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ChatGPT in Ophthalmic Practices: An Overview

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Abstract

Due to advancing technology, artificial intelligence (AI) models have begun to revolutionize various aspects of our lives, including scientific and clinical research. Here, we attempt to review different journals regarding on the uses and limitations of ChatGPT in the medical services as well as Ophthalmology. In November 2022, the introduction of ChatGPT's responses to assess its potential in contributing to innovative oculoplastic research. In November 2022, the introduction of ChatGPT by OpenAI captured worldwide public attention. ChatGPT is a large language model (LLM) that provides human-like text content using statistical patterns from an enormous database of textbooks, articles and websites. It can gather and analyze information, such as medical history, symptoms, and signs, to offer precise preliminary diagnosis and medical guidance.

Keywords: ChatGPT; Large Language Model; Medical; Ophthalmology; Oculoplasty

Abbreviations

AI: Artificial Intelligence; LLM: Large Language Model; RLHF: Reinforcement Learning with Human Feedback; PPO: Proximal Policy Optimization.

Introduction

ChatGPT is a kin model to instructGPT, and a recent modification of artificial intelligence (AI), based on a large language model (LLM) application of Reinforcement Learning with Human Feedback (RLHF) [1,2] ChatGPT is trained to provide a rapid, detailed response following instructions. It has taken the universe by storm since it launched in November 2022. ChatGPT has developed human-machine interaction to the next magnitude. The program usually mimics human conversation in a dialogue format and responds to questions or statements with intelligent-sounding texts [2]. The program was developed by 'OpenAI' (San Francisco, USA), and access is easy and free. The dawn of ChatGPT has augmented the dispute on the restraints of artificial intelligence and the possible threats to humans and their innate intelligence. ChatGPT performed well on a simulated ophthalmic assessment, but domain-specific pretraining of LLMs may increase performance in ophthalmic sub-specialities [3]. It also helps to write the documentation of the patients, postoperative discharge summary, case summary, PowerPoint presentations, and manuscript writing of a research paper. Here, we describe the overview of the applications and limitations of the ChatGPT in the medical services and in the Ophthalmic arena.

How Does it Work?

ChatGPT (Table 1) is a trained model using RLHF, using the same methods as InstructGPT. There is a little difference in the data acquisition setup. A trained model using supervised fine-tuning: AI trainers play a role on both

sides, like the users and an AI assistant. The InstructGPT is a typical formation of RLHF for language modelling, includes the following stages: (a) Pre-instruct an LLM using supervised training, Train a recognized model based on the pre-instructed LLM using RLHF, and Precise-tune the existing LLM based on the learned recognizing model using Proximal Policy Optimization (PPO) [4].

Features	
Model Type	Generating Text Model specializing in dialogue
Training Methods	Transformer architecture
	Trained on dialogue and human demonstration datasets
	Trained using supervised fine tuning + RLHF
Base Model	GPT 3.5 (Text & Speech), Upgrade model: GPT 4 (Text, speech & Image)
Main Applications	Generate Text Content, Text Summarization, Chatbots, Write and Debug code, Dialogue systems
Availability	Free Limited online App, Paid ChatGPT Plus subscription, Paid API

Table 1: The features of ChatGPT.

The potentiality of ChatGPT in Academic and Clinical aspect of Medical Services

The performance of ChatGPT thrusts the scientific universe and the health community to perform intelligible medical examinations and make scientific manuscripts [5]. ChatGPT can be used in multiple dimensions of the healthcare system, including preparing an academic module and developing a discharge certificate with case summaries and imaging reports. It is also simplified for generating medical reports, helping to interactive computer-based diagnosis, and consultancy [6-8]. However, there are a few limitations; the potential of ChatGPT is helping to improve the next generation of medicine and research publication positively. A universal guideline is a present issue in terms of its efforts and legitimacy [9]. An extensive survey was carried out of 2184 physicians in the USA who have reported disease course, discharge diagnosis, medication, follow-up sections, and summary of the case. All are important categories which are required to be mentioned in discharge summaries [9]. The high-quality discharge summary is an important issue that cannot be disregarded due to our time constraint factor and workload burdens to junior officers. ChatGPT can help to overcome these potential issues. Good training in the program on ChatGPT can help build a diagram for every operative procedure and medical condition in a standardized structure, style, and high-yield pattern. The rapid auto-generation by ChatGPT and a human identification of well-constructed automated discharge notes would reduce the time spent on patient care and overworked healthcare systems. A tremendous task is needed for the performance of ChatGPT to be part of the routine healthcare process that churns out case reports, operative notes, and discharge notes by pressing a button. Focused training of the ChatGPT program on specific disorders and patient-specific information, incorporating electronic medical record systems, patient data protection and their management procedures, is an important tool for developing the potential use of artificial intelligence in our medical practices [10,11].

