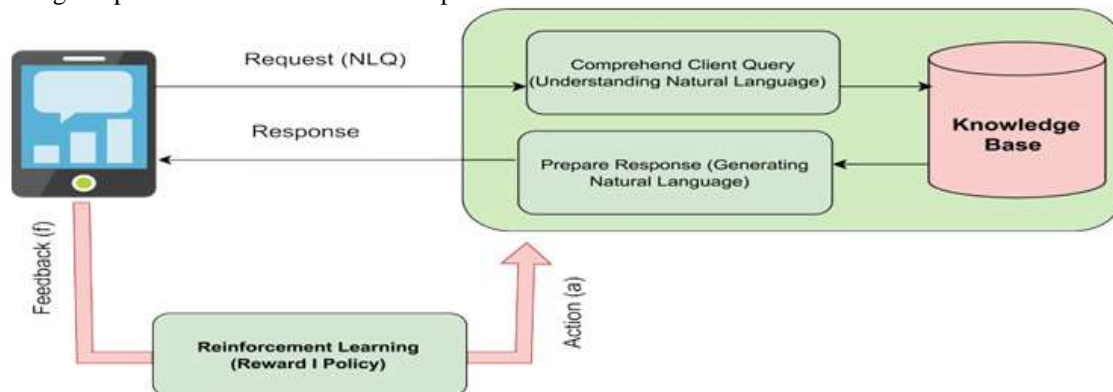


Figure 3: General architecture of ChatGPT

i. Power to Switch Tasks

ChatGPT is a helpful tool for a wide range of applications because of its versatility across industries and disciplines. It may be fine-tuned to fulfill a range of functions, such as document generation, coaching, interpreting, and customer service, among others. Because ChatGPT is so flexible, programmers can utilize it to create specialized applications.

ii. Cognitive comprehension

One of ChatGPT's most powerful features is its ability to understand conversational settings. ChatGPT's capacity to interpret the meaning of words and phrases leads to genuine and engaging interactions with users.

iii. Ability to create new languages

ChatGPT's ability to generate language is excellent; the information it produces is sensible, logical, and free of grammatical errors [1]. Its proficiency in text creation makes it useful for activities like authoring materials, summarizing, and revising.

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v. Competence in several languages

Due to its language flexibility, ChatGPT can be used internationally and has a larger potential user base. This function enables it to develop content in multiple languages, analyze user

emotions, translate text.

vi. The capacity to expand

Because of its modular design, ChatGPT may be scaled in terms of processing resources and response times. It can be utilized for a wide range of tasks, from personal endeavours to enterprise-wide projects, because to its capacity for expansion.

vii. Short-chance and No-chance training

ChatGPT has the ability to learn new tasks quickly and without the need for extensive training. In few-shot learning, the framework can learn new tasks from a small number of instances, but in zero-shot learning, it can provide answers for tasks that it has never seen before [11]. This capacity reduces the need for large tagged datasets and significant refinement, hence shortening the creation cycle.

viii. Modifying

The ability to modify ChatGPT is crucial since it allows programmers to adapt the model to a range of uses. Because the model was trained on a smaller dataset created especially for the intended use case, ChatGPT's responses are more accurate and relevant[5]. Because ChatGPT can be fine-tuned, programmers can create much specialized recommendations.

ix. ChatGPT is developing quickly.

Achieving optimal customer engagement and promoting fruitful communication with AI models such as ChatGPT significantly rely on prompt implementation. Through rapid programming, users can instruct the AI model to provide more accurate, relevant, and useful responses.

VIII. APPLICATIONS: ROADMAP AND OUTLOOK

ChatGPT has been applied outside of the scholarly research community because of its versatility and exceptional natural language

processing abilities. In this part, we go over the many applications that

ChatGPT may be used for (Fig. 3), which highlights how the platform can improve collaboration, change corporate processes, and inspire fresh ideas.



