Review Article

ChatGPT and artificial intelligence the future of healthcare?

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ABSTRACT

Artificial intelligence is an upcoming branch of computer science, with applications across the world in each and every industry. The launch of ChatGPT- an advanced and easily accessible machine learning and artificial intelligence application will alter the manner in which both the medical fraternity, research and global healthcare sectors are trained and operate. ChatGPT was launched on the 30th of November 2022, by a San Francisco based software company (OpenAI). ChatGPT is a cutting-edge language model (chatbot) which forms part of the (Generative Pre-trained Transformer) group of software. The powerful inbuilt language model allows the generated response to be humanoid in nature and not to be perceived as being AI generated and therefore attaches a greater innate value to the resultant text, thereby negating the need to re-read and re-write the generated text. The model has multiple advantages across medical education, research, patient treatment and monitoring. As with all technology and models of this nature, innate disadvantages are evident; predominantly in the realm of data security and medicolegal difficulties. ChatGPT is an extremely powerful tool, with limitless capabilities and shall most certainly be useful in optimizing our daily lives and routines. The scope for such powerful artificial intelligence is undeniable and will most certainly gain traction within the medical sector. The healthcare sector will however demand a higher level of refinement and an AI model more specifically designed by and for the healthcare sector before the large-scale implementation thereof within the field will be accepted and viable.

KEYWORDS

Artificial Intelligence; Machine Learning; Software; Computer Heuristics, Deep Learning; Robotics

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INTRODUCTION

Artificial intelligence is an upcoming branch of computer science, with applications across the world in each and every industry. The boom and rapid development of new technology both in the realms of hardware and software (such as microprocessors and smaller circuitry) has drastically shaped the medical sector and has fueled the growth and development of both research and treatment perspectives as well as outcomes. [1] With the launch of advanced and easily accessible machine learning and artificial intelligence applications such as ChatGPT, the manner in which both the medical fraternity, research and global healthcare sectors are trained and operate will be forever altered. [2] The medical industry is expected to undertake a drastic metamorphosis through the application of this new branch of technology. The model at the forefront of this transition is ChatGPT, which was launched in its current form on the 30th of November 2022. [3]

CHATGPT

ChatGPT was launched on the 30th of November 2022, by a San Francisco based software company (OpenAI). ChatGPT is a cutting-edge language model (chatbot) which forms part of the (Generative Pre-trained Transformer) group of software. The current ChatGPT runs on the GPT-3.5 architecture, which has been developed off of its predecessor GPT-3 (as an extension thereof). The GPT-3 architecture was launched in June of 2020 and was the world's most powerful language model with over 170 billion parameters, the current ChatGPT has numerous advancements and upgrades which further extrapolates the capabilities and computing power of the model. [4] The model is specifically designed for chat-based applications and is able to be used across every field, with unimaginable capabilities at speeds which humans are unable to match. The application is both responsive, engaging and coherent in its interaction between the data it collates as well as text it produces in response to the questions or commands posed by the user. [5]

ADVANTAGES AND USES OF CHATGPT

ACADEMIC & RESEARCH ADVANTAGES

The powerful inbuilt language model allows the generated response to be humanoid in nature and not to be perceived as being AI generated and therefore attaches a greater innate value to the generated text, thereby negating the need to re-read and re-write the generated result. The speed at which the model can isolate, consolidate and summarize text allows for a powerful method in which researchers can form the basic architecture as to follow and use as a foundation for their research. This ability can assist newer and less experienced researchers in learning as how to structure and form abstracts, indexes and content for their manuscript. [6] The ability of the model to produce both a scientifically and grammatically sound abstract is one of the greatest tools for researchers to brainstorm possible avenues and topics for their future research, likewise it can be used as a teaching tool for students in abstract writing. The model has great scope for application in clinical trials, with particular advantages being noted in participant recruitment and an expedited manner in identifying and selecting strong candidates for specific clinical trials. [7]

The model has a great potential in the sphere of medical education with the ability to almost instantaneously generate multiple choice questions, summarizations, short/long answer questions pertaining to a specific topic, thus aiding both the teaching staff and students alike. The ability of the model to create a rapid overview and study notes in point form can drastically reduce the workload and bypass the long and labour-intensive process of handwriting notes from textbooks and class notes. [8,9] We put ChatGPT to the test and requested for it to generate: "HIV study notes"- the model produced a concise 411-word summary of study notes with a good overview of a large infectious disease topic, in the break neck speed of 43.88 seconds. The beauty of ChatGPT is the immense sources of data that it can draw from, data which is most often more recently published than that which is available in the textbooks.

