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ChatGPT offers an editorial on the opportunities for chatbots in dermatologic research and patient care

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Abstract

ChatGPT is a chatbot developed by OpenAI, an artificial intelligence research laboratory, that is trained on massive-scale internet text data to understand a broad range of language styles and topics. As a mature, conversational chatbot, ChatGPT can respond to follow-up questions and produce coherent primary texts based on the user's request. We explore the opportunities and risks of integrating chatbots into dermatologic patient care and research while presenting ChatGPT's response to the same question.

Keywords: artificial intelligence, chatbot, dermatology, research

Introduction

Advances in artificial intelligence (AI) have created opportunities to transform healthcare. The number of primary research articles investigating the applications of AI in medicine has grown exponentially over the past decade [1]. The field of dermatology has followed a similar trend as dermatologists explore the possibilities of using AI to aid in the detection of melanoma and non-melanoma skin cancers using clinical, dermoscopic, and histopathologic images [2-8]. Much of this research has focused on computer vision enabled by deep learning methods to analyze pixel and voxel data [9].

Natural language processing (NLP) methods have been less studied in dermatology. Natural language processing refers to AI algorithms that can analyze

free-text data, such as primary articles or speech-to-text dictation [10]. One application of NLP algorithms is creation of interactive chatbots that can be used to coordinate patient care and deliver psychotherapy [11,12]. However, these experimental chatbots often employ a predefined structure of engagement such that their range of responses are limited.

ChatGPT is a chatbot deployed by OpenAI (San Francisco, CA), an AI research laboratory, that is trained on massive-scale internet text data to understand a broad range of language styles and topics [13]. It can form a coherent response to an inquiry with sophisticated paragraphs. With such a mature language model, issues arise such as how to distinguish between text written by a chatbot and a human. There have been reports of ChatGPT-generated scientific abstracts fooling scientists and ChatGPT being listed as a co-author on research papers [14,15]. The capability of ChatGPT in producing primary texts will undoubtedly open new possibilities for the role of chatbots in patient care and research. To demonstrate, we offer the response below of ChatGPT (version 3.5) to the following prompt:

"Write me a research editorial about the opportunities for chatbots to be incorporated into dermatologic research and dermatologic patient care."

(Start of editorial generated by OpenAI's ChatGPT)

Introduction: Chatbots have emerged as a significant technological innovation in recent years, revolutionizing the way businesses, organizations, and individuals interact with their customers and

audiences. Chatbots are computer programs that simulate human-like conversations, using artificial intelligence (AI) and natural language processing (NLP) technologies to interact with humans. They can be programmed to answer questions, provide information, and even carry out tasks, such as scheduling appointments or making purchases.

In the field of healthcare, chatbots have been increasingly utilized to support patient care, especially during the COVID-19 pandemic, in which telemedicine became essential. Dermatology is a field of medicine that has also seen the emergence of chatbots as a potential tool to support patient care and dermatologic research.

Opportunities for chatbots in dermatologic research:

Chatbots have the potential to enhance dermatologic research by providing a convenient and efficient way to collect data from patients. Dermatology research often involves collecting large amounts of patient data, including symptoms, medical history, and demographic information. Chatbots can be used to collect this information by providing patients with a conversational interface to input their information.

Chatbots can also be used to support clinical trials by providing patients with information about the study and answering any questions they may have. This can improve patient engagement and help to reduce the dropout rates in clinical trials, which can be a significant challenge in dermatology research.

In addition, chatbots can be programmed to analyze data collected from patients to identify patterns and trends, which can be useful for identifying risk factors, developing treatment protocols, and improving patient outcomes.

Opportunities for chatbots in dermatologic patient care:

Chatbots can also support dermatologic patient care by providing patients with a convenient and accessible way to receive information and support. Patients can use chatbots to ask questions about their skin condition, receive treatment recommendations, and access educational resources.

Chatbots can also be programmed to provide patients with reminders about appointments, medication schedules, and skincare routines. This can improve patient adherence to treatment plans and help to improve patient outcomes.

Furthermore, chatbots can provide patients with personalized care by analyzing patient data and providing tailored recommendations based on their individual needs. This can improve patient satisfaction and help to improve the overall quality of care.

Conclusion

In conclusion, chatbots have significant potential to support dermatologic research and patient care. They can be used to collect patient data, support clinical trials, provide patients with information and support, and improve patient adherence to treatment plans. As the technology continues to evolve, it is likely that chatbots will become an increasingly integral part of dermatologic research and patient care. However, it is important to ensure that chatbots are designed and programmed with patient safety and privacy in mind and that they are used in conjunction with, rather than as a replacement for, human healthcare providers.

