Chatbots in Healthcare

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Abstract: Chatbots, as part of AI devices, are computer programs designed to carry on a dialogue with users using natural languages. Healthcare has become an attractive market for chatbot applications. The main purpose of healthcare chatbots is to help patients in less time and for less money than it would take to see a medical professional. Healthcare chatbots have great potential, but they still have a long way to go to win over consumers. This paper provides a brief introduction on the uses of healthcare chatbots, including their benefits, challenges, and risks to patients.

Keywords: *Chatbot, Healthbot, Healthcare Chatbots*

I. INTRODUCTION

Technology has transformed our modern society, pushing new boundaries every day. Virtually anything can be accessed via a computer or app. The development of conversational system as a medium of conversation between human and computer has made a great stride. Healthcare providers are now offering telemedicine options like chatbots. The whole idea of visiting the physician or nurse in person is gradually fading away [1].

Healthcare is important for leading a good life. In the US, healthcare is a highly rapidly developing field. The healthcare industry has seen a wave of emerging technologies such as AI, Internet of things, and 3D printing with significant potential to alter and disrupt the sector. It is moving toward personalized care, where patients are expected to take more control of their own health. This is something that can be accomplished with machine learning technology.

Chatbots (also known as a talkbots or chatterbots) are artificial intelligence (AI) programs designed to simulate human conversation via text or speech. They are also known as conversational agents, interactive agents, virtual agents, virtual humans, or virtual assistants [2]. Chatbots are becoming more prevalent in our daily lives, They have revolutionized some industries like marketing, business, retail, insurance, customer care support. They can be used in various fields like education, healthcare, route assistance, business, market, stock, banking,customer care, counselling, recommendation systems, support system, entertainment, brokering, journalism, online food and accessory shopping, telecom, travel, and many more [3]. Chatbots are gradually being adopted into the healthcare industry. Chatbots are effective tools in healthcare due to their simplicity in interaction.

II. CONCEPT OF CHATBOTS

The first chatbot (Eliza) was developed in 1966 by Joseph Weizenbaum for the people who have psychological issues. Since then, Chatbots have gained popularity in all the domains such as banking, e-commerce, healthcare, education, and smart homes [4]. A chatbot describes a computer system or the situation in which human is chatting with the robot (computer). Chatbots may be regarded are mimic systems which imitate the conversations between two individuals. They employ different degrees of human-like appearance and behavior, such as facial expressions, compassion, humor, and tone of voice. Thus, chatbots are computer programs with a conversational user interface capable of emulating natural, conversational interpersonal exchange. Fueled by artificial intelligence (AI), chatbots are becoming a viable option for human–machine interaction.

Healthcare chatbot can diagnose the disease and provide basic details about the disease before consulting a doctor. It is designed to reduce the healthcare costs and improve accessibility to medical knowledge. The healthcare chatbot is an entity which imitates human discussion using AI. Figure 1 illustrates a text-based healthcare chatbot [5]. An AI-based chatbot has three domains: databases, natural language processing (NLP), and machine learning (ML). Mostly chatbots are some kind of computer programs that use natural language processing (NLP) for interpreting the user input and generating the corresponding response. In other words, NLP helps users to submit their problem about the health. The aim of the system is to replicate a person's discussion. Chatbots interact with users using natural languages. Chatbot may ask a list of symptoms and relevant information such as age and sex. The system provides response by use of an efficient Graphical User Interface (GUI). The GUI is an artificial creation invented to enable interactions between human and computers. The chatbot system helps users to freely submit their complaints and queries regarding health by voice .since customer satisfaction is the major concern for developing this system [6,7].
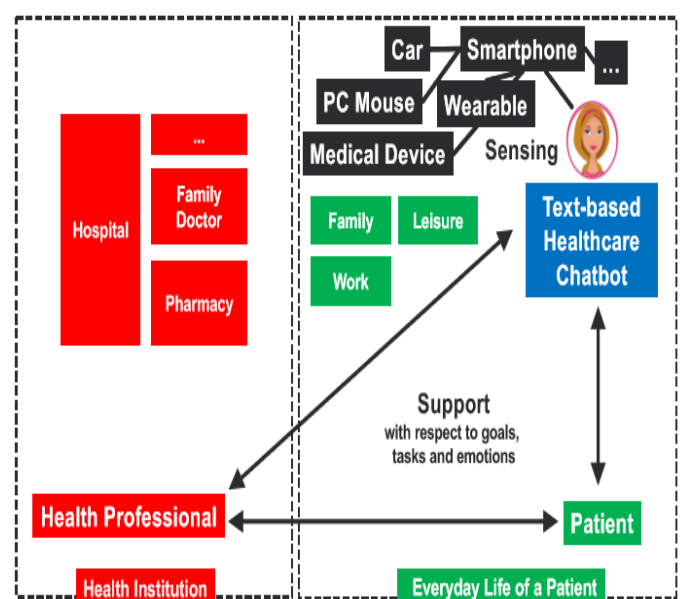