In respect to the advantages of ChatGPT for the teaching faculty, it has great scope for the grading of grammar and essay assessment, thus aiding in reducing the workload of faculty whilst also minimizing bias against students. This allowing for more academic time to be spent on teaching and reviewing difficult concepts. [10]

CLINICAL AND PRACTICAL ADVANTAGES FOR PHYSICIANS

ChatGPT has the ability to act as a virtual assistant for medical staff and practitioners which can streamline and best aid the optimization of a physician's time and energy, which

will ultimately benefit the patient and result in better medical care. The model can aid in clinical decisions by acting as a support by providing assistance and reassurance in the rapid diagnosis of patients, further adding a level of confidence to the provisional diagnosis made by a treating physician. A great prospect of the model is its ability to optimize medical record management in an unprecedented manner with cross-referencing between a patient's own medical history and that of their near relatives, which can thus take full advantage of the machine learning and AI to predict future risk potential of various familial disease and even malignant and or inherited conditions. The ability of ChatGPT to be used as a digital scribe with fast and accurate speech to text scribing will be used more intensely in the near future and will result in less errors being made due to poor handwriting and misinterpretations thereof. The model has the ability to aid in the triaging of patients particularly in the case of large-scale natural disasters, thereby increasing the likelihood of survival in such disastrous events and allows physicians to focus on saving lives instead of performing triage manually. Enhanced holistic patient care via improved patient monitoring and early recognition of exacerbations of chronic conditions will reduce mortality and morbidity of patients. [11,12]

ADVANTAGES FOR PATIENTS

The model allows for continuous medication tracking which will greatly assist patents with tracking their medicine intake in respect to the proper dose, timing and duration of the relevant drug, thereby improving patient outcome as well as patient compliance and intern reducing the development of drug resistance. The conversational tone and abilities of the Chatbot can be used to assist individuals with mental health issues by providing support and assistance in times of difficulty and can also aid in referring such patients to medical doctors and physiatrists in a timeous manner. [13,14]

DISADVANTAGES OF CHATGPT

The AI model is powerful, however further refinement will still be necessary before it can wholeheartedly be incorporated into medical education. In the test conducted, where ChatGPT was used to produce notes on "HIV"; the notes were deemed to be adequate for the search parameters entered, further clarification and improvement of the information would be necessary for the notes to be accepted at a medical standard for students in the field, the notes however for a layman are suffice for self-education.

Medicolegal and ethical roadblocks. As with such an autonomous and rapid model, ethical concerns and issues are at the forefront of the disadvantages posed by such technology, for example if the bot were to misdiagnose a disease, who does the burden of liability fall upon?[15] Data privacy concerns are a large obstacle as medical information is inherently sensitive and should not be disclosed under any circumstances. [16]

Although bias can be reduced, the innate bias which is inbuilt as the model is trained through current data and information on the internet may result in harm. Superadded to this the inability of the bot to differentiate between reliable and unreliable sources could result in catastrophic implications for all the parties involved. ChatGPT is limited to the data it was trained on, hence any new research or future medical findings will not be accessible or presented by the AI and thereby crucially cripple its use fundamentality as the medical sector changes and evolves on and hourly basis.[17]

Job security is of a major concern, as AI and bots such as ChatGPT have and display the potential to make manned operation in certain sectors obsolete.[18]

EXPERT OPINION

ChatGPT and similar AI models are extremely powerful tools, with limitless capabilities and shall most certainly be useful in optimizing our daily lives and routines. The scope for such powerful artificial intelligence is undeniable and will most certainly gain traction within the medical sector. The application of such technology in the medical sector however, due to the sectors sensitive nature with respect to patient information and the human lives which are at stake in critical decision making, will demand a higher level of refinement and an AI model more specifically designed by and for the healthcare sector. The numerous disadvantages of such technology are evident and will take time to overcome before full deployment and integration of said model is possible, however the use and integration of such powerful tools in small aspects of patient care in the interim will benefit both the patient and treating physician.

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