

Application of artificial intelligence in the field of scientific research –chat GPT as a model-**Bouazza Abid Imene**

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imiabid324@yahoo.fr**Reçu le :** 04/09/2024**Accepté le :** 21/12/2024**Publié le :** 31/12/2024**Abstract:**

This research paper aims to show the importance of using one of the artificial intelligence applications, which is the chat GPT program in scientific research, based on the inductive approach. We found through the study that the program offers researchers many advantages in various fields by reducing the workload of researchers and to enhance various aspects of research, however the program is accompanied by major threats during its application by researchers, which is why the study recommends its use according to special caveats.

Keywords: chat GPT ; artificial intelligence ; scientific research ; program ;uses.

Jel Classification Codes : O32 ,O33 , B41.

ملخص:

تهدف هذه الورقة البحثية إلى توضيح أهمية استخدام أحد تطبيقات الذكاء الاصطناعي و هو برنامج chat GPT في البحث العلمي، و ذلك بالاعتماد على المنهج الاستقرائي ، و قد استنتجنا من خلال الدراسة أن البرنامج جيد و يقدم للباحثين العديد من المزايا في مجالات متعددة و مختلفة من خلال تقليل أعباء العمل على الباحثين و تعزيز جوانب مختلفة من البحث العلمي، إلا أن البرنامج تصاحبه تهديدات كبيرة أثناء تطبيقه من قبل الباحثين، و لهذا توصي الدراسة باستخدامه وفق محاذير خاصة.

الكلمات المفتاح: شات جي بي تي ذكاء اصطناعي ؛ بحث علمي؛ برنامج ؛ استخدامات.

تصنيف JEL: O32 ، B41 ، O33.

I. Introduction:

Modern developments at the world level have opened rapid and successive horizons in many fields, as artificial intelligence, with its diverse and distinguished applications represented in speech recognition, summarization, language translation, text creation, and other features, has become an important role for users, especially in the field of research. Scientific, and the chatGPT program, which is an abbreviation for Chat Generative Pre-trained transformer, which was developed by the artificial intelligence research company Open AI in San Francisco, is considered a modern model that works using artificial intelligence that relies on deep learning techniques, and works based on the information that has been provided to it. In advance, it interacts with users through chat to answer their inquiries in a natural, linguistic way and in a detailed manner, no matter how complex the questions are. It performs many services, including producing advanced and intelligent writings. It also works to process a huge amount of complex data, in addition to its ability to write texts. Short or summarizing video clips and other services in the field of scientific research.

In the context of the above, the following problem can be formulated :

To what extent does the GPT chat application contribute to the field of scientific research?

II. Theoretical framework of artificial intelligence

II .1 The concept of artificial intelligence :

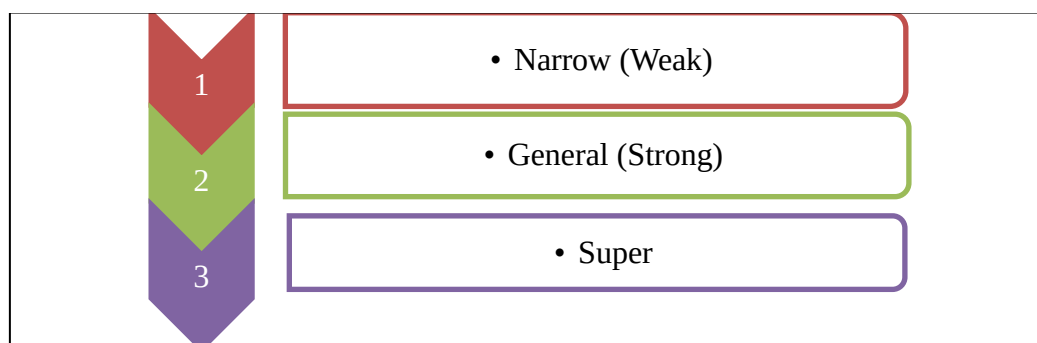
Artificial Intelligence is a way of making a computer, a computer-controlled robot, or a software think intelligently, in the similar manner the intelligent humans think. is accomplished by studying how human brain thinks, and how humans learn, decide, and work while trying to solve a problem, and then using the outcomes of this study as a basis of developing intelligent software and systems (Artificial Intelligence, p. 01).

