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THE APPLICATION CHATBOTS IN MEDICAL PURPOSES

Abstract: *This article discusses the use of chatbots in medicine. The architecture of creating the chatbot, as well as the possibility of introducing the option of empathy to the user into the chatbot are considered. Two studies in this area were analyzed. Based on them, conclusions are drawn about the attitude of people towards chatbots in the field of medicine.*

Keywords: *chatbots, medicine, healthcare, the architecture of chatbots.*

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ПРИМЕНЕНИЕ ЧАТБОТОВ В МЕДИЦИНСКИХ ЦЕЛЯХ

Аннотация: *В данной статье рассматривается использование чат-ботов в медицине. Рассмотрены архитектура разработки чат-бота и метод, позволяющий возможность эмпатии пользователю в чат-боте. Также проанализированы исследования в этой области. На их основе делаются выводы об отношении людей к чат-ботам в области здравоохранения.*

Ключевые слова: *чат-боты, медицина, здравоохранение, архитектура чат-ботов.*

Introduction

The technology of AI (artificial intelligence) in healthcare has a high potential for improving the quality of medical care and improving results of patient's treatment. A chatbot as one of the models of artificial intelligence is being implemented in various domains of activity. A widespread use of chatbots has helped to begin the introduction of this technology into medical facilities. The use of chatbots in medicine affords an opportunity to optimize the daily work of medical practice and resource savings of the clinic, giving nurses and doctors free time. With the development of technology and the accumulation of large amount of medical data, it has become possible to create smarter bots that analyze patient responses and ask clarifying questions on their basis.

However, despite the availability of chatbots and the possibility of using this technology 24/7, not all patients are ready to trust the machine in matters related to health. There is also a problem in developing chatbots. The development of a chatbot response algorithm can be difficult because of technical difficulties.

An architectural framework of a chatbot

The architectural framework of a chatbot is a three-tier architecture with a user interface (UI) component, the bot application core, a personality processing module, and external data sources and services.

There is an individual UI for every bot. UI is a first impression about the program.

The core contains the logic of the bot and is implemented with a combination of available platform services, like conversation services. These services complement the basic dialog, improve user experience and provide alternative means to interact with the bots. The core also contains the dialog logic itself, which handles the progress of the exchange between the bot and the user. With help of this, the bot can handle memory, keep track of the user-provided context for answers.

The personality of cognitive agents plays an important role in subsequent credibility from the users. Chatbots should not only accurately handle user answers but also approach to each user. The personality processing module is responsible for this.

Another equally important components are external data sources and services. The external data sources and services have an important role to provide dynamic content for the bot and improve its human-like behavior and subsequently increase user engagement [1, p. 78-79].

The attitude to chatbots

For the introduction of cognitive agents in health facilities, it is important to know the attitude of people to this system. As part of the research, it was held two surveys: the first survey was among the University of Southampton students, the second survey was posted on the site. When analyzing the answers, qualitative data were organized into three themes: «Understanding of chatbots», «AI Hesitancy» and «Motivations for health chatbot» [2, p. 4].

Some interviewees noted that they had heard about the use of chat bots in social media but did not represent how they functioned technologically. One of the main criteria of mistrust is the lack of empathy for the patient in the bot and the lack of the ability to feel human emotions. As a result of this, people think that bots can give unreliable advice that will not help in the treatment. However, respondents noted the opportunity to ask questions of an intimate nature, which may be embarrassing to ask a doctor, which allows you to get advice from a virtual assistant. Many noted a convenient chat format in the form of a web chat, which allows you to get a consultation 24/7.

In general, people are ready for chatbots as an intermediary between a patient and a doctor. 65% of respondents believe that using virtual assistants is a good idea but it needs more information about bots so that users understand the technology.

Emotion-Sensitive Conversational User Interfaces

The classification of user statements in the context of a chatbot is an important step for automatic, appropriate answering of user statements by a chatbot. Bern University of Applied Sciences researchers created classification of emotions. The concrete task is to categorize a user statement into predefined emotional categories. There are seven axes of emotions (disgust, joy, surprise, anger, fear, sadness, contempt). Using the recursive neural network, the bot detects the emotions. The

emotion analysis algorithm analyzes a user input. The resulting polarity vector with strength per emotion class is used to select the corresponding answers based on predefined selecting metrics. These answers can be randomly selected from a pool of matching answers to make the conversation more natural. The answer is displayed on the user interface of the application. In this way, the conversation can be continued coherently considering the emotional fluctuation of users [3, p. 1166].

SIML is used to build the chatbot's brain in researchers' work. It is a derivative of Extensible Markup Language (XML) and can react to user input, collect and manage data, learn from it and generate new content for conversations [3, p. 1165].

The using cognitive agents in mental healthcare

One of the main goals of WHO (World Health Organization) is to improve the mental health of the population. However, access to services of mental health remains a problem for all countries. Depression is becoming the most common mental illness, and suicide continues to rise in countries with average and low living standards. Unfortunately, there is currently a lack of clinical workforce. However, with the increasing use of chatbots, chatbots began to appear, which may be personal psychologists. Popularizing such chatbots could reduce the risk of mental disorders and have the future in therapy [4, p. 457].

In order to learn about the possibility of using cognitive agents, American authors conducted studies where they analyzed data from PubMed, EmBase, PsycINFO, Cochrane, Web of Science, and IEEE Xplore [4, p. 458]. Participants in researches noted an improvement in well-being when talking with chatbots. They also note that the chatbot is a good alternative to psychologists when there is no financial opportunity to this.

Even though the study accepted a few numbers of respondents, we would like to note that the development of chatbots in psychotherapy could have a positive effect on the mental well-being of the population, noting such advantages of this technology as accessibility and anonymity.

Conclusion

Chatbots are already used in everyday life, but there is still a lack of confidence in them, which makes it difficult to increase the number of users. In medicine the requirements for the chatbots are increasing as people demand higher requirements. However, due to distrust of AI technologies, they are not in a hurry to introduce them into widespread use, which does not allow us to benefit from the advantages that they can offer. A chatbot is not a substitute for doctors. A chatbot is an assistant to patients and doctors, their facilitator. It can help to collect a medical history, help to find the right doctor, advise where to turn for help and support in difficult situations. We think that in future, communication with artificial intelligence will become commonplace in the field of medicine and this will increase the quality of service, reduce the number of incorrect diagnoses and, as a result, improve the quality of people's life.

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