(End of editorial generated by OpenAI's ChatGPT)

When followed up with the prompt:

"Would you be able to provide sources to some of the claims made in this editorial?" ChatGPT's response was the following:

Certainly, here are some sources to support the claims made in the editorial:

(Start of editorial generated by OpenAI's ChatGPT)

- Wang Y et al. Chatbots in healthcare: A systematic mapping study. *Journal of Biomedical Informatics*. 2019; 99:103319. doi: 10.1016/j.jbi.2019.103319.
- Bui DC et al. The role of telemedicine in dermatology clinical practice in the era of COVID-19: recommendations for clinical use. *Journal of the American Academy of Dermatology*. 2020; 83(1): 285-286. doi: 10.1016/j.jaad.2020.04.033.

- Ahmed AM et al. Chatbots and artificial intelligence in mental health: a review of the emerging ethical challenges. *International Journal of Social Psychiatry*. 2021; 67(1): 5-16. doi: 10.1177/0020764020964351.
- Halcomb EJ et al. Telehealth interventions for reducing waiting lists and wait times for specialist outpatient services: a scoping review. *Journal of Telemedicine and Telecare*. 2021; 27(2): 73-82. doi: 10.1177/1357633X20966635.
- Alkhodair S et al. The Role of Chatbots in Dermatology: Opportunities and Challenges. *Dermatology and Therapy*. 2021; 11(2): 597-608. doi: 10.1007/s13555-021-00510-9.

I hope these sources are helpful to you. Let me know if you have any further questions.

(End of sources provided by OpenAI's ChatGPT)

Discussion

ChatGPT created an organized, coherent editorial piece given the open-ended and relevant prompt. However, it fell short in several ways. The editorial was written in broad strokes and failed to cite specific examples of success stories that would have strengthened its claims. Additionally, when prompted for sources to support some of the claims made in the editorial, ChatGPT provided a list of *fabricated sources with nonexistent DOIs*. Interestingly, the fourth citation provided, "Telehealth interventions for reducing waiting lists and wait times for specialist outpatient services: a scoping review," was a legitimate article published in the *Journal of Telemedicine and Telecare*, though it was published in 2016 by a different set of authors. Branum et al. presented similar findings when assessing ChatGPT's response to PICOT questions, showing that the chatbot provided false citations and study details to support its claims [16]. Overall, the editorial demonstrated ChatGPT's strengths in brainstorming relevant ideas and presenting them in an organized format, but it also highlighted its shortcomings in producing primary texts as it was unable to provide concrete evidence to bolster its ideas.

Patient safety and privacy remain an important caveat to the use of chatbots. Because of increasingly

mature chatbots and AI tools, more layers of abstraction separate the human user from clinical data such that it may be feasible for a chatbot to entirely lead an interaction with a patient without a care provider being involved. Therefore, chatbots must be equipped with robust safeguards to protect against potential data breaches.

In addition, we offer additional caveats to the use of chatbots in research and patient care. It is necessary to build standard guidelines to detect algorithmic bias. These biases may represent a flaw introduced by the engineers who developed the chatbot, but they may also represent propagation of inherent societal biases that create an artificial signal in the data. For example, Hans et al. (2018) demonstrated an AI algorithm trained on images of Caucasian patients performed poorly on images from Asian patients [17]. Algorithmic bias must be detected and corrected for before deploying for general use by clinicians or patients.

Another caveat is the "explainability" and legal liabilities of a chatbot. The issue of explainability is often raised regarding non-language AI models such as neural networks used to process pixel/voxel data to classify or segment an image. If the model makes an incorrect prediction, the user has little insight into the inner workings of the model that led to its prediction. With a conversational chatbot like ChatGPT, which can answer follow-up questions, explainability is less of an issue. However, there remains the question of who would be liable if a chatbot delivers an incorrect diagnosis or offers harmful advice.

Finally, the capability of chatbots to produce primary documents makes it difficult to assess academic integrity. Standard citation guidelines should be created to allow authors to properly disclose the use and role of chatbots in their work. There has also been some preliminary work in building a detector for chatbot-generated content to prevent its unethical use [18]. However, these early solutions still seem to demonstrate a considerable false negative rate such that educators and reviewers should practice caution when trialing this software.

Conclusion

Chatbots are positioned to play a significant role in medical research and patient care in the future. Dermatology as a field must be prepared to embrace this innovation and consider the most appropriate

use cases for this technology while remaining cautious of its risks.

Potential conflicts of interest

The authors declare no conflicts of interest.

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