Artificial Intelligence (AI) is the Science and Engineering domain concerned with the theory and practice of developing systems that exhibit the characteristics we associate with intelligence in human behavior, such as perception, natural language processing, problem solving and planning, learning and adaptation, and acting on the environment (Tecuci, 2012, p. 168).

Through the previous definitions, it can be said that artificial intelligence is “one of the computer sciences the modern robot is searching for advanced methods to program it to carry out actions and conclusions similar to the methods Which is attributed to human intelligence, through understanding the thorny mental processes carried out by the human mind While thinking and then translating them into equivalent mathematical operations, this increases the computer’s ability to solve the operations Barbed (Djamel, 2022, p. 175).

II .2 Types of artificial intelligence :

Fig.(01) :Types of artificial intelligence



Source : Assad Saleh Assad, Artificial intelligence : The opportunities the risks and -the reality in the Arab contries, Economic additions, p168-169.

- 1- **Narrow (weak) artificial intelligence:** It is the simplest form of artificial intelligence, and is programmed to perform specific functions within a specific environment. His behavior is considered a reaction to a specific situation, and he can only act in the conditions of his environment.
- 2- **Strong or general artificial intelligence:** It is characterized by the ability to collect information, analyze it, and accumulate experiences from the situations it acquires, which qualifies it to make independent decisions, such as self-driving cars and instant chat robots.
- 3- **Super artificial intelligence:** It seeks to emulate humans, and here we can distinguish between two basic types. The first: It attempts to understand human thoughts and emotions that affect human behavior, and it has a limited ability to social interaction. As for the second: it is a model of the theory of mind, as these models can express their internal state and predict the feelings and attitudes of others.

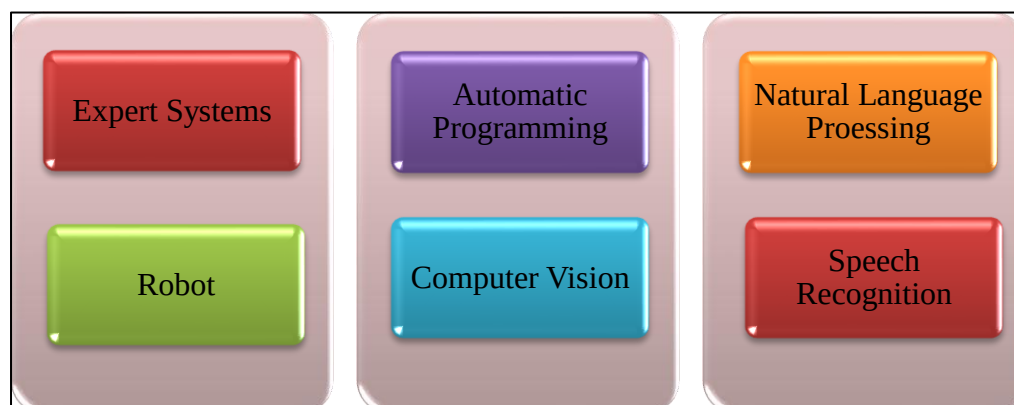
II.3 Characteristics of artificial intelligence :

Artificial intelligence has many characteristics that have made it an effective investment in many areas, which include :

- Applying artificial intelligence to devices and machines enables them to plan and analyze problems using logic ;
- Devices adopting artificial intelligence can understand and analyze inputs well to provide outputs that meet user needs with high efficiency ;
- It enables continuous learning, where the learning process is automatic and self-paced without being subject to monitoring and supervision ;
- He can process the huge amount of information he is exposed to and he can also find solutions to unfamiliar problems using his cognitive abilities ;
- It can notice similar patterns in data and analyze them more effectively than human brains.

