Generative artificial intelligence in lymphoedema care

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Key words

Generative artificial intelligence, Bard, ChatGPT, lymphoedema

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Abstract

Generative artificial intelligence (AI) is a type of AI that can create new content, such as text, images or music. Generative AI may revolutionise healthcare communication through changing the way that health education is delivered to both patients and health practitioners. Chatbots, as one implementation example of generative AI, interact with users via text- or voice-based conversations and employ natural language-processing techniques to comprehend and interpret user inputs and generate suitable responses. This article provides an overview of generative AI and explores the characteristics of two brands of chatbot systems, ChatGPT and Bard. Potential future research directions are described for lymphoedema care.

Artificial intelligence (AI) is integrated to our everyday lives: "Netflix knows which films and series people prefer to watch, Amazon knows which items people like to buy when and where, and Google knows which symptoms and conditions people are searching for" (Bohr, 2020). The technology behind these common software applications, such as Netflix understanding viewing preferences, stems from AI.

AI that can generate new and original content, such as text, images, and music, rather than relying solely on pre-existing data or predetermined rules, is called generative AI. Generative AI is still under development, but it has the potential to revolutionise the way healthcare is delivered through assisting in digital communication (Pavlik, 2023).

One such means of revolutionising digital communication is through chatbots being used to assist both patients and practitioners in information delivery. A chatbot is an AI-driven computer programme that imitates human conversation to communicate with users via text or voice. It employs sophisticated language processing techniques to interpret user input and generate pertinent responses.

Chatbots have applications in customer service, information retrieval, virtual assistance and entertainment. They can be implemented on a variety of platforms and channels to provide automated and effective responses to user queries and tasks, without the need for ongoing human intervention. Some chatbots adhere to predefined rules, while others use machine learning to enhance their conversational skills over time. In the context of generative AI, a chatbot would be used to generate responses in a creative and contextually relevant manner.

Chatbot systems

Two experimental chatbot system brands that are freely accessible to the general public are:
- ChatGPT (OpenAI; California/Version 3.0; Open AI, 2023b)
- Bard (Alphabet [Google's parent company] Version 2.0.1; California).

Both systems can generate human-like responses to natural language input by predicting the most likely next word in a sequence of text. Both systems disclose on the user interface that they are in experimental stages.

ChatGPT

ChatGPT can be described as an advanced AI language model that engages in conversation, answers questions, offers explanations and can assist users in different areas of interest based on text input (*Figure 1*). The ChatGPT interface mentions some capabilities and limitations of Version 3.0 of the software including the fact that the software may occasionally generate incorrect information and occasionally produce harmful instructions or biased content (Open AI, 2023a). The capabilities and limitations of ChatGPT Version 3.0 (*Figure 2*) are the technology:
- Remembers what users have said earlier in the conversation.
- Allows the user to provide follow-up corrections.
- Is trained to decline inappropriate requests.
- May occasionally generate incorrect information.
- May occasionally produce harmful instructions or biased content.
- Has limited knowledge of the world and events after 2021.

