

RESEARCH ARTICLE

From ChatGPT-3 to GPT-4: A Significant Advancement in AI-Driven NLP Tools

Md. Saidur Rahaman*¹ | M. M. Tahmid Ahsan² | Nishath Anjum³ | Harold Jan R. Terano⁴ | Md. Mizanur Rahman⁵

¹Metropolitan University Sylhet, Bangladesh

²Shahjalal University of Science and Technology Sylhet, Bangladesh

³Metropolitan University Sylhet, Bangladesh

⁴Camarines Sur Polytechnic Colleges Camarines Sur, Philippines

⁵BRAC University Dhaka, Bangladesh

Correspondence

*Corresponding Author.

Email: saidur@metrouni.edu.bd

Abstract

Recent improvements in Natural Language Processing (NLP) have led to the creation of powerful language models like Chat Generative Pre-training Transformer (ChatGPT), Google's BARD, and Ernie, which has shown to be very good at many different language tasks. But as language tasks get more complicated, having even more advanced NLP tools is essential nowadays. In this study, researchers look at how the latest versions of the GPT language model (GPT-4 & 5) can help with these advancements. The research method for this paper is based on a narrative analysis of the literature, which makes use of secondary data gathered from previously published studies, including articles, websites, blogs, and visual and numerical facts, etc. The findings of this study revealed that GPT-4 improves the model's training data, the speed with which it can be computed, the flawless answers that it provides with, and its overall performance. This study also shows that GPT-4 does much better than GPT-3.5 at translating languages, answering questions, and figuring out how people feel. The study provides a solid basis for building even more advanced NLP tools and programs like GPT-5. The study will help AI & LLM researchers, NLP developers, and academicians in exploring more into this particular field of study. As this is the first kind of research comparing two NLP tools, therefore researchers suggested going for quantitative research in the near future to validate the findings of this research.

KEYWORDS:

AI, ChatGPT-3, GPT-4, GPT-5, Google's BARD, LLM, NLP

1 | INTRODUCTION

"ChatGPT-3 to GPT-4 and beyond

A step forward that makes us wants more.

AI-powered NLP tools that don't get old,

Significant steps forward that we can't ignore- Md. Saidur Rahaman and ChatGPT"

Natural Language Processing (NLP), a subfield of Artificial Intelligence (AI), is an increasingly popular field in technology, big data, and machine learning (Juhn & Liu, 2020 [1]; Jiang & Lu, 2020 [2]). NLP entails complicated techniques for teaching

machines to interpret and analyze human language, allowing them to execute tasks such as translation, sentiment analysis, and text summarisation (Khurana et al., 2023 [3]). Many NLP tools compete to be the greatest human assistant, and many prominent technology companies are attempting to build their tools to win market shares, such as ChatGPT (OpenAI), BARD (Google), and Ernie (Baidu) (Rahaman et al., 2023 [4]; Tiwari, 2023 [5]). Among them, the development of the GPT, expanded as Generative Pre-trained Transformer models by OpenAI, was one of the most significant accomplishments in this industry (Rahaman et al., 2023 [4]). One thing to remember is that this model is built on the neural network's deep learning model to produce a coherent and meaningful response. GPT-4, the newest version, was released for consumers in March 2023 with new and exciting features. Researchers assume that this release has set the tone for a journey that will alter the AI experience. By introducing ChatGPT-3 in November 2022, OpenAI has already captured the interest of the whole tech industry. Everyone is excited to see what GPT-4, their forthcoming NLP sensation, has in store for them (Hughes, 2023 [6]). Finally, it is available; this review paper will concentrate on the advanced features and capabilities of this version of the AI Chatbot (GPT-4). The general people believe GPT-4 will be the gold standard in the NLP-based chatbot sphere, and their abilities will propel them to this position. It has elevated the version to the most potent NLP tool available. GPT-4's capabilities have recently been investigated in various applications, including text completion, summarisation, and translation (Hughes, 2023 [6]). These modifications would result in a significant improvement in its performance and NLP (Rahaman et al., 2023 [4]). This research examines the advancements in AI-driven NLP tools from ChatGPT-3 to GPT-4 and the significant advancements in the coming days. Overall, the research may contribute to a better understanding of cutting-edge NLP tools, such as GPT-4 but not limited to GPT-5 or even BARD & Ernie, and their potential impact on diverse applications, paving the way for further advancements in AI-driven NLP tools.