The uses of ChatGPT in Ophthalmology

The ophthalmology arena has observed significant progress in recent years, with revolutionary technologies and management transmuting how eye care is delivered. The aforementioned inventive development is the integration of AI in the form of ChatGPT, a large language model developed by OpenAI. This visionary perspective on ophthalmic care has the potential to revolutionize the industry, improving patient satisfaction and outcomes and magnifying the overall productivity of ophthalmic practices [12] Few reported articles have been published on ChatGPT uses in Ophthalmology, and we have summarized all available articles for readers.

A study reported that ChatGPT's performance is good in the context of ophthalmic practices, including surgical notes and discharge summaries. Still, there is a need for it to be specifically trained and re-trained in these perspectives, which requires the responsibility of both the developers and the users [2]. The responses of ChatGPTs regarding patient data on retinal diseases reported that it is highly accurate for information on disease prevention and prognosis, with fewer responses on treatment options [11-15]. Ali MJ, et al. [10] quizzed ChatGPT on different lacrimal drainage system disorders and reported average overall performance [10].

However, the stirring fact is that ChatGPT is inclined to allow mistakes and error-free them when presented with different prompts and premises [2]. ChatGPT is a powerful language AI model trained on huge numbers of unlabeled data from the internet, demonstrates upgraded accuracy in answering ophthalmology questions [3].

ChatGPT's performance in generating ophthalmic discharge summaries and operative notes is being praised and encouraged. ChatGPT's accuracy in diagnosing patients with primary and secondary glaucoma, using specific case examples, was similar to that of senior ophthalmology residents. ChatGPT-4 provides accurate responses on definitions, prevalence, risk factors, treatments, surgery success rates, post-op details, and vision recovery after ocular surgery. ChatGPT 4.0 diagnosed corneal eye diseases with an 85% success rate, compared to 60% for ChatGPT 3.5 [16-19]. Using AI systems has been remarkable in identifying non-surgical conditions in radiologic images. GPT-4 can process images, utilize deep learning, and handle big data, unlike GPT-3.5. This helps to enable more accurate analysis of radiological images, like as X-rays and Computed Tomography (CT) scans. It identifies and separates structures like organs, tumours, and vessels and calculates size and vascular constriction parameters. This enhances surgical procedures, diagnostics, planning efficiency, safety, and postoperative care in various surgical fields [3,12,20-25]. A study found that ChatGPT provides accurate, reliable, and easily accessible information on various oculocial aesthetic procedures [21].

Limitations

- The supervised training may mislead the model because the ideal answer depends on what the AI Model instructs in the questions and answers.
- ChatGPT is sensitive to a sharp twist in phrasing or trying the same input multiple times. For example, the AI model can state that it does not know the answer after one phrasing of a question but can respond correctly given a rephrase.
- The AI Model may be excessively wordy and overuse certain phrases.
- The model may respond to injurious instructions and show biased behaviour [21,25,26].

With several limitations of ChatGPT, it helps in the rapid learning process, preparing case summaries quickly. The expanding abilities of ChatGPT will overcome most limitations but not all of them [2,6]. The potential for such innovative technology to revolutionize medical science is high. The recent version of ChatGPT is ChatGPT Plus. ChatGPT Plus is a recent version of the AI chatbot ChatGPT. ChatGPT Plus features include easier access to ChatGPT, even in peak hours, faster response than previous models, and advanced and advanced access to recent features and improvements [27].

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