II.4 Basic areas and applications of artificial intelligence:

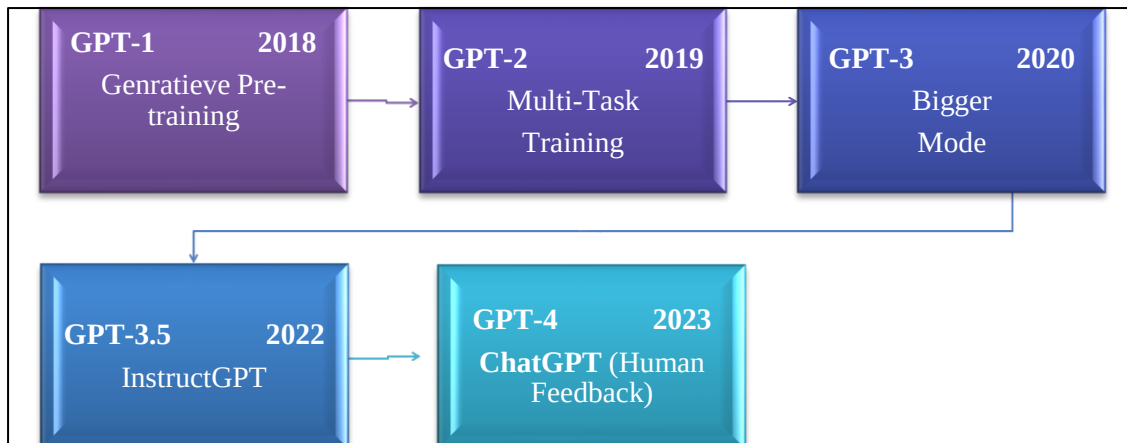
Fig.(02) : Basic areas and applications of artificial intelligence



Source : Souad Boubaha, Artificial Intelligence : Applications and Reflections, Economics of finance and business, p97-98.

III. chat GPT model :

Fig.(03) : GPT timeline from the first release to the latest release



Source : Sukhpal Singh Gill, Rupinder Kaur, chat GPT : Vision and Challenges, Internet of Things and Cyber-Physical Systems, volume 3, p 264.

➤ **GPT-1 :** It is the initial version of the GPT programming language, and it was made available to the public in 2018, when OpenAI issued a research paper entitled “Improving Language Understanding through Generative Pre-Training.” They presented this prototype along with the general concept of the pre-trained generative transformer, and the basis of the system was A transformer neural network architecture that was developed specifically for use in NLP applications such as language modeling and machine translation. GPT-1 was pre-trained on a large set of text data that includes documents, research papers, and online content, and the model was taught To predict the next word in a text string based on the words that preceded it, the huge amount of text data served as training for the model in order to improve it for certain tasks including language translation, text analysis and classification after initial training.

➤ **GPT-2 :** It is an improvement to the previous model and is considered one of the greatest language models available when it was released. It included 1.5 billion parameters and was pre-trained on the function of language modeling and they fed it with data, which is a large collection of textual resources such as books, articles, and Internet content. This model was programmed to guess what comes next in text by looking at what came before it. This model also produced longer, more coherent text sequences and showed greater generalizability across tasks and contexts. GPT-2 could be improved for a number of downstream tasks after Initial training including classifying and analyzing text as well as answering questions.

