



A Monthly e Magazine  
ISSN:2583-2212

July, 2023; 3(07), 1480-1483

Popular Article

## Application of ChatGPT in Medical Science and Research

**Dr. M.K. Vijayasarathi, Dr. Anandu S., Dr. Gunturu Narasimha Tanuj**  
ICAR- Indian Veterinary Research Institute, Bareilly, Uttar Pradesh, India  
<https://doi.org/10.5281/zenodo.8170714>

### *Abstract*

ChatGPT (Chat generative Pre-Trained Transformer) is a large artificial intelligence language model developed by OpenAI based on the GPT-3.5 architecture and was launched on November 30, 2022. It is one of the most advanced Natural Language Processing systems (NLPs), with the ability to generate human-like responses and comprehend complex language structures. This article will discuss what is ChatGPT, its mechanism, applications in medical science, and limitations.

### **1. Introduction**

ChatGPT (Chat generative Pre-Trained Transformer) is a state-of-the-art language model that uses deep learning techniques to generate natural language responses. It was developed by OpenAI and released in November 2022. ChatGPT is an autoregressive model, which means it generates text by predicting the next word in a sequence based on the previous words. It is based on the transformer architecture, which was introduced by Google in 2017. The transformer architecture uses self-attention mechanisms to analyze and understand the relationships between words in a sentence.

#### **1.1 Mechanism of ChatGPT**

The mechanism of ChatGPT is based on the transformer architecture, which is a type of neural network that uses self-attention mechanisms to understand the relationships between words in a sentence. Self-attention mechanisms allow the model to attend to different parts of the input sequence and give more weight to important words. This mechanism allows ChatGPT to understand the context of a conversation and generate human-like responses. The transformer architecture consists of two main components: the encoder and the decoder. The encoder takes the input sequence



and generates a set of hidden representations, which are passed to the decoder and then the decoder uses these representations to generate an output response.

## 1.2 Applications of ChatGPT in Medical Science

One of the main advantages of ChatGPT is its ability to analyze large amounts of data and generate insights based on that data.

### (1) Medical Diagnosis (2) Patient monitoring (3) Drug discovery

(1) ChatGPT can be used to assist with medical diagnosis by analyzing patient symptoms and generating a list of possible diagnoses. This can help doctors make more accurate diagnoses and reduce the risk of misdiagnosis. ChatGPT can also provide personalized health advice to patients based on their symptoms and medical history. (2) ChatGPT can be used to monitor patient health by analyzing patient data and generating alerts when there are signs of a potential health issue. This can help doctors intervene early and prevent serious health complications. ChatGPT can also be used to provide patients with personalized health advice and reminders about medication and appointments. (3) ChatGPT can analyze large amounts of data on drug compounds and predict which compounds are likely to be effective. This can help researchers identify new drug candidates more quickly and reduce the time and cost of drug development.

## 1.3 Limitations of ChatGPT

While ChatGPT has shown great promise in medical science, it also has some limitations that must be considered. Here are some of the limitations of ChatGPT in medical science

(1) *Accuracy* - ChatGPT requires large amounts of training data to achieve high levels of accuracy. This can be a challenge in medical science, where data privacy regulations and ethical considerations can limit the amount of data that can be used for training. Another limitation is that it is based on statistical correlations between words and does not understand the meaning of language. This can lead to errors and misunderstandings in complex conversations and also human oversight may be necessary to ensure that the responses are accurate and appropriate.

(2) *Data bias and Lack of contextual understanding* - The model can only generate responses based on the information it has learned from its training data. If the data is biased, then the model's responses will also be biased. This could be problematic in medical science, where certain patient groups may be underrepresented in the data, leading to biased responses that could potentially harm patients. ChatGPT lacks a contextual understanding of the conversation. This means that it may sometimes provide irrelevant or inappropriate responses. In the context of medical science, this could lead to incorrect diagnoses or treatment recommendations, which could be dangerous for patients.