2 | NATURAL LANGUAGE PROCESSING: ADVANCEMENT AND LIMITATIONS

The natural language processing (NLP) branch of artificial intelligence focuses on using natural language in computer-human interaction. (Aladakatti et al., 2023 [7]). It entails the creation of models and algorithms that let computers comprehend, analyze, and synthesize human language (Raina et al., 2022 [8]). NLP has become increasingly important as the amount of textual material on the internet rises and the requirement to understand it does (Wolf et al., 2020 [9]; Otter et al., 2019 [10]). These models acquire human language and perform numerous linguistic tasks with astounding precision by utilizing vast volumes of data. GPT-3, GPT-4, and other models have learned linguistic patterns from billions of tokens (Bang et al., 2023 [11]). By transferring knowledge from one task to another, transfer learning enables models to learn concepts more quickly. Text categorization and sentiment analysis can benefit from the expertise of a language modelling model. Models have been able to do tasks for which they have not been trained, thanks to zero-shot and few-shot learning techniques. A model's adaptability and versatility increase when it can do a new task without further training data (Fitria, 2023 [12]). Multimodal models (GPT-4) may produce voice and video explanations and tag images. Model architecture enhancements, deep learning-based models, pre-training on enormous quantities of data, transfer learning, zero-shot, and few-shot learning techniques, and more have contributed significantly to recent natural language processing (NLP) achievements (Frackiewicz, 2023 [13]). Nevertheless, it has several drawbacks, including bias from the training data, a lack of common sense and full awareness, and the inability to reason as humans do. Furthermore, using and practicing with it requires a lot of computer power. More study and development in AI-driven natural language processing (NLP) tools are necessary to meet these problems. NLP technologies are already in use and have the potential to alter how people interact with computers (Ahmed & Wahed, 2020 [14]). Modern NLP technologies, despite their drawbacks, are a substantial advancement in AI-driven natural language processing and have the power to change the field of human-computer interaction fundamentally.

3 | RESEARCH METHODOLOGY

This paper uses secondary data from articles, websites, blogs, and visual and numerical facts to conduct a narrative literature analysis. This narrative literature review summarizes and evaluates relevant literature utilizing archive information from the research collected (Ventresca & Mohr, 2017 [15]). Researchers conduct a narrative review to identify unsolved questions, intriguing new research avenues, and discrepancies. Based on literature reviews, research subjects, and conceptual frameworks can be generated, enlarged, or confined (Coughlan et al., 2007 [16]). Our research methodology flowchart is below.

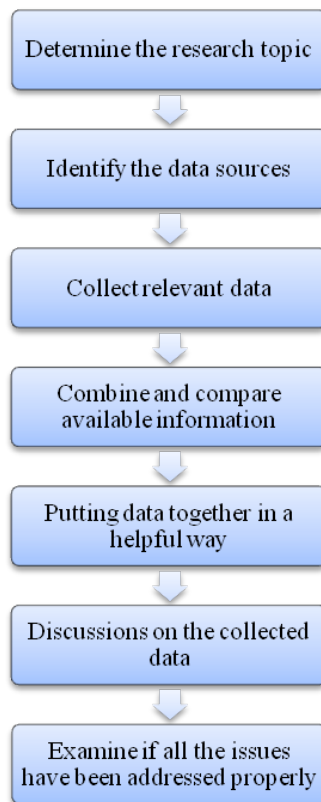


FIGURE 1 Research Process (Authors' own creation)

3.1 | Data Collection

Before gathering data, the researchers reviewed ChatGPT-3 and GPT-4 literature. Systematic research was conducted to ensure complete and relevant data. This study gathers ChatGPT-3 and GPT-4 data from academic papers, technical reports, web articles, and other sources. Researchers searched for relevant papers from Google Scholar, IEEE Xplore, ACM Digital Library, SSRN, and arXiv. "ChatGPT-3," "GPT-4," "AI-driven NLP tools," "Natural Language Processing," and others are searched. Online forums, communities, and social media sites provided further data. These documents can illuminate ChatGPT-3 and GPT-4's public perspectives, applications, and limitations.

3.2 | Data Analysis

The research data analysis plan qualitatively assessed the data. The performance, limits, and applications of ChatGPT-3 and GPT-4 were analysed using an analysis of themes. Data analysis began with organizing and cleaning the data. The data was stored in a database or spreadsheet with information on its origin, creation date, and relevance to our research themes. To simplify the analysis, we grouped data by origin. Finally, the data was briefly analyzed for themes or trends. The researcher did not use NVivo, Atlas, or MAXQDA to analyze data. Searching for data themes and patterns evaluated ChatGPT-3 and GPT-4's architecture, performance, and restrictions. After identifying the main issues, we investigated their relationships. The data were carefully examined for ChatGPT-3 and GPT-4 themes and patterns. This shows AI-driven NLP tool enhancements and limitations.

4 | FINDINGS OF THE STUDY

The most recent iteration of Generative Pre-trained Transformer (GPT) models is a shining example of how natural language processing (NLP) technologies have advanced significantly as a result of advances in artificial intelligence (AI). While ChatGPT-3 is an innovative tool, it is anticipated that GPT-4 will represent a significant progression in AI-driven NLP tools (Bubeck et

al., 2023 [17]). In this discussion, the researchers investigate the potential improvements that GPT-4 offers over its predecessor. The GPT-4 architecture is anticipated to be among the most significant innovations in the history of the NLP-based chatbots (Nori et al., 2023 [18]). GPT-3 is one of the most potent NLP models available till the emergence of the GPT-4, with 175 billion parameters in its design alone. GPT-4 is anticipated to have additional capabilities, enabling it to perform more challenging tasks (Rahaman et al., 2023 [4]). It is also anticipated that GPT-4 will feature other architectural advancements that will increase the precision and efficacy of its language processing duties (Peng et al., 2023 [19]). The ability of GPT-4 to comprehend context is another area in which it is anticipated to thrive. ChatGPT-3 can answer questions based on the instructions well, but it has limitations in understanding the contents clearly (Rahman et al., 2023 [20]). GPT-4 should be able to get around this problem by figuring out what's going on and giving more acceptable and allowed answers. Teebagy et al. (2023) [21] say that GPT-4 should also improve text recognition, completion, and language modeling.

