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Ethical and Practical Dimensions of MedicalBot

Advancing Healthcare with ChatGPT-derived chatbot

Ethan Yifan ZHU

u7560434

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School of Computing,
College of Engineering, Computing and Cybernetics,
The Australian National University

1 Introduction

A new age has arrived with the fast growth of artificial intelligence (AI). Now it has been integrated into numerous industries, including the healthcare industry (Väänänen et al., 2021). One of these developments is the creation of intelligent chatbots. They are computer programmes that comprehend and provide replies using a text-based interface. And they are regarded as potential to improve healthcare and patient care (Holmes et al., 2019). Launched in November 2022, ChatGPT is based on the generative pre-trained transformer (GPT) architecture and is associated with chatbots (Brown et al., 2020). The far-reaching consequences of it can be described as a paradigm shift in healthcare practice (Sallam et al., 2023).

MedicalBot is a chatbot branching from the well-known ChatGPT technology. This essay will explore the concept, ethical considerations, and managing ethical aspects of MedicalBot. It will serve as a virtual healthcare adviser, and provide support for a range of patient care needs.

2 Project Description

In this part, we are introducing a mythical project MedicalBot. It is a chatbot derived from ChatGPT and it serves as an advisor in the medical field when patients reach for help.

2.1 Project Aim

MedicalBot aims to improve patient care by acting as a helpful digital healthcare assistant. It focuses on three aspects: personalised health monitoring, effective information hub, and mental health support.

For personalised health monitoring, MedicalBot actively monitors and responds to individual health needs. Vital signs, activity levels, and health indicators can be monitored by using data from wearable devices and self-reported information. By using these data and indicators, it aims to provide individualised lifestyle recommendations, medication alerts, and health concern early warning systems.

For the effective information hub, we treat MedicalBot as a reliable health information centre. It can access a vast repository of medical information, including disease explanations, treatment options, and health tips. It would integrate advanced natural language processing (NLP) capabilities to understand and accurately respond to a wide range of health enquiries.

For mental health support, it serves as a sympathetic virtual assistant providing emotional and mental health help. In this section, sentiment analysis is used to identify emotional indicators in user messages. It will provide advice on how to manage stress, anxiety, and depression as well as self-help resources and when to get help from a professional psychological therapist.

2.2 Method

MedicalBot uses advanced data mining and processing techniques combined with natural language processing (NLP) to interact with patients conversationally.

Data mining techniques play a key role in the relevant pattern extraction from huge datasets, including wearable device and patient input datasets. Personalised health monitoring relies heavily on this method to get health indicators. MedicalBot also uses real-time data processing techniques to guarantee that health monitoring is up-to-date and pertinent to the user's immediate needs.

The NLP methods are utilised to understand and respond to a wide range of health-related questions. Processing user questions and complex medical language is essential to deliver information that is understandable and helpful. The system is also designed to learn from user interactions, which will enable it to improve the accuracy and relevance of its replies over time.

2.3 Data Source and Nature

Medical databases and user inputs are two major data sources. It uses user self-reported health data as well as data from wearable devices, e.g. heart rate and sleep habits, to provide personalised health monitoring. It uses data from the user's interactions as well. The interaction data includes the textual content, the sentiment and tone etc. Besides, it has access to medical databases that contain details on general health information.

The nature of the data used by MedicalBot is highly sensitive and confidential. Strict data security and privacy regulations are required since they contain personal lifestyle information, health and medical records, and emotional expressions. MedicalBot strictly complies with all healthcare privacy laws and regulations, including GDPR (Rahime Belen Saglam and Jason, 2020) and HIPAA (Li, 2023), while collecting and processing data.

2.4 Authority of Data Access

MedicalBot's access to patient data is strictly based on both user permission and legal compliance. To follow data protection regulations such as the GDPR and HIPAA, it obtains users' informed consent before gathering and using their data. Users have a clear understanding of how their information will be used according to this transparent permission-granting procedure.

2.5 Expected Use and Impact

Within its three main features, MedicalBot's main purpose is to enhance patient care. It provides personalised health recommendations and warnings to enhance individual health management. As a central source of information, it helps patients comprehend their health conditions and give available treatments. Besides, its sentiment analysis tool provides emotional support for mental health. It would guide users on mental well-being and when to get expert assistance.

Beyond the first expectation, healthcare providers and researchers could analyse this data as well. It will help to gain insight into public health patterns and maybe improve service delivery and healthcare policy. However, this expectation involves ethical consideration. Ensuring that patients are aware of how their information is being used is crucial. Informed permission must be given for every data usage. Furthermore, to preserve privacy, the sensitive nature of the data must adhere to ethical standards and privacy legislation.

In terms of societal impacts, MedicalBot makes health information and assistance easily accessible, particularly in places with little healthcare resources. This aligns with the broader goal of enhancing public health services. However, ethical data usage and technical innovation must coexist. We need to find a balance between these two factors.

3 Ethical Considerations

We would examine MedicalBot compliance with major ethical frameworks. Particularly with the Australian Privacy Principles (APP) and the UNESCO Recommendation on the Ethics of Artificial Intelligence. These frameworks make sure that MedicalBot operations are moral, considerate of user rights, and align with society norms.

3.1 Ethical Principles and Values

The UNESCO Recommendation on AI Ethics focuses on how AI is affecting many social sectors, including healthcare. This recommendation emphasises respect for human dignity, human rights, and basic freedoms. When giving medical advice, MedicalBot should respect human dignity and recognise human rights and freedoms especially when it involves the protection of medical data.