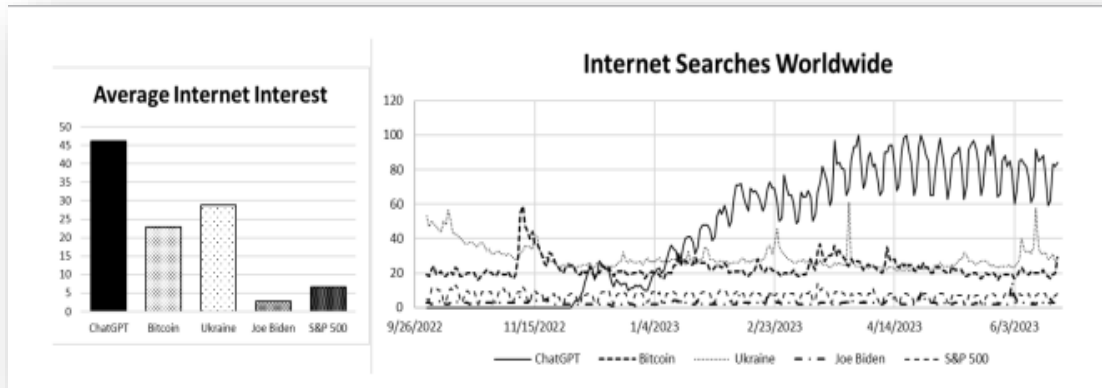
➤ **GPT-3 :** It is more important and efficient than its predecessor, with 175 billion parameters. It provides greater accuracy compared to previous versions with weak capacity, and its capacity has become superior to the NLG cell from Turing, which contains 10 billion parameters, and thus it has become the largest neural network ever produced, and It is considered better than any previous model for producing text convincing enough to appear as if it was written by a human. It processes text input to perform a variety of natural language tasks, and this model can create anything with text structure, even if it is text summaries or programming code.

➤ **GPT-3.5 :** It is a good model for completing general tasks and chat-specific tasks, and it is considered a good enough model for most needs. It has gained great popularity due to its low price, speed, and effectiveness. This model is also considered exceptional when it comes to understanding and creating text, answering questions, and performing translations. In addition, it works as a powerful means to automate and enhance various processes.

➤ **GPT-4 :** It was created recently and is considered the most distinguished language model in OpenAI, and one of the largest language models ever created, as it is rumored to contain 1 trillion parameters. It is a model capable of dealing with the input and output of text and images.

It is considered smarter and less Realistic errors compared to the previous model gives a better understanding of precise instructions. This program can handle more complex tasks and create more accurate responses. It is also considered an adept model in understanding and developing different dialects and responding to the feelings expressed in the text.

Fig.(04) :Internet searches



Source : Juan Denpere, Kennedy Modugu, Allan Heshan, The impact of chat GPT in higher education, Frontiers Education, p02.

The following figure shows the search interests of Google users using a set of indicators during the year from 2022 to 2023 in all countries of the world. It is clear from this curve that users were influenced by the artificial intelligence program chatGPT, which was launched on November 30, 2022, and continued to increase starting from the year 2023 by a percentage 112.740%. This program has attracted more than 30 million users in less than a week since its launch, and this is what made it the fastest growing application in history, according to a UBS analysis, due to its many advantages compared to previous programs launched by OpenAI. ChatGPT was considered more innovative and reliable in terms of For users, it has the ability to deal with complex tasks such as programming and is also able to process data and develop business strategies. This is what has helped users or researchers to produce a large number of research articles.

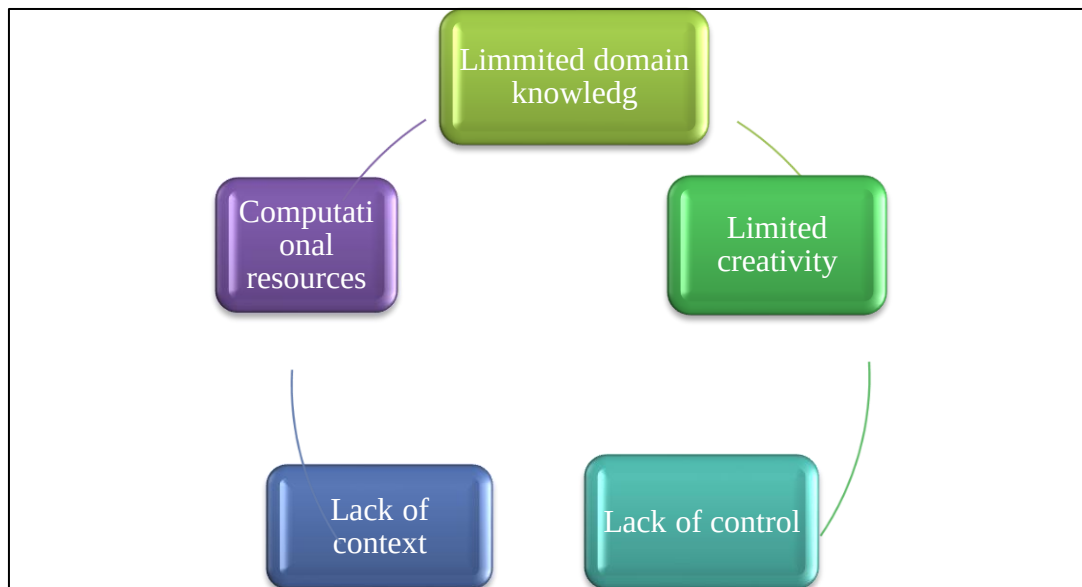
III.1 Uses of ChatGPT :

