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The Dawn of a New Digital Age: Addressing the Impact of ChatGPT and Artificial Intelligence in the Field of Medicine

Dr Geoffrey Everest Hinton is a leading figure in the deep learning community and is regarded as one of the three Godfathers of Artificial Intelligence (AI). In May this year, Dr Hinton publicly announced his departure from Google because he wanted to freely speak about the risks of AI. In this light, we as medical professionals must also be aware of the potential existential risks arising from its deliberate misuse by malicious people.

Artificial Intelligence assumes that thinking and reasoning can be replicated and mechanized. It has become the "flavor of the day" or the next big thing, and its use is advancing rapidly. It is no longer science fiction; AI has emerged as a powerful reality in today's world. We now live in the digital age of 'Big Data' and its applications are now increasingly finding a place in most industries, including medicine. We are already using Big Data daily. It is already integrated into our everyday lives through tools such as Google Maps, facial recognition, and digital smart assistants such as Apple's Siri, Google Home, and Amazon's Alexa while more and more applications are being developed and introduced every day.

Artificial Intelligence: Chat Generative Pre-Trained Transformer (ChatGPT)

The recent introduction of Chat Generative Pre-Trained Transformer (ChatGPT), the latest large language model (LLM), prompted many to reflect on the exciting ways AI can impact our lives in the very near future. With ChatGPT, you can ask a question and receive a properly punctuated grammatically correct answer within seconds. Chat Generative Pre-Trained Transformer gained over 100 million users within two months of its launch, establishing itself as the fastest-growing consumer application in history [1].

Like all other LLM-based AIs, ChatGPT uses extensive text datasets to generate new text matching the text it was trained on, requiring understanding, interpreting, and generating human language via computer systems [2]. GPT-4, the latest version of ChatGPT, does not directly have internet access and has only been trained on information available up until 2021. On the other hand, while Google's Bard AI language model (currently available only via waitlist) allows access to Google's search engines, it is not readily available to everyone. Therefore, ChatGPT is the most powerful language model presently available.

Chat Generative Pre-Trained Transformer (ChatGPT) in Medicine and Clinical Research

Chat Generative Pre-Trained Transformer is currently one of the largest and most powerful AI processing models today. It has 175 billion language parameters and is used in a variety of industries like technology, banking, marketing,

and entertainment. It will quickly broaden its use into medicine and clinical research.

Recent scientific literature has examined ChatGPT's impact on the field of medicine. While some studies have shown that it is helpful for conversational and writing tasks, increasing efficiency and accuracy of output, others have identified its limitations in medical research [3].

Factual Inaccuracies of Large Language models (LLMs)

The major and most consequential downside of ChatGPT, and other future LLMs, is the potential risk of presenting incorrect data in a medical or scientific setting. Furthermore, its information may also turn out to be not accurate, making it an imperfect tool for medical research. One needs to remember that presenting incorrect information can carry significant and harmful risks.

This risk was highlighted in a Northwestern University study [4]. Researchers used ChatGPT to write 50 medical-research abstracts based on articles published in medical journals. When given a mixture of original and general abstracts, blinded human reviewers correctly identified 68% of generated abstracts as being generated by ChatGPT, but they also incorrectly identified 14% of original abstracts as being generated. The reviewers indicated that it was surprisingly difficult to differentiate between the two.

The results of this study are encouraging some researchers to use ChatGPT as a writing tool, since people reading their papers may not recognize that their words were actually generated by AI. The study highlights the potentially dangerous risk that ChatGPT is able to mislead human reviewers in a medical setting. False research may lead to inappropriate medical decisions based on imprecise information, which in turn could have detrimental results for our patients.

Can Chat Generative Pre-Trained Transformer (ChatGPT) Still Be Useful in Medical Research?

Currently, ChatGPT has data only from 2021 and earlier. For this reason, there are instances of factual inaccuracies from outdated information. However, by recognizing the potential problems with ChatGPT, the scientific community can harness its helpfulness. An article published in Nature in February 2023 described computational biologists using ChatGPT to improve finished research papers and received outputs with increased readability and better-edited manuscripts [5].

Using ChatGPT for the purpose of delegating tedious tasks like proofreading and editing, increases productivity and content quality would allow researchers to devote more time in advancing their field of medicine.

There will be continuous advancements and constant evolution of LLMs. It is therefore important to understand the capabilities and limitations of AI. In view of the potential risks arising out of AI possibly using inaccurate or outdated information, at the moment, it is not advisable to rely on ChatGPT as the sole source of references or facts. While it cannot replace human expertise, ChatGPT can nowadays already make tedious tasks such as editing a lot easier.

Can Artificial Intelligence (AI) Completely Replace Medical Practitioners?

At present, several different AI systems are being used by payers and providers of healthcare and life sciences companies. Advancements in AI, such as ChatGPT, will serve as an usher in more advanced AI systems. It has the potential to improve the delivery of healthcare and make it more efficient by improving diagnostics, analysis of large

datasets, and reducing the burden of administrative paperwork. However, AI will never be able to replace medical practitioners.