3.2 Privacy and Data Security

Chatbots for healthcare gather health data and communicate with patients. Data security and privacy are requirements for this procedure (May and Denecke, 2021). MedicalBot relies on processing personal information, like medical records and biometric data. Following the Australian Privacy Principles (APP), his project should use strong data security methods to protect sensitive health information. It requires user permission for data collection and usage. Users should be informed about data usage, storage, and their rights to revoke consent. Only approved systems and persons can access the data. Additionally, the project should be aligned with international data protection laws such as GDPR and HIPAA. All these methods provide robust frameworks for data security.

3.3 Bias and Fairness

Biases in training data may result in mistake tolerance, the marginalisation of some groups, and the exclusion of groups from the tool's development and governance

(Fournier-Tombs and McHardy, 2023). The difficulty for MedicalBot is to provide health advice free from bias based on age, gender, or ethnicity. It should guarantee that algorithms are trained on a variety of datasets. Additionally, to detect and address any new biases, there should be constant monitoring and upgrading of AI models.

3.4 Transparency and Explainability

One problem is that customers have little understanding of how models make certain judgements due to the lack of transparency behind chatbots (Du, Liu and Hu, 2019). Because AI in healthcare is so complicated, it must be transparent and comprehensible. MedicalBot should be intended to be transparent about how it operates and makes decisions. It should ensure that the AI's health suggestions are clear and understandable.

3.5 Ethical Dilemmas

One of the ethical dilemmas AI will cause is unemployment. The public is concerned about which occupations will be redundant and eventually vanish as AI becomes more prevalent (Gezgin, 2023). By presenting itself as an additional tool intended to complement rather than replace human medical experts, MedicalBot must face this ethical dilemma. The intention is rather, will improve their capabilities, efficiency, and decision-making processes. MedicalBot can provide initial diagnostic suggestions, while medical experts provide the final judgement and decision-making authority.

4 Managing Ethical Aspects

We will consider both technological and non-technological solutions to address the ethical issues previously mentioned.

4.1 Technical Approaches

4.1.1 Interpretable Machine Learning

An important technical strategy is to use interpretable machine learning methods (Du, Liu and Hu, 2019). These methods can be categorized into two groups: intrinsic interpretable and post-hoc interpretable. The first method is called intrinsic interpretability. It builds models, such as decision trees or linear models, that have built-in explainability. The second one is called post-hoc interpretability. It means creating more models that can clarify how complicated algorithms make decisions. This approach helps increase transparency and build user confidence by providing clear explanations about data analysis procedures and judgment processes.

4.1.2 Bias Reduction

It is essential to use comprehensive ways to remove the bias in medical generative AI (Hastings, 2024). This is not about simply including more data in the training dataset. The techniques in pre-processing and post-processing must be unique for

each task since these are highly efficient methods. If we are speaking about critical tasks such as diagnostic reasoning, then an unbiased external source would serve to strengthen the model's credibility. One should take extra caution when engaging in activities that require subjective patient assessments. It would be better to carefully use the technology until more effective techniques for mitigating bias are developed.

4.2 Non-Technical Approaches

4.2.1 Procedural Measures

Robust procedural standards must be established and followed in ethical data mining (Cios and William Moore, 2002). Creating detailed protocols for each stage of data handling is important, i.e. from data collection to processing to application. Ensuring that users are informed about the purpose and consequences of the use of their data is crucial to this process. Similarly, this process would also include establishing a delineation between access to data resources as well as providing guidelines on sharing and storage facilities.

The management of data breaches or improper handling is important as well (Culnan and Williams, 2009). This requires a well-defined reaction plan that involves informing those who are impacted and acting quickly to correct the situation. In addition to protecting users, it increases confidence in the system's ability to handle data responsibly.

4.2.2 Governance Frameworks

Governance frameworks are crucial in the surveillance of the ethical aspect of data mining (Al-Badi, Tarhini and Khan, 2018). This is done by putting in place a particular committee or group that ensures legal and ethical standards. Such an organization would be necessary for reviewing and approving data mining projects, monitoring continuing operations as well as making necessary adjustments.

Ideally, the governance structure should be diverse enough to include among others: data scientists, ethicists, legal experts and even patient advocates. Its integrity can further be improved through external audits and reviews.

4.2.3 Educational Approaches

The educational approaches focus on raising awareness of the ethical issues involved in data mining. Staff training sessions should include the security, privacy, and confidentiality of patient data as well as methods for making moral decisions. It is also essential for all staff to continue learning through seminars and workshops. It will keep them up to date on the latest ethical norms and technologies. This continuing education helps achieve a high level of ethical conduct.

5 Conclusion

MedicalBot is a notable development in healthcare as a derivative of ChatGPT technology. It provides efficient information sharing, mental health assistance, and personalised health monitoring. Although it has to deal with a complicated ethical framework, it shows its potential to improve healthcare area.

This essay emphasised MedicalBot's adherence to data protection, privacy, and bias reduction, which is consistent with frameworks such as HIPAA and the GDPR. It also covered ethical dilemmas, particularly those of employees in healthcare. Most importantly, MedicalBot's ethical management involves both technical approaches and non-technical approaches. These methods guarantee transparency, fairness, and ethical standards.

To sum up, MedicalBot is a cutting-edge illustration of how artificial intelligence might improve healthcare, as long as it carefully handles ethical difficulties. As technology develops, MedicalBot will have the potential benefits. It will combine AI with human knowledge and provide a way where healthcare is both cutting-edge and morally sound.

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