To achieve these improvements, more sophisticated algorithms and more extensive training data will be used. It is anticipated that GPT-4 will be more applicable to various applications, including chatbots and virtual assistants, due to its capacity for more complex duties. It is also anticipated that GPT-4 will make significant strides in reducing response bias. GPT-4 is anticipated to resolve the criticisms against ChatGPT-3 for producing responses with a slant toward specific groups or demographics (Capelouto, 2023 [22]). GPT-4 will be able to generate more inclusive and equitable results if it is trained on a more diverse dataset and its programming incorporates ethical considerations (Teebagy et al., 2023 [21]). GPT-4 is anticipated to represent a significant advancement in AI-driven NLP tools, with improvements in design, context comprehension, performance, and bias reduction (Capelouto, 2023 [22]). It will be fascinating to observe the development of this technology over time, as it will enhance the effectiveness and efficiency of GPT-4 in a variety of applications. The following advancement can be achieved through the advancement of NLP tools focusing on GPT-4.

4.1 | ChatGPT-4 Performance: Human Intelligence and Knowledge Tests

There are some significant improvements in ChatGPT-4 in the scores of the exams that humans participate in (Choi et al., 2023 [23]). All these models were designed to test human intelligence and knowledge. The most recent version of GPT has improved significantly and shows a staggering performance. Exams like the LSAT or GRE are not easy at all, but GPT-4 has also shown tremendous performance in these areas, as getting a score like 332 out of 340 in the GRE is not a piece of bread for everyone (Capelouto, 2023 [22]). Only this indicator shows how this GPT model can become a strong challenger to human intelligence. Another thing to be noted, namely, is that the ability of ChatGPT-4 to answer the multiple-choice questions is quite spectacular (Choi et al., 2023 [23]). This is going to be an exciting thing for the ones involved with it.

“It may come as a shock to some, but the capabilities of this version actually exceed those of human intelligence in certain contexts” - Md. Saidur Rahaman

4.2 | ChatGPT-4's Truthfulness: Language Model Technological Advancement

ChatGPT-4 has made progress in providing truthful answers, where it has shown more reliability in providing truthful answers than any other previous versions of this (Oberleiter, 2023 [24]). This feature has made it easier for them to become one of the leading state-of-the-art language models, using NLP and deep learning technology to provide and generate the answers. However, there is still a long way to go, and many improvements will be made to make it perfect (Teebagy et al., 2023 [21]). The latest version is more reliable in providing accurate answers to the users (Adiguzel et al., 2023 [25]). It has significantly improved the quality of the answers. In the most recent version, this became clear that the version of ChatGPT is far ahead of other versions in terms of providing truthful answers. Even they have scored a significant amount of score in many truthfulness tests (Rudolph et al., 2023 [26]).

“ChatGPT-4 can be a game changer in artificial intelligence because of the superior language model technology that powers its unmatched honesty” - Md. Saidur Rahaman

4.3 | GPT-4 Text Scanner: Like the Human Eyes

This really is a wonderful thing; the most recent version of ChatGPT (GPT-4) can scan handwriting into text (Truly, 2023 [27]). Really, this is a scintillating ability that will make things easier for humans in so many ways if they work accurately. It will help

them save time and energy reading all the handwritten text individually and deciphering the meaning. Sometimes, it gets too complicated for human eyes to figure out the correct text from a handwritten script. In this sense, it is a helpful tool for human beings. The inclusion of this feature has made it more attractive to users. Anyone would love to have a tool like this that helps them by minimizing their difficulties in performing tasks.

“ChatGPT-4 can accurately scan handwritten scripts and transform them to text like humans”- M.M. Tahmid Ahsan

4.4 | GPT-4 is known as a Multimodal Tool

It was quite predictable that there would be some more input modes to be added to the list (Rahaman et al., 2023 [4]). This version of ChatGPT, GPT-4, will be revolutionary as it supports multiple modes, which was absent in the previous versions. Only text inputs were allowed in the previous versions of this chatbot (Bubeck et al., 2023 [17]). This would enable the users to use it more effectively, and the best outputs will satisfy the user’s demands (Truly, 2023 [27]). The users can put images and videos as input, which they were not allowed in the previous versions. The image input feature also ensures that ChatGPT-4 can be used as an image scanner, providing information regarding the image given as input. Also, the AI-based chatbot can edit the picture according to the user’s prompts. It will also increase the users’ productivity, and they can generate more constructive ideas using this tool effectively (Rangapur & Wang, 2023 [28]).

“Once it was only a unimodal tool, but now it is multimodal as images can also be given as input along with text”- M. M. Tahmid Ahsan

4.5 | GPT-4: Interview Question Maker and Respondents

Making appropriate interview questions for fewer people might be easy for an individual. However, indeed, it will be challenging for a person to ask questions to a large number of people. ChatGPT-4 can be a great assistant to those who face difficulties preparing many interview questions daily (Truly, 2023 [27]).