Figure 4: Applications Roadmap and Outlook

i. Academic Research

ChatGPT handles enormous quantities of data, revolutionizing scientific research. It makes use of natural language processing (NLP) to extract data from publications, summarize data, spot trends, and support automated modeling [4]. Its effect on data interpretation speeds up research, increases productivity, and reveals new information. ChatGPT simplifies complicated datasets and expedites research by effectively extracting and synthesizing data from several sources. It provides researchers with significant insights by highlighting recurrent themes, trends, and interrelationships.

ii. Instruction and learning

Higher education and training benefit greatly from ChatGPT's individualized instructional resources, prompt advice, and interesting learning materials catered to the requirements of each individual student. It facilitates online discussions, helps teachers grade

student work, and offers personalized recommendations for study materials and activities. It also assists teachers in enhancing their classes and teaching strategies by providing tailored advice based on student performance information and best practices in education. Additionally, ChatGPT can benefit learners of foreign languages by offering personalized recommendations for enhancing vocabulary, phrases, and pronunciation [7]. It may also help learners effectively prepare for tests by evaluating their learning preferences and historical performance. By evaluating each student's unique educational needs, it may be used to provide individualized recommendations for one-on-one tutoring sessions.

iii. Journalism and media

Screenplay authoring, story development and dialogue creation for a range of media types are all aided by ChatGPT. By examining user demographics and behavior, it enhances engagement by delivering pertinent replies that are

tailored to the sort of content and interactions[4]. On the basis of user choices, it also makes audio, movie, and TV programs recommendations. By examining personality and past data, ChatGPT provides tailored advice on voices, accents, and character qualities for voice acting.

iv. Medical studies and wellness:

For a number of reasons, ChatGPT is useful in the medical and healthcare industries. First of all, it can help with patient diagnosis by examining medical histories, current conditions, and symptoms to develop tailored treatment regimens. Second, it might provide a summary of clinical research to bolster practises that rely on research. Thirdly, ChatGPT may let people communicate with medical professionals and offer straightforward medical information and advice [7]. It may also be utilised to develop tools that help physicians diagnose and treat patients based on individual data, as well as robots that help with patient evaluation. Finally, by developing instructional resources, ChatGPT can improve healthcare education.

v. Revenues and Trades

There are several uses for ChatGPT in the banking and business industries. Tasks like creating accounting records, evaluating market data, and creating customized investment suggestions based on user profiles may all be automated by it [5]. It also analyses customer feedback's emotional content for use in advertising and product development. ChatGPT facilitates the creation of marketing collateral, business planning, and customized spending recommendations. It may be used in customer service by chat bots that handle transactions and provide answers to questions. ChatGPT helps businesses and financiers by analyzing financial data, spotting patterns, and offering insights into market movements. Additionally, it aids banks and other financial organizations in cost-cutting initiatives by examining transaction data for possibly illicit activity, which supports anti-fraud initiative [1].

vi. Legal support

ChatGPT assists solicitors by generating contracts and pleas that are legally binding. It may offer concise and accurate answers to legal questions, summarize legal materials, and evaluate legal conflicts based on prior decisions. Through chatbots, it provides legal assistance, assists academics in analyzing large volumes of legal data, and finds discrepancies in agreements [5].

ChatGPT is a writing tool that helps lawyers creates precise legal papers.

vii. Creative composition and content creation

ChatGPT's ability to generate original narrative themes, arrange highlights, and create personality portrayals can help with writing, editing, and content development. It offers creative directions, creates data automatically for several platforms, helps overcome writer's block, and enhances vocabulary, readability, and brevity. It may be used to the creation of content for social media posts, blog posts, and advertising texts by providing targeted writing recommendations derived from data analysis.

viii. Coding and troubleshooting software

ChatGPT provides clients with code snippets for developing required features by analyzing programming language, functionality, and requirements. It facilitates programme optimization, helps debugging by pointing up problems and offering fixes, and supports code inspection by examining the structure, language, and functionalities. By detecting problems and providing fixes, ChatGPT increases the dependability of programmes, which makes it an invaluable resource for programmers[7].

ix. Commercial Operations

Through the analysis of user behavior and preferences, ChatGPT improves lead generation and client retention. It delivers individualized recommendations based on consumer behavior, allows chat bots to connect with customers, and makes customized product recommendations. It also evaluates advertising data to guide future marketing plans and acts as a training aid for salespeople, providing advice on deal closure and product placement [1].