ChatGPT has gained widespread popularity for its ability to generate realistic, coherent and sometimes even witty responses to open-ended questions and prompts. It has been used in various applications, such as chatbots, virtual assistants and language-related research.
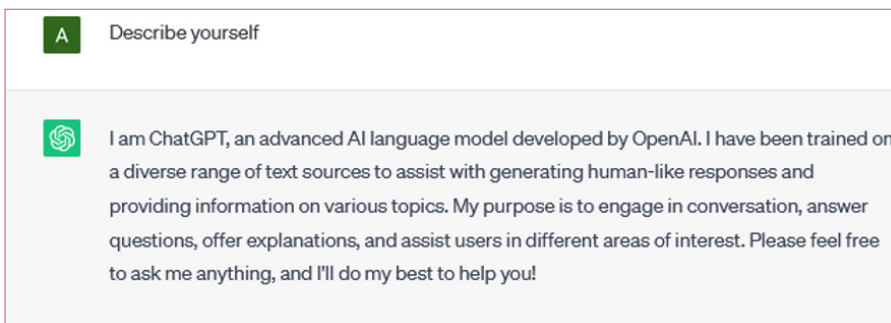
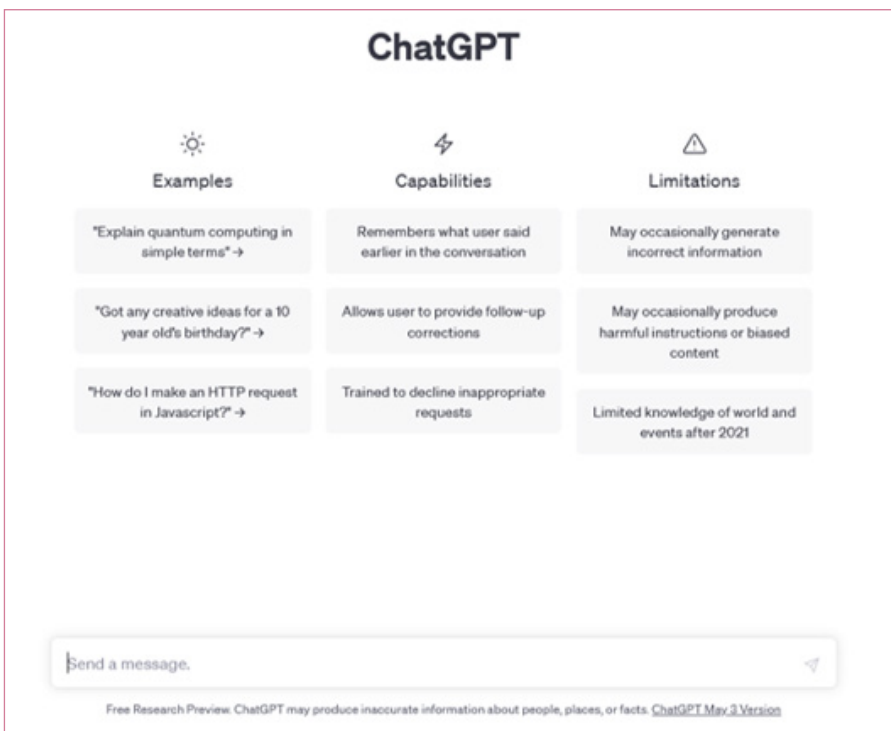Figure 1. ChatGPT response to being asked "Describe yourself".

Figure 2. ChatGPT interface with stated capabilities and limitations.
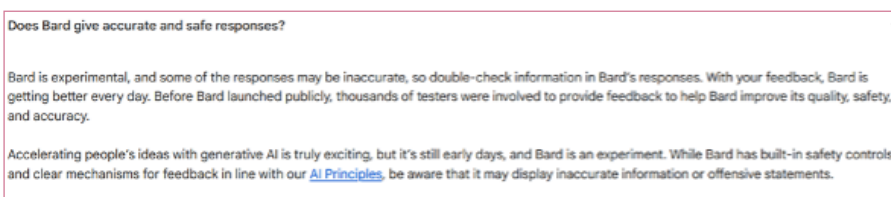

Figure 3. Bard interface.

Figure 4. Bard frequently asked question about whether it produces accurate and safe responses.

As Homolak (2023) states: "The hype surrounding ChatGPT is not unjustified: the model is (still) free, easy to use and able to authentically converse on many subjects in a way that is almost indistinguishable from human communication."

Research on ChatGPT is in its early stages. "Some patients could find ChatGPT a handy and approachable method to get information and assistance while figuring out how to manage their disease" (Javaid et al, 2023).

Bard

"Google officially debuted Bard, its AI technology, with the goal of competing with Open AI's well-known ChatGPT-3 language model" (Ram and Verma, 2023).

Bard can also be described as an advanced AI language model that engages in conversation, answers questions, offer explanations and can assist users in different areas of interest based on text input. The Bard interface is similar to ChatGPT (*Figure 3*).

Bard's limitations are stated on the website (Google, undated b). One of the frequently asked questions is: "Does Bard give accurate and safe responses?" The answer includes the fact that Bard is experimental and some of the responses may be inaccurate. Users are encouraged to double check the information obtained from Bard (*Figure 4*).

Google has published principles for AI that include several objectives, stating: "While we are optimistic about the potential of AI, we recognise that advanced technologies can raise important challenges that must be addressed clearly, thoughtfully, and affirmatively:
1. Be socially beneficial.
2. Avoid creating or reinforcing unfair bias.
3. Be built and tested for safety.
4. Be accountable to people.
5. Incorporate privacy design principles.
6. Uphold high standards of scientific excellence."