GPT Chat has many uses, including the following (Muhammad, 2023, p. 09):

- 1- Assistance in writing or creating a CV. All the user has to do is request that, and GPT Chat can also request assistance in modifying the CV.
- 2- Content creation, including writing creative texts, writing scripts for video clips, etc., which also allows content producers to obtain a better version of their texts in terms of style or practice writing scripts and creative content.
- 3- Creating creative images from texts, as AI Open develops an advanced artificial intelligence model capable of converting texts into images DALLE.2.
- 4- Explains complex topics simply and solves mathematical equations step by step.
- 5- Unlike Google Translate, the GPT Chat artificial intelligence model provides content creation in multiple languages at the same time, which allows content makers and marketers to write content that targets speakers of different languages in the best possible way.
- 6- Writing rich articles on almost any topic, in addition to summarizing scientific papers or research.
- 7- GPT Chat is an ideal companion for chatting, unlike other chatbots that provided chatting by default, based on artificial intelligence.

III.2 Limitations of chatGPT in scientific research:

Fig.(05) : limitaion of chat GPT



Source : omar Ibrahim Obaid, Ahmed Hussein Ali, Mohamad Ghazi Yassen, Impact of chat GPT on Scientific Reseaach : Opportunities, Risks, limitation and Ethical Issues, Iraqi Journal for Computer Science and Mathematics, p16.

III.3 The importance of using chatGPT in scientific research:

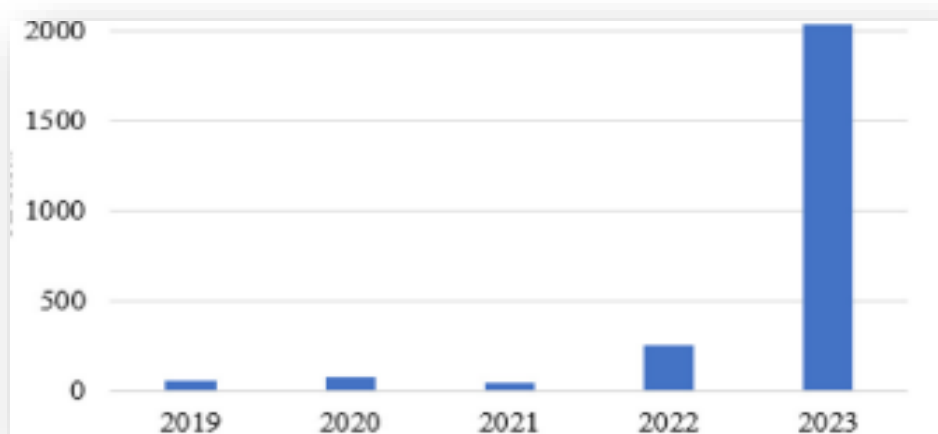
The program helps in producing high-quality research papers through a set of the following points (Al Suwaidi & bin Hammad Ajlahi, 2023, pp. 35,36,37):