x. Institutions of finance

ChatGPT develops chat bots for customer service that fulfill orders, provide tailored recommendations, and provide assistance. It assists institutions in preventing losses by aiding in the detection of fraud and money laundering in financial transactions. By evaluating financial data and offering astute investment guidance, ChatGPT also helps with investment management. Furthermore, it helps customers manage their spending, savings, and debt while assisting financial institutions in developing risk mitigation plans by spotting possible dangers [7].

xi. Mentoring and guidance

By offering personalized instruction, ChatGPT has the potential to revolutionize the way scientific information is acquired by students. By considering each user's individual learning preferences, benefits, and limitations, ChatGPT can assist users in understanding and remembering information more effectively. This individualized approach to teaching has promise for closing knowledge gaps and giving students the skills they need to succeed in STEM (science, technology, engineering, and mathematics) fields [7]. The influence of ChatGPT extends beyond academia; it has improved scientific education and popularized science. It has been investigated how ChatGPT may transform science education and the various ways it can be applied to increase scientific literacy. There is a great deal of potential for

ChatGPT to be used in science education and public awareness campaigns to raise people's interest, engagement, and scientific understanding [17].

IX. RESEARCH PROSPECTS AND FUTURE DIRECTIONS

Despite the fact that ChatGPT has greatly aided scientific discoveries, it is crucial to acknowledge and address the research issues that its use has brought to light. This section explores these issues and anticipates future patterns that might indicate ChatGPT's potential among the scientific community. Concerns that frequently come up while using ChatGPT for scientific research include the following:

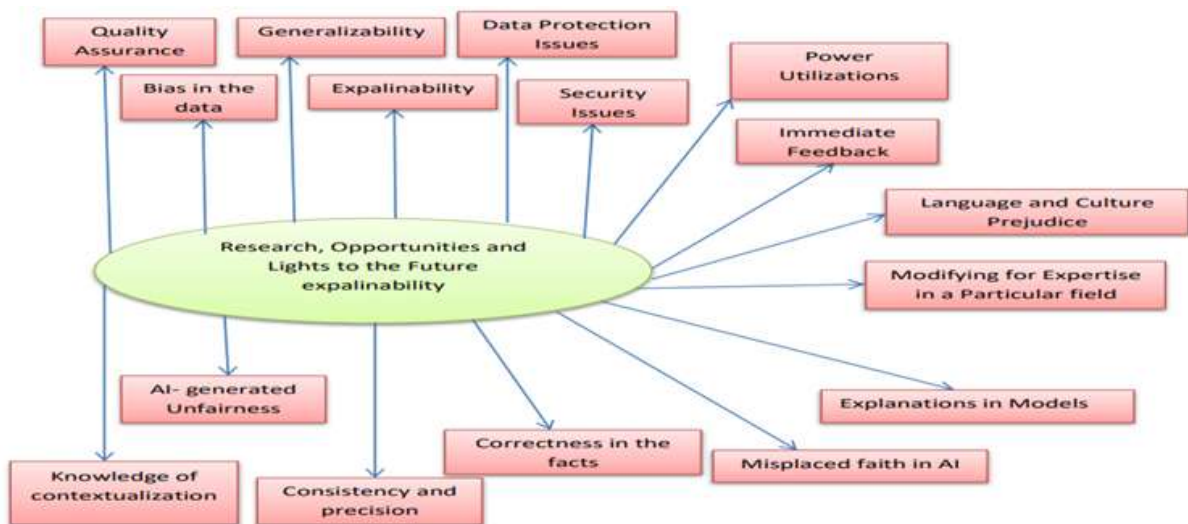


Figure 5: Research, Opportunities and Lights to the Future Direction

i. Quality Assurance

Although ChatGPT can produce excellent language, it can also provide responses that are inappropriate or of low quality. To continue creating top-notch material, ChatGPT has to be monitored, learned from, and improved upon constantly.

ii. Unbalance in the data

The amount and type of data that ChatGPT is trained on can have an impact on its outcomes. Prejudiced data used for training to create predictions may have negative effects on the medical community, law enforcement, and employment.