With advancements in AI and other technologies, fully autonomous robotic systems will be the next reality. However, the job of a medical practitioner goes far beyond seeing patients and providing treatment [6]. The medical practitioner's role is centered around providing personalized treatment along with the human to human touch. Despite the advances in AI, medical tasks will still require the application of specialized subject knowledge and opinions, coupled with genuine human compassion.

Therefore, the potential of using AI in healthcare primarily lies in its ability to increase efficiency by redistributing workload, optimizing performance, and improving patient care through a collaborative synergy between man and machine. Artificial Intelligence cannot and should not replace medical practitioners.

Human Intelligence (HI) - Artificial Intelligence (AI): A collaboration between Man and Machine

Human intelligence (HI) differs from AI in its biological evolutionary history, adaptability, creativity, emotional intelligence, and ability to comprehend complex abstract concepts [7]. Artificial Intelligence cannot replace human professionals in the field of medicine and clinical research. Therefore, AI and HI should collaborate to capitalize on their respective strengths.

Artificial Intelligence in the context of LLM applications, can only create knowledge with the help of historic inputs from established research that has been previously conducted and already available. It cannot create new knowledge like humans can. Without human beings, medical and scientific progress is not possible. Well-trained and highly qualified human researchers are necessary to discover new knowledge and scientific breakthroughs. LLMs are only effective as a complement to medical research. Moreover, AI cannot be used as definitive data or evidence without considering its limitations, risks, and factual inaccuracies as discussed earlier.

Let's keep in mind that the algorithms of ChatGPT and other LLMs are only as good as the old data on which they are trained. Continued training will further improve them, and this will serve to facilitate progress in the medical field. The use of collaborative intelligence, where humans and AI work together, is essential to ensure that we fully leverage the strengths of both to achieve the best possible outcomes [8].

Conclusion

With the advancement of technology over time, AI can be harnessed to be used in increasingly sophisticated ways to facilitate and advance the field of medicine. Chat Generative Pre-Trained Transformer used as a tool for medical purposes is already being tested and will continue to be evaluated regardless of whether it has been trained specifically on medical data [9]. Discussions about its benefits, potential hazards, possible areas of applications, or needed regulations are also ongoing [10].

We are at the infancy of the use of AI in medicine and there is no limit to how far AI can bring us in the future. We live in an exciting and inspiring time for medicine. It is imperative, however, that regulations and frameworks are in place to guide its application. Medical practitioners must guide the use of AI correctly, so that AI's potential is only utilized appropriately to facilitate the progress of medicine.

Reference

1. Bartz D. As ChatGPT's popularity explodes, U.S. lawmakers take an interest.

[internet]. 2023 [cited 2022 February 24]. Available from: https://www.reuters.com/technology/chatgpts-popularity-explodes-us-lawmakers-take-an-interest-2023-02-13/.
2. Editorials. Tools such as ChatGPT threaten transparent science; here are our ground rules for their use. Nature. 2023 Jan;613(7945):612.
3. Deng J, Lin Y. The benefits and challenges of ChatGPT: An overview. Frontiers in Computing and Intelligent Systems. 2022;2(2):81-3.
4. Gao CA, Howard FM, Markov NS, Dyer EC, Ramesh S, Luo Y, Pearson AT. Comparing scientific abstracts generated by ChatGPT to original abstracts using an artificial intelligence output detector, plagiarism detector, and blinded human reviewers. BioRxiv. 2022:2022-12.
5. Van Dis EA, Bollen J, Zuidema W, van Rooij R, Bockting CL. ChatGPT: five priorities for research. Nature. 2023 Feb 9;614(7947):224-6.
6. Han J, Davids J, Ashrafian H, Darzi A, Elson DS, Sodergren M. A systematic review of robotic surgery: From supervised paradigms to fully autonomous robotic approaches. The International Journal of Medical Robotics and Computer Assisted Surgery. 2022 Apr;18(2): e2358.
7. Korteling JH, van de Boer-Visschedijk GC, Blankendaal RA, Boonekamp RC, Eikelboom AR. Human-versus artificial intelligence. Frontiers in Artificial Intelligence. 2021 Mar 25; 4:622364.
8. Ang TL, Choolani M, See KC, Poh KK. The rise of artificial intelligence: addressing the impact of large language models such as ChatGPT on scientific publications. Singapore Medical Journal. 2023 Apr;64(4): 219-221.
9. Kung TH, Cheatham M, Medenilla A, Sillos C, De Leon L, Elepaño C, Madriaga M, Aggabao R, Diaz-Candido G, Maningo J, Tseng V. Performance of ChatGPT on USMLE: Potential for AI-assisted medical education using large language models. PLoS Digital Health. 2023 Feb 9;2(2): e0000198.
10. European Commission. Proposal for a regulation of the European Parliament and of the council laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) and amending certain union legislative acts; 2021, Brussels, 2021/0106.

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