Future research directions

In the context of lymphoedema care, future research possibilities include investigating generative AI for:
● Health education purposes: ChatGPT or Bard may be used to provide information about the causes, symptoms and treatment of lymphoedema. This
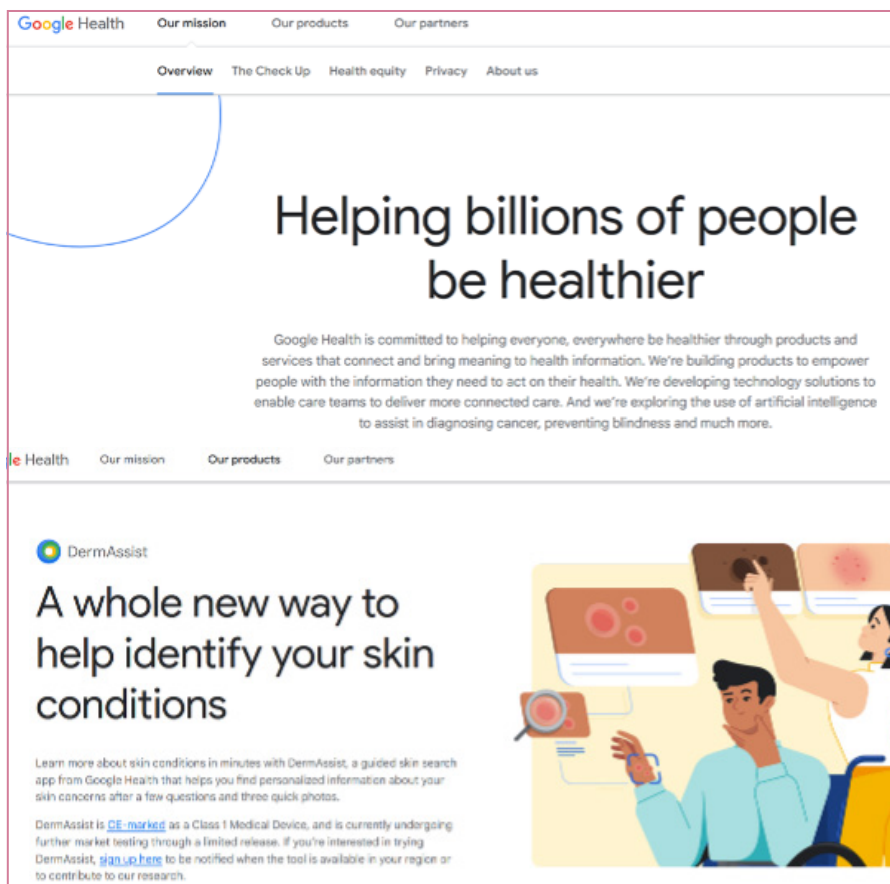
Figure 5. The online description of Derm Assist by Google.

information can help patients and health practitioners to understand the condition.

- Virtual support: ChatGPT or Bard may be used to provide virtual support. Ayers et al (2023) compared the responses of physicians and chatbots to patient questions posed on a public social media forum. The quality and empathy ratings of chatbot responses were significantly higher than those of physician responses. While this is a promising result there need to be further studies on a much larger population group to validity and reliability of responses.
- Condition tracking and health condition diagnosis: Google Health, for example, is a personal health record platform

that uses generative AI to help patients manage their health (*Figure 4*). Google Health can be used to track health data, set goals, and find information about health conditions. "We're developing technology solutions to enable care teams to deliver more connected care. And we're exploring the use of artificial intelligence to assist in diagnosing cancer, preventing blindness and much more" (Google, undated c).

Considering that lymphoedema is known to cause skin abnormalities, an example of a relevant application under Google Health may be Derm Assist (*Figure 5*) which is being researched. The use case is that patients can diagnose skin conditions

through taking photos of their skin. Advertised as a Class 1 medical device undergoing research Google states the technology is "a guided skin search app from Google Health that helps you find personalized information about your skin concerns after a few questions and three quick photos".

Applications such as this may, in the future, allow patients to take photos of their limbs and receive information on a likely diagnosis.

As generative AI technologies continue to develop, further innovative and effective ways to use AI to improve healthcare may be developed.

Conclusion
Generative AI is a rapidly advancing area of digital technology. Further research is warranted in this innovative area.

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