iii. Ability to generalise

Because ChatGPT is usually trained on very large datasets, it is often erroneous and struggles to generalise to new data. Developing new training methodologies is crucial to improving ChatGPT's generalizability.

iv. Accuracy and coherence

Although ChatGPT has shown a remarkable capacity to write in a humanoid style, it has occasionally been discovered to make errors or deliver inaccurate facts. It is up to AI-generated data to maintain consistency and accuracy in scientific findings.

v. Unfairness produced by AI

There's a chance that the enormous amounts of text utilized to train ChatGPT include

errors. Future research may be impacted by the biases that the AI model inadvertently propagates.

vi. Unfounded confidence in AI

Over-reliance on ChatGPT and other advanced AI models might reduce researchers' ability to think independently and solve problems.

vii. Justification

The ChatGPT model is intricate and challenging to understand. This might make it difficult to infer the model's decision-making procedure and identify any underlying problems.

viii. Utilisation of Power

ChatGPT models demand a lot of processing power and might be harmful to the ecology because of the volume of data they hold. The ChatGPT models' power efficacy has a lot of space for development.

ix. Immediate response

ChatGPT can generate text instantly, although it could take some time to react. ChatGPT would be useful for many users if it were quicker and more flexible.

x. Security concerns

Disinformation and intolerance are only two instances of the harmful content that ChatGPT may generate. It is essential to create controls to prevent the production of such content.

xi. Concerns about data security

Given ChatGPT's extensive access to user data, users' security and privacy may be jeopardized. Appropriate rules and procedures must be created in order to ensure the ethical use and storage of user data.

xii. Prejudice based on language and culture

It's probable that ChatGPT has biases against particular linguistic and cultural pairings, which might result in inappropriate or biased responses. To counteract these biases, more training datasets and assessment tools that are inclusive of other cultures and languages are required.

xiii. Models with explanations

Results from ChatGPT and other AI language models might be challenging to understand and justify. If these models become more explainable, make it easier to see how they make judgements, and give details about how they work, customers may be able to maintain trust and

make better decisions based on the content generated.

xiv. Adjusting for subject-matter expertise

Although ChatGPT possesses a wide range of general knowledge and abilities, it might not have the depth of particular subject matter knowledge required for specific jobs. AI language models need to be successfully customized and fine-tuned for certain industries, use cases, and sectors in order to fully fulfill their potential.

xv. Contextualization expertise

Even while ChatGPT is capable of generating rational and contextually aware replies, it may struggle to understand the wider picture or to maintain consistency over the course of lengthy talks. Enhancing the model's ability to comprehend and remember meaning over extended material segments is an ongoing issue that has to be resolved.

xvi. Accuracy of the information

Content generated by ChatGPT and other AI language models could be erroneous or untrustworthy. Ensuring that the generated content is legitimate and consistent with the provided data is a major issue, particularly in applications where accurate facts are essential, such as news articles, educational programs, or medical care. The AI research community will be able to improve the efficacy, precision, and usefulness of language models, such as ChatGPT, by tackling these problems. This will open the door for the creation of more sophisticated and moral AI-driven applications in a variety of sectors.

X. CURRENT PATTERN

ChatGPT is encountering new kinds of difficulties as its user base continues to expand. Students who choose ChatGPT's conveniences over traditional education can contribute to the advancement of AI and boost its future use for customers. The influence of ChatGPT will also be seen in the sphere of educational technology. Through ChatGPT, a number of educational technology businesses are now giving students the opportunity to ask questions, get their questions answered, and get a basic understanding of a subject[1].