- **Providing an overview of the topic:** One of the primary ways that ChatGPT can assist in the research process is by helping to collect information from a variety of sources. Once you provide it with keywords related to the topic of the paper, it will be able to create a list of relevant articles and papers, saving time and effort. In the literature review process, in addition, ChatGPT can be used to summarize the main findings of these articles and papers, highlighting the most important and relevant information.
- **Asking research questions or hypotheses:** By providing it with the basic concepts and any relevant information that has already been collected on the subject of the research, the chat will be able to create a list of potential research questions based on the information provided. At this point, it is necessary to review the research questions that have been created, and determine Questions based on questions that correspond to the scope and purpose of the research, and then use it to form hypotheses to build the chosen research.
- **Create an outline for the research paper:** Once the research is complete, ChatGPT can be used to create a detailed outline for the paper by providing it with the main ideas and concepts that will be addressed in the research. It can create a logical structure for the paper including sections of introduction, methods, results, and conclusion, which ensures the organization of the paper. good.
- **Create custom text for each paragraph in the research paper:** After the outline is completed, ChatGPT can be used to create text for each section of the paper, so you can ask it, for example, to write the introduction section, the conclusion, or others, all in an easy and quick way.

- **Ensuring that the text follows the correct formatting guidelines:** It is possible to use this important tool to ensure that the text of the research paper follows the required formatting guidelines, through the following steps:
- ChatGPT provides formatting guidelines specific to the field of study such as: citation style, font, and margin size.
- Review texts and ensure their accuracy the use of the ChatGPT tool is not limited to the previous points, as it can assist in the step of reviewing texts after completing writing, through:
 - Grammar and spelling check.
 - Verify the validity of the facts.
 - Plagiarism check.
 - Readability.

ChatGPT can be used in the pre-writing stage of the research paper, and also in the writing stage to produce a high-quality scientific paper, as the chatGPT program is a powerful tool that has the ability to revolutionize the way scientific papers are written by assisting in the process of researching, planning, writing, reviewing the research paper, etc. As we mentioned previously, it can thus save a lot of time and effort for researchers. The following figure shows the annual articles indexed in Google Scholar on the chatGPT program:

Fig.(06) : Annual articles indexed in Google Scholar on the chat GPT



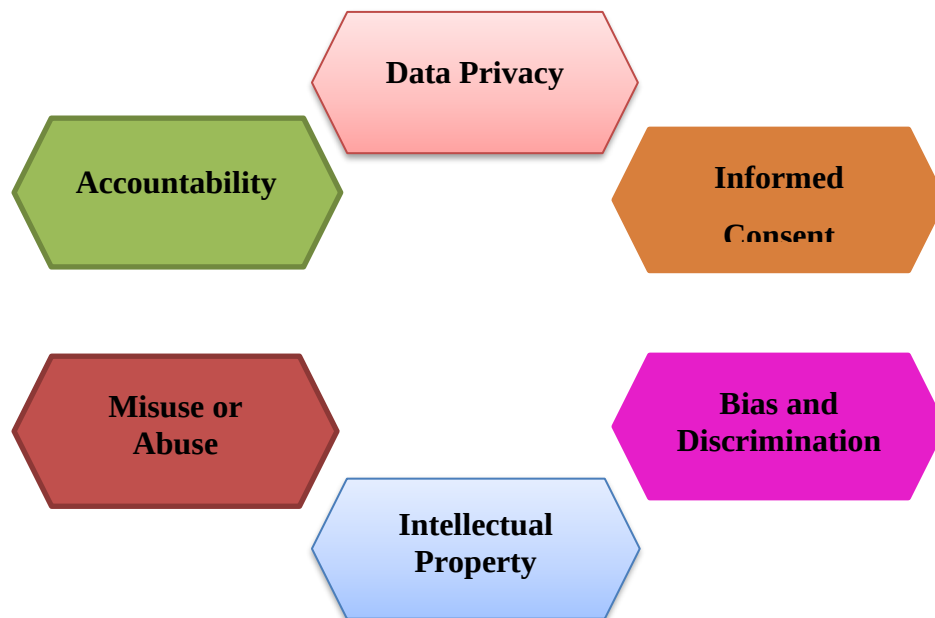
Source : Partha Pratin Ray, ChatGPT: A comprehensive review on background, applications, key challenges, bias, ethics, limitations and future scope, Internet of Things and Cyber-Physical Systems, p122.