“Thankfully for them, ChatGPT-4 is here for their aid and making their lives a lot easier. Another notable thing is that it would save them much time, which they had to give in thinking and making interview questions”- Nishath Anjum

GPT-4 chatbot’s increased ability has ensured it can generate more intelligent questions. This feature will be highly beneficial for those trying to spend time making interview questions (Truly, 2023 [27]). It would also help the academicians in so many ways by minimizing the complexities in their activities. Even if there is another thing that can drop jaws, it can even generate the best potential answers to a question (Rahman et al., 2023 [20]). So, the answers will be in the hands of interview takers if they ever need clarification.

4.6 | ChatGPT-4 Input Capabilities: Coding Genius

Another significant change is the number of words that can be given as input. This version has a massive amount of 25000 words that can be given once as an input, which is eight times more than ChatGPT -3’s range of word input (Varghese, 2023 [29]). This has also made things easier for the users to give the chatbot more extensive text prompts and get the desired response. Also, this version of ChatGPT can be used as an AI picture generator, which can generate pictures according to the prompts given by the users (Bubeck et al., 2023 [17]). The increased character limit for input has made things more straightforward and more accessible for them (OpenAI, 2023 [30]). Again, ChatGPT-4 can be the town’s newest coding sensation. GPT-4 can be lightning-fast in generating codes as they use artificial intelligence. After the evolution of this splendid tool, it has already been noticed that there is a significant decrease in the number of job openings in this sector (Zarifhonarvar, 2023 [31]).

“Get ready to witness the coding revolution with ChatGPT-4, which is set to redefine how to interact with technology” - Md. Saidur Rahaman

4.7 | ChatGPT-4 Understand Complex Inputs: More Secured, Well Shielded

Among the new features of ChatGPT-4 is its astonishing ability to understand complex and nuanced prompts given by the users. GPT 4 exhibits human-level performance on various professional and academic benchmarks (OpenAI, 2023 [30]). Even GPT can generate responses more like humans as they can be more natural in generating responses to make it more human-like. This version of ChatGPT is much more secure than preceding any other version. As this version uses an expanded version of NLP and LLM, there is little risk of this version getting crashed (Liu et al., 2023). This version's virus and threat protection ability is quite remarkable and is really a side that gives satisfaction to the ones more concerned with this matter (Truly, 2023 [27]).

“Regarding technology, everyone prefers to utilize a product that is as safe as possible. GPT-4’s security features will ultimately boost the bot’s user base”-Md. SaidurRahaman

4.8 | Improved Deep Learning

One of the core features of the previous versions of ChatGPT is its profound learning ability. But GPT-4 can use deep learning technology more efficiently, surpassing the earlier version of it by a long way (Peng et al., 2023 [19]). Another big plus point of this version is that the usage of artificial neural networks has increased remarkably, which helps improve writing ability like human beings. It uses various sources and domains to provide an accurate response (OpenAI, 2023 [30]). This ability enables the chatbot to get into the groove quickly and create a strong base for itself among the people who use it (Nori et al., 2023 [18]).

“This GPT-4 has certainly gained popularity. That’s because every performance improves the NLP”-M.M. Tahmid Ahsan

4.9 | Diversified Range of Language Accuracy

In the previous versions of ChatGPT, a good performance in other language recognition and answering following the prompts being given in those languages has been displayed, and the run continues with this version as well (Varghese, 2023 [29]). The performance of ChatGPT-4 in a variety of languages exhibits that this version's ability to improve accuracy in these languages has increased tremendously (OpenAI, 2023 [30]). One example can be given with the accuracy in English, where it was 70.1% in GPT 3.5 and 85.5% in GPT 4 (Goncharenko, 2023 [32]). GPT-4 providing insightful answers to queries is another critical feature of this version, making the tasks much easier for the users.

“There is conclusive evidence that there has been a significant leap forward in terms of performance with GPT-4.” - Md. Saidur Rahaman

4.10 | Increased Ability to deliver Answers in a Shorter Time Frame

The preceding version of ChatGPT (GPT-3.5) has already made a considerable reputation for generating quick, accurate answers in seconds (OpenAi, 2023 [30]). There is another significant thing that this version of ChatGPT has made sure that it is different from all its preceding versions in terms of getting slow or crashing completely when there is a high traffic of users. This makes users more comfortable using it (Peng et al., 2023 [19]). Indeed, this will increase the popularity of this version among its users of it over time.