(3) *Limited domain expertise and Lack of emotional intelligence* - ChatGPT's responses are limited to the data it has been trained on. While it can generate responses based on a broad range of medical topics, it may not have the same level of expertise as a medical specialist in a particular field. This could lead to inaccurate diagnoses or treatment recommendations. ChatGPT does not have the emotional intelligence of a human. It cannot pick up on emotional cues or provide emotional support to patients. In medical science, emotional support is often a critical component.

(4) *Ethical concerns* - There are also ethical concerns around the use of ChatGPT in medical science like the privacy of patient data and the potential for bias in the model's responses. There are also ethical concerns related to the use of ChatGPT in research publications. For instance, there is the potential for the misuse of ChatGPT-generated text for creating false or misleading information. Although it has shown great potential in generating text and assisting in research, there are several limitations to its use in research publications. While Chat GPT generates text that is coherent and logical, it lacks the ability to fully comprehend the meaning and context of the information. Therefore, the generated text may contain inaccuracies or inconsistencies that could mislead readers and compromise the credibility of the research. Chat GPT has the ability to learn from large amounts of text data, including biased or incomplete data. This can lead to the generation of biased text, which can perpetuate stereotypes and perpetuate social inequalities. Therefore, it is essential to carefully monitor and evaluate the text generated by Chat GPT to ensure that it is unbiased and accurate.

(5) *Limited Understanding of Scientific Concepts*

Chat GPT relies on statistical patterns and correlations to generate text. It lacks the ability to understand scientific concepts and theories in the same way that humans do. Therefore, it may struggle to accurately convey complex scientific information, especially when dealing with specialized or technical language and also it may struggle to distinguish between factual information and opinions/assumptions. This can lead to the generation of inaccurate or misleading information. According to OpenAI, none of ChatGPT's responses is exact copies of any specific text but rather generated by synthesizing the training data and ChatGPT has raised various ethical issues such as encouraging plagiarism and cheating. Additionally, there are concerns about the use of Chat GPT to automate tasks that would otherwise require human labor.

## 2. Conclusion

In conclusion, while ChatGPT has great potential in medical science, it is important to recognize its limitations. The technology should be used in conjunction with human medical professionals to ensure accurate diagnoses and treatment recommendations. Additionally, ongoing



research is needed to improve the model's accuracy and to address the ethical concerns surrounding its use in medical science.

### 3. Reference

- Gasevic, D., Siemens, G., & Sadiq, S. (2023). Empowering learners for the age of artificial intelligence. *Computers and Education: Artificial Intelligence*, 100130. <https://doi.org/10.1016/j.caeai.2023.100130>
- Liebrenz, M., Schleifer, R., Buadze, A., Bhugra, D., & Smith, A. (2023). Generating scholarly content with ChatGPT: Ethical challenges for medical publishing. *Lancet Digital Health*, 5(3), e105–106. [https://doi.org/10.1016/S2589-7500\(23\)00019-5](https://doi.org/10.1016/S2589-7500(23)00019-5)
- Mohammadreza Farrokhnia, Seyyed Kazem Banihashem, Omid Noroozi & Arjen Wals, 2023. A SWOT analysis of ChatGPT: Implications for educational practice and research. *Innovations in Education and Teaching International*. <https://doi.org/10.1080/14703297.2023.2195846>
- Naveen Manohar, Shruthi S. Prasad Use of ChatGPT in Academic Publishing: A Rare Case of Seronegative Systemic Lupus Erythematosus in a Patient With HIV Infection Open Access Case Report DOI: 10.7759/cureus.34616
- Tlili, A., Shehata, B., Adarkwah, M. A., Bozkurt, A., Hickey, D. T., Huang, R., & Agyemang, B. (2023). What if the devil is my guardian angel: ChatGPT as a case study of using chatbots in education. *Smart Learning Environments*, 10(1), 15. <https://doi.org/10.1186/s40561-023-00237-x>
- Welle, D. (2023). ChatGPT is changing education, AI experts say — but how? [https://news.abs-cbn.com/spotlight/01/25/23/chatgpt-is-changing-education-ai-experts-say-but-how?](https://news.abs-cbn.com/spotlight/01/25/23/chatgpt-is-changing-education-ai-experts-say-but-how/)