Despite several problems, ChatGPT will be helpful in real-world situations. For this reason, companies are eager to use it in order to profit. AI will soon be able to identify which students will benefit most from working with which teachers. The complex mix of fear, astonishment, optimism,

anxiety, and worry that defines our society's reactions to the rapidly growing AI ecosystem necessitates careful thinking while creating new AI applications.

i. Combining robots and computer vision

When ChatGPT is used in conjunction with other AI fields like robotics and computer vision, its potential is maximised. Human interaction with technology can be revolutionized by intelligent and interactive AI systems that fuse the language capabilities of ChatGPT with the physical and perceptual capabilities of computer vision and bots [7]. Imagine a day in the future when you can speak with a robot that can assist you with housekeeping or grocery shopping, or with a home automation system that allows you to control the lights, temperature, and other devices while conversing in your native tongue. The convergence of AI technologies will result in two things: improved natural language generation and a more seamless and intuitive user experience [8]. This will enable ChatGPT to become increasingly adept at navigating the subtleties of human interaction.

ii. Integrating with IoT

With possible uses ranging from healthcare technology to urban planning to robots and customer service, ChatGPT and IoT have a lot of room to expand. Furthermore, combining ChatGPT with IoT is a remarkable combo that is changing how people interact with technology and has the potential to drastically improve our quality of life in the years to come [3].

a. Threat to cybersecurity

With the desire for creative AI chatbots growing worldwide, hackers are using ChatGPT-themed traps to spread malware across Facebook, Instagram, and WhatsApp. Facebook's parent company, Meta, published a study on the spread of malware across its many platforms that poses as ChatGPT [13]. Using ChatGPT, the company's security experts have found ten different varieties of malware that have been attacking users' devices since March 2023.

XI. CHALLENGES

These are some of the limitations as confirmed by OpenAI. ChatGPT occasionally generates replies that seem plausible but are incorrect or nonsensical. The reasons this problem is hard to solve are as follows:

(1) RL training does not currently have a source of truth,

(2) Training the model to be more cautious leads to it rejecting questions that it can answer correctly,
(3) Supervised training leads to model misinterpretation because the optimal response relies on the model's knowledge rather than that of the human demonstrator.

In addition to the difficulties listed by OpenAI, the following issues should be taken into account when utilizing ChatGPT.

- A learner's creative attitude will be hindered by reliance on the ChatGPT algorithm.
- There is no citation or reference provided for the findings generated by ChatGPT, which raises the possibility of plagiarism.
- Learners may receive inaccurate replies.
- Limited outcomes with a narrow range of answers to some of the queries posed.

Changes in the input phrase or several tries at the same question are easily detected by ChatGPT. For instance, the model could argue it is ignorant when asked a question in its original form, but it can correctly answer when it is asked in a different way.

The model frequently employs a lot of words and overuses certain phrases, such "openAI-trained language model," repeatedly. These issues arise from well-known over-optimization concerns as well as biases in the training data (trainers favor longer replies that appear more comprehensive)[7].

The model ought to provide clarifying questions in response to a user's ambiguous query. Rather, our current models frequently deduce the user's intent.

Despite efforts to have the model reject wrong requests, it occasionally exhibits biased behavior or reacts negatively to instructions. To warn against or prohibit particular types of harmful content, OpenAI is using the Moderation API; nevertheless, for the time being, we expect some false positives and negatives.

XII. CONCLUSION

There is potential for ChatGPT and other AI Large Language Models (LLMs) to be useful tools for research and teaching. ChatGPT is a cutting-edge large language model that can produce almost identical text for any natural language question and carry on human-like conversations. The model may be used to study programming, compose essays, solve puzzles, clarify difficult subjects, give virtual tuition, practise languages, and answer questions. It can also be used to educate and assist research. In addition, the

ChatGPT paradigm may be used to non-technical topics like language and literature as well as technical ones like computer programming and engineering. The results of our experiments and surveys demonstrate the value of ChatGPT for research and education in addition to programming instruction. But although though ChatGPT is an effective tool that may produce outstanding answers on a wide range of subjects, it still has certain drawbacks, including a lack of common sense, the possibility of prejudice, trouble with sophisticated thinking, and an inability to comprehend visual information. When utilizing ChatGPT, it's critical to be aware of its limits and not to rely solely on it. Furthermore, the ethical ramifications of ChatGPT are intricate and multidimensional, warranting serious consideration. These include issues related to prejudice and discrimination, privacy and security, technological misuse, responsibility, transparency, and societal effect.

Despite all of the challenges and obstacles, we think that the dangers mentioned may be adequately controlled and should be taken into consideration in order to provide consistent and fair access to Large Language Models for research and teaching.

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