“The users will expect an even faster response from the latest versions of ChatGPT”- Md. Saidur Rahaman

5 | DISCUSSION OF THE STUDY

Since November 2022, the whole world has been experiencing a large tech storm, and the creator of that storm is; OpenAI, the firm that works on the development of the AI ran tools and has been engaged in this field since its formation (Roose, 2023 [33]). It has already been experienced that GPT-3.5 (which runs the ChatGPT-3) was the most advanced NLP model in the series (Kosinski, 2023 [34]). It has showcased a stellar performance with the help of impressive capabilities in generating coherent and human-like responses to text-based prompts that the users have given. As the anticipated release of GPT-4 has come into

a reality, it is essential to study the advancements and capabilities of these two GPT models (Nori et al., 2023 [18]). Some significant changes are coming up in this version to ensure the continuity of the improvement process. Everyone knows that the newest version is the most powerful one and can go beyond users' expectations towards this version (Teebagy et al., 2023 [21]). It has exceeded the preceding version not by a narrow margin; there was a considerable margin, to be precise. In all aspects, ChatGPT-4 has crossed the previous version.

Another thing is that the ChatGPT-3 was the best tool that provides text responses to the users. The architectural base of this is GPT-3.5. Furthermore, for generating these responses, they use the NLP model, making it capable of providing the recipe for making a Pizza, or even for the people who are so busy with their lives, writing smart email replies for them, which saves much time for them and eases the things in so many ways (Thiergart et al., 2021 [35]). As the ChatGPT-4 is a relatively new concept, more about its exciting features will emerge as time progresses. Despite the ChatGPT-3 having shown some jaw-dropping capabilities with text and language manipulation, making itself a wizard among NLP-based text response-generating tools, it has some limitations as well (Shahriar & Hayawi, 2023 [36]). These limitations are like ChatGPT cannot fully generate responses like human beings. Also, it cannot provide fully accurate information regarding world events after 2021 (Truly, 2023 [27]). There have also been some other limitations like it cannot generate a full humanoid suggestion in some cases (Wang, 2023 [37]). The lack of valid information was another issue, but this issue was fixed by the developers in the last version. These are the factors that ChatGPT-4 has overcome, and they have shown a tremendous ability to build this version as a stronger one than all preceding versions (Peng et al., 2023 [19]).

There is no surprise that the newer versions consistently surpass the previous ones. These models are upgraded only to remove flaws and inefficiencies. These upgrades make things more efficient and user-friendly and ensure that new things are also being added to the list of features. Another significant thing about the GPT-4 is its ability to perform tests like LSAT and GRE effectively and, sometimes, more efficiently than human beings (Capelouto, 2023 [22]). Another notable change the users can experience is the number of words that can be given as input. This version has a massive amount of 25000 words that can be given once as an input, which is eight times more than ChatGPT -3's range of word input (Hughes, 2023 [6]). There are some more mind-blowing features to be introduced to the people by the ChatGPT-4. The users will be allowed to upload pictures to this and make commands to change or edit them or give the command to generate an image, which will generate them into an image (Arya, 2023 [38]). Also, it has been reported that this version can provide information about world events after 2021. Moreover, another notable difference is that this version of ChatGPT is multimodal; it can operate things in multiple modes. Meanwhile, ChatGPT-3 was confined to only one mode, which is; Text mode (Rotman, 2023 [39]). This multimodal tool will be an excellent tool to assist humans. One more thing makes the GPT-4 more efficient: it underwent so many tests in the laboratory, and all the weaknesses are carefully examined and amended (Peng et al., 2023 [19]). In conclusion, both GPT models have been representing the development of this NLP system. The models show remarkable capabilities in generating coherent and human-like responses to text-based prompts. The release of GPT-4 is an important and notable milestone in the field; it will help reshape the area of using artificial intelligence to generate responses for the users' aid (Rotman, 2023 [39]). This tool has all the abilities and potential to become the best virtual assistant to humans.

6 | IMPLICATIONS OF THE STUDY

The purpose of this research is to assess the development of natural language processing (NLP) since the release of GPT-4, the updated version of the widely used GPT-3 artificial intelligence (AI) language model. The study discusses the recent developments and enhancements to NLP software, which may have far-reaching implications for sectors as diverse as customer service, finance, healthcare, and education. The research may also shed light on other potential applications for GPT-4, such as the development of smarter and more personable chatbots, virtual assistants, machine translators, and language models for assessing and predicting text. As a result of this research, natural language processing (NLP) technology may become more well-understood, which may also result in the developing of innovative NLP-based applications and solutions in various sectors.

7 | LIMITATIONS AND WAY TO FUTURE

There may not be enough data for the study, also might be biased, and there are ethical concerns regarding the use of AI-driven NLP tools. These issues may affect the study's precision, applicability, and generalizability, as well as its applicability in various disciplines. Therefore, the researchers must recognize and address these limitations appropriately to ensure the study's

validity and reliability. Future NLP and AI research could improve GPT-4's performance, allow it to use multiple languages, consider ethics, integrate it with other AI technologies, and improve the user experience. These fields of study could lead to more intelligent, more powerful AI-driven systems that could impact healthcare, education, banking, and customer service. To maximize AI-driven NLP tools' potential, academics must continue to study these topics.