We notice from the figure that the number of annual articles indexed in Google Scholar was small in the year 2019, and this number began to rise starting in the year 2022 and reached 2000 articles in the year 2023, which is the period in which the GPT chat was created, which is considered the largest language model that has been created. Absolutely due to the many advantages it provides to researchers in all fields, as it is used as a search engine, which allows researchers to enter inquiries for a specific topic and receive the information they need more quickly and effectively. The program is also used in writing articles, summarizing scientific research, and drafting scientific research. In addition, it allows identifying research gaps and correcting them. It is also used in statistical analysis, as the GPT chat was able to analyze previous data and predict future data on a large scale.

III.4 Ethical issues of chat GPT in scientific research:

In order to use the GPT chat program in scientific research correctly, ethical regulations must be verified because it may be used to examine confidential data, which affects the privacy and confidentiality of the data, and this matter requires approval first, and using the program in scientific research may also lead to biased results. Or discriminatory, and it may also be used for malicious purposes that result in incorrect, unexpected or unintended information and conclusions, and this requires responsibility for the resulting results for the scientific researcher.

Fig.(07) : Ethical issues of chat GPT in scientific research



Source : omar Ibrahim Obaid, Ahmed Hussein Ali, Mohamad Ghazi Yassen, Impact of chat GPT on Scientific Reseaach : Opportunities, Risks, limitation and Ethical Issues, Iraqi Journal for Computer Science and Mathematics, p16.

III.5 Opportunities and risks of using chat GPT in scientific research:

The chatGPT program has opened up distinct possibilities for individuals in general and researchers in particular due to its many advantages, which has allowed researchers to discover new research methods and make decisions regarding the hypotheses for which the study was conducted. These opportunities are represented in (Al-Saeed, 2023, p. 16):

- Effectively supports the researcher during the stage of writing the final research report;
- Improve the writing of the research report by finding and correcting typos and eliminating grammatical inconsistencies;
- It works to provide advanced vocabulary;
- It allows more time to be allocated to experimentation and implementation of the research steps and analysis of its data.
- The model can also summarize published research on a specific topic, which helps researchers understand the topic;
- Provides new research evidence and ideas for the researcher by analyzing a specific research topic.

Although chatGPT shows promise for advancing scientific research, it is not perfect and has potential risks, sometimes leading to inaccurate or inappropriate responses. These risks are (Schönberger, 2023, pp. 335,336):

- Bias: Using chatGPT can introduce different types of biases because the data used to train the model may contain some flaws that become an integral part of the model, which is reflected in the responses it generates.
- Wrong information: chatGPT not only generates text, but also provides explanations of scientific contexts as well as incorrect and randomly generated citations or sources, and it is also possible for the model to obtain or deal with wrong information.
- Difficulty in evaluating results: It is difficult to distinguish between texts created by chatGPT and those written by people, as the source of the result remains unclear, which makes it difficult to detect false information.
- Failure to consider current and scientific sources: Since the chatGPT database is not currently up to date, relevant information may be missing, and the results of scientific studies are not considered and are not freely available.
- Unclear authorship: It is not clear how text generated by chatGPT should be cited in publications, and it is also unclear to what extent chatGP can use existing documents so that the program may be infringing copyright even if no copies have been made. Content literally.

IV. CONCLUSION:

chat GPT is considered a modern and powerful program, it has become competitive with traditional search engines due to its ability and speed in answering questions and providing accurate information that users need in scientific research, it is also used to improve search services, create content, write articles, and explain complex topics. However, the model suffers from some defects that are considered a threat to it when used, therefore its users, especially researchers, should not rely on it completely because it weakens their ability to think creatively, in addition to the ethical effects it leaves behind, such as bias and misuse.

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