8 | CONCLUSION

In conclusion, much progress has been made in recent years in developing natural language processing (NLP) tools that use artificial intelligence (Rahaman et al., 2023 [4]). The rise of advanced language models like ChatGPT-3 has shown how AI can change how we talk to machines and how people interact. Nevertheless, as the need for more complex language models grows, there is a need for models that are even more powerful. When GPT-4 comes out, it should take AI-powered NLP tools to the next level. With GPT-4's improvements, people and machines should be able to interact in a way that is even more natural and human-like. This will make communication easier and help people make better decisions. As AI technology keeps improving, it seems there are no limits to what NLP tools can do. NLP tools can be used for many things, from helping businesses improve customer engagement and satisfaction to improving language-based research. Even it tremendously serves the academicians as it helps them in many academic activities (Rahman et al., 2023 [20]). It is exciting to see how far this field has come, and we can expect language models to get brighter in the future. One thing is for sure, these chatbots have come to make a revolutionary change to our day-to-day lifestyle. Also, in the upcoming days, many more beautiful things will be a delightful experience for people who love technology and related things. Moreover, the AI-based tools industry is proliferating; as a result, many new beautiful things are on the list of entering. That would be an absolute delight for tech-loving people. But, people must have to be tech-savvy.

“Being tech-savvy is not just about keeping up with the latest gadgets and software, it’s about equipping ourselves with the knowledge and skills to navigate a world that’s becoming increasingly interconnected and digital” - (Md. Saidur Rahaman & ChatGPT, 2023)

9 | ACKNOWLEDGMENT

The researcher would like to acknowledge the following individuals and organizations for their contribution and support in making this research possible.

Funding Statement: The authors did not receive any funds for this research.

Conflict of Interest: The authors declare that they have no competing interests.

Data availability Statement: Not applicable as the data has been taken from secondary sources.

Ethical Consideration: The researchers assumed that the participation of any organization in this study would not compromise the confidentiality of their data. However, we will not utilize these data for anything other than academic study. Despite this, we will not be required to obtain ethical clearance to gather and analyze data from previously published studies in which prominent researchers have informed authorization. When preparing a paper, however, the researcher is aware that etiquette, fraudulent publication, plagiarizing and publishing twice, authorship, and potential conflicts of interest are all important factors to consider.

Authors' contributions: First and second authors focused on the conceptualization, organization, discussions, and referencing of the study. The third, fourth, and final authors were editing and proofreading, and submission of the manuscript to improve the quality of the paper.

References

- [1] Y. Juhn and H. Liu, “Artificial intelligence approaches using natural language processing to advance EHR-based clinical research,” *Journal of Allergy and Clinical Immunology*, vol. 145, no. 2, pp. 463–469, Feb. 2020. [Online]. Available: <https://linkinghub.elsevier.com/retrieve/pii/S0091674919326041>

- [2] K. Jiang and X. Lu, "Natural Language Processing and Its Applications in Machine Translation: A Diachronic Review," in *2020 IEEE 3rd International Conference of Safe Production and Informatization (IICSPI)*. Chongqing City, China: IEEE, Nov. 2020, pp. 210–214. [Online]. Available: <https://ieeexplore.ieee.org/document/9332458/>
- [3] D. Khurana, A. Koli, K. Khatter, and S. Singh, "Natural language processing: state of the art, current trends and challenges," *Multimedia Tools and Applications*, vol. 82, no. 3, pp. 3713–3744, Jan. 2023. [Online]. Available: <https://link.springer.com/10.1007/s11042-022-13428-4>
- [4] M. S. Rahaman, M. M. T. Ahsan, N. Anjum, M. M. Rahman, and M. N. Rahman, "The AI Race is on! Google's Bard and OpenAI's ChatGPT Head to Head: An Opinion Article," Rochester, NY, Feb. 2023. [Online]. Available: <https://papers.ssrn.com/abstract=4351785>
- [5] N. Tiwari, "Ernie Bot vs. ChatGPT: A Comparative Analysis of AI-Language Models," Mar. 2023. [Online]. Available: <https://www.analyticsvidhya.com/blog/2023/03/ernie-bot-vs-chatgpt-a-comparative-analysis-of-ai-language-models/>
- [6] A. Hughes, "ChatGPT: Everything you need to know about OpenAI's GPT-4 tool." [Online]. Available: <https://www.sciencefocus.com/future-technology/gpt-3/>
- [7] S. S. Aladakatti and S. Senthil Kumar, "Exploring natural language processing techniques to extract semantics from unstructured dataset which will aid in effective semantic interlinking," *International Journal of Modeling, Simulation, and Scientific Computing*, vol. 14, no. 01, p. 2243004, Feb. 2023. [Online]. Available: <https://www.worldscientific.com/doi/10.1142/S1793962322430048>
- [8] V. Raina and S. Krishnamurthy, "Natural Language Processing," in *Building an Effective Data Science Practice*. Berkeley, CA: Apress, 2022, pp. 63–73. [Online]. Available: https://link.springer.com/10.1007/978-1-4842-7419-4_6
- [9] T. Wolf, L. Debut, V. Sanh, J. Chaumond, C. Delangue, A. Moi, P. Cistac, T. Rault, R. Louf, M. Funtowicz, J. Davison, S. Shleifer, P. von Platen, C. Ma, Y. Jernite, J. Plu, C. Xu, T. Le Scao, S. Gugger, M. Drame, Q. Lhoest, and A. Rush, "Transformers: State-of-the-Art Natural Language Processing," in *Proceedings of the 2020 Conference on Empirical Methods in Natural Language Processing: System Demonstrations*. Online: Association for Computational Linguistics, Oct. 2020, pp. 38–45. [Online]. Available: <https://aclanthology.org/2020.emnlp-demos.6>
- [10] D. W. Otter, J. R. Medina, and J. K. Kalita, "A Survey of the Usages of Deep Learning in Natural Language Processing," Dec. 2019, arXiv:1807.10854 [cs]. [Online]. Available: <http://arxiv.org/abs/1807.10854>
- [11] Y. Bang, S. Cahyawijaya, N. Lee, W. Dai, D. Su, B. Wilie, H. Lovenia, Z. Ji, T. Yu, W. Chung, Q. V. Do, Y. Xu, and P. Fung, "A Multitask, Multilingual, Multimodal Evaluation of ChatGPT on Reasoning, Hallucination, and Interactivity," Feb. 2023, arXiv:2302.04023 [cs]. [Online]. Available: <http://arxiv.org/abs/2302.04023>
- [12] T. N. Fitria, "Artificial intelligence (AI) technology in OpenAI ChatGPT application: A review of ChatGPT in writing English essay," *ELT Forum Journal of English Language Teaching*, vol. 12, pp. 44–58, Mar. 2023.
- [13] M. Frackiewicz, "OpenAI and Its Role in the Evolution of Natural Language Processing – TS2 SPACE," 2023. [Online]. Available: <https://ts2.space/en/openai-and-its-role-in-the-evolution-of-natural-language-processing/>
- [14] N. Ahmed and M. Wahed, "The De-democratization of AI: Deep Learning and the Compute Divide in Artificial Intelligence Research," Oct. 2020, arXiv:2010.15581 [cs]. [Online]. Available: <http://arxiv.org/abs/2010.15581>
- [15] M. Ventresca and J. Mohr, "Archival Research Methods," Jan. 2002, pp. 805–828.
- [16] M. Coughlan, P. Cronin, and F. Ryan, "Step-by-step guide to critiquing research. Part 1: quantitative research," *British Journal of Nursing*, vol. 16, no. 11, pp. 658–663, Jun. 2007. [Online]. Available: <http://www.magonlinelibrary.com/doi/10.12968/bjon.2007.16.11.23681>
- [17] S. Bubeck, V. Chandrasekaran, R. Eldan, J. Gehrke, E. Horvitz, E. Kamar, P. Lee, Y. T. Lee, Y. Li, S. Lundberg, H. Nori, H. Palangi, M. T. Ribeiro, and Y. Zhang, "Sparks of Artificial General Intelligence: Early experiments with GPT-4," Apr. 2023, arXiv:2303.12712 [cs]. [Online]. Available: <http://arxiv.org/abs/2303.12712>

- [18] H. Nori, N. King, S. M. McKinney, D. Carignan, and E. Horvitz, “Capabilities of GPT-4 on Medical Challenge Problems,” Apr. 2023, arXiv:2303.13375 [cs]. [Online]. Available: <http://arxiv.org/abs/2303.13375>
- [19] B. Peng, C. Li, P. He, M. Galley, and J. Gao, “Instruction Tuning with GPT-4,” Apr. 2023, arXiv:2304.03277 [cs]. [Online]. Available: <http://arxiv.org/abs/2304.03277>
- [20] M. Rahman, H. J. R. Terano, N. Rahman, A. Salamzadeh, and S. Rahaman, “ChatGPT and Academic Research: A Review and Recommendations Based on Practical Examples,” *Journal of Education, Management and Development Studies*, vol. 3, no. 1, pp. 1–12, Mar. 2023. [Online]. Available: <https://journals.cspc.edu.ph/index.php/jemds/article/view/175>
- [21] S. Teebagy, L. Colwell, E. Wood, A. Yaghy, and M. Faustina, “Improved Performance of ChatGPT-4 on the OKAP Exam: A Comparative Study with ChatGPT-3.5,” *Ophthalmology*, preprint, Apr. 2023. [Online]. Available: <http://medrxiv.org/lookup/doi/10.1101/2023.04.03.23287957>
- [22] J. Capelouto, “Here’s how GPT-4 scored on the GRE, LSAT, AP English, and other exams | Semafor,” 2023. [Online]. Available: <https://www.semafor.com/article/03/15/2023/how-gpt-4-performed-in-academic-exams>
- [23] J. H. Choi, K. E. Hickman, A. Monahan, and D. B. Schwarcz, “ChatGPT Goes to Law School,” *SSRN Electronic Journal*, 2023. [Online]. Available: <https://www.ssrn.com/abstract=4335905>
- [24] A. Oberleiter, “ChatGPT 4& AI: The Truth! and a Practical Chat GPT guide,” Apr. 2023. [Online]. Available: <https://www.udemy.com/course/chatgpt-programming-and-social-media-marketing-with-chatgpt/>
- [25] T. Adiguzel, M. H. Kaya, and F. K. Cansu, “Revolutionizing education with AI: Exploring the transformative potential of ChatGPT,” *Contemporary Educational Technology*, vol. 15, no. 3, p. ep429, Jul. 2023. [Online]. Available: <https://www.cedtech.net/article/revolutionizing-education-with-ai-exploring-the-transformative-potential-of-chatgpt-13152>
- [26] J. Rudolph, S. Tan, and S. Tan, “ChatGPT: Bullshit spewer or the end of traditional assessments in higher education?” *Journal of Applied Learning & Teaching*, vol. 6, no. 1, Jan. 2023. [Online]. Available: <https://journals.sfu.ca/jalt/index.php/jalt/article/view/689>
- [27] A. Truly, “GPT-4: how to use, new features, availability, and more,” Apr. 2023. [Online]. Available: <https://www.digitaltrends.com/computing/chatgpt-4-everything-we-know-so-far/>
- [28] A. Rangapur and H. Wang, “ChatGPT-Crawler: Find out if ChatGPT really knows what it’s talking about,” Apr. 2023, arXiv:2304.03325 [cs]. [Online]. Available: <http://arxiv.org/abs/2304.03325>
- [29] A. Varghese, “GPT-4: Everything about the OpenAI’s newly introduced large language model,” Mar. 2023. [Online]. Available: https://www.business-standard.com/article/technology/gpt-4-everything-about-the-openai-s-newly-introduced-large-language-model-123031500690_1.html
- [30] OpenAI, “GPT-4 Technical Report,” Mar. 2023, arXiv:2303.08774 [cs]. [Online]. Available: <http://arxiv.org/abs/2303.08774>
- [31] A. Zarifhonarvar, “Economics of ChatGPT: A Labor Market View on the Occupational Impact of Artificial Intelligence,” Rochester, NY, Feb. 2023. [Online]. Available: <https://papers.ssrn.com/abstract=4350925>
- [32] V. Goncharenko, “GPT-4 Outperforms All Existing Large Language Models,” Mar. 2023. [Online]. Available: <https://mpost.io/gpt-4-outperforms-all-existing-large-language-models/>
- [33] K. Roose, “How ChatGPT Kicked Off an A.I. Arms Race,” *The New York Times*, Feb. 2023. [Online]. Available: <https://www.nytimes.com/2023/02/03/technology/chatgpt-openai-artificial-intelligence.html>
- [34] M. Kosinski, “Theory of Mind May Have Spontaneously Emerged in Large Language Models,” Mar. 2023, arXiv:2302.02083 [cs]. [Online]. Available: <http://arxiv.org/abs/2302.02083>
- [35] J. Thiergart, S. Huber, and T. Übellacker, “Understanding Emails and Drafting Responses – An Approach Using GPT-3,” Feb. 2021, arXiv:2102.03062 [cs]. [Online]. Available: <http://arxiv.org/abs/2102.03062>

- [36] S. Shahriar and K. Hayawi, "Let's have a chat! A Conversation with ChatGPT: Technology, Applications, and Limitations," Mar. 2023, arXiv:2302.13817 [cs]. [Online]. Available: <http://arxiv.org/abs/2302.13817>
- [37] J. Wang, Y. Liang, F. Meng, B. Zou, Z. Li, J. Qu, and J. Zhou, "Zero-Shot Cross-Lingual Summarization via Large Language Models," Apr. 2023, arXiv:2302.14229 [cs]. [Online]. Available: <http://arxiv.org/abs/2302.14229>
- [38] N. Arya, "GPT-4: Everything You Need To Know," 2023. [Online]. Available: <https://www.kdnuggets.com/gpt-4-everything-you-need-to-know.html>
- [39] D. Rotman, "ChatGPT is about to revolutionize the economy. We need to decide what that looks like." [Online]. Available: <https://www.technologyreview.com/2023/03/25/1070275/chatgpt-revolutionize-economy-decide-what-looks-like/>
- [40] "ChatGPT response, Prompt: Write a beautiful quote on the title: But, people must have to be tech-savvy." 2023. [Online]. Available: <https://help.openai.com/en/articles/6825453-chatgpt-release-notes>
- [41] "ChatGPT: Everything you need to know about OpenAI's GPT-4 tool." [Online]. Available: <https://www.sciencefocus.com/future-technology/gpt-3/>
- [42] Z. Liu, X. Yu, L. Zhang, Z. Wu, C. Cao, H. Dai, L. Zhao, W. Liu, D. Shen, Q. Li, T. Liu, D. Zhu, and X. Li, "DeID-GPT: Zero-shot Medical Text De-Identification by GPT-4," Mar. 2023, arXiv:2303.11032 [cs]. [Online]. Available: <http://arxiv.org/abs/2303.11032>
- [43] M. S. Rahaman, "Can ChatGPT be your friend? Emergence of Entrepreneurial Research," Rochester, NY, Feb. 2023. [Online]. Available: <https://papers.ssrn.com/abstract=4368541>

How to cite this article: Rahaman, M. S., Ahsan, M. M. T., Anjum, N., Terano, H. J. R., & Rahman, M. M. (2023). From ChatGPT-3 to GPT-4: A Significant Advancement in AI-Driven NLP Tools. *Journal of Engineering and Emerging Technologies*. Vol. 2 No. 1