Figure 1: A text-based healthcare chatbot [5].

One may also regard a chatbot as a software system that allows you to simulate real conversations between devices and users by means of a conversational interface [8]. Chatbots use three

types of conversation styles [9]: static, semi-automated, and fully-automated conversation dialogue. The static conversation style is rule-based and it is easy to build. Automated refers to the generative-based model, which uses deep learning models to build interaction. This is very complex and requires a lot of training data. The semi-automated automates some parts while the rest is handled by a human.

III. APPLICATIONS

Chatbots generally are used for the intelligent assistant applications. They can act as automated conversational agents, capable of promoting health, providing education, and potentially prompting behavior change. They have been applied in health education, diagnostics, and mental health. The chatbots can handle several healthcare needs, such as personalized medical follow-up, communication and transmission of test results, dissemination of information, advice patients, and provide patients with more information about the products they use. They can be used by clinicians to easily retrieve information about drug interactions and side effects and streamline the interaction with electronic health records. For patients, chatbots perform customer service tasks such as booking appointments. Although chatbots are not designed to offer diagnoses, patients can turn to them to identify symptoms and recommend further actions [10]. The cancer chatbot would help cancer patients to clarify their doubt regarding cancer. According to WHO, cancer is the second major cause of death. Figure 2 shows some examples of what chatbots can do [11].
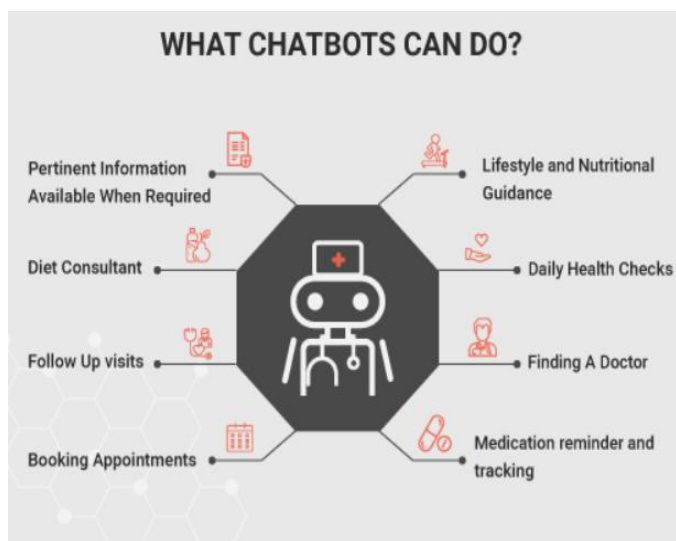

Figure 2: Typical examples of what chatbots can do [7].

Today, chatbots are offered by Apple (Siri), Amazon (Alexa), Google (Assistant), Microsoft (Cortana) or Samsung (Bixby). Most of them are marketed without any specific use in mind. They can answer questions about knowledge stored in their data base, place orders, play music for you, manage appointments, etc. Chatbots with a health focus include Florence, Molly, Lark, Babylon, Melody, Koko, and Dara. For example, BABYLON has claimed that its chatbot performs as well as human doctors at providing patients with health advice [12].

IV. BENEFITS AND CHALENGES

Chatbots bring several benefits: anonymity, asynchronicity, personalization, scalability, authentication, consumability, etc. [13]. Chatbot is the perfect way to deliver personalized patient care. The benefits of using chatbots in health include providing a personalized diagnoses based on symptoms,

improving patient education and treatment compliance, increasing access to healthcare, improving doctor–patient and clinic–patient communication, reducing healthcare costs, and improving accessibility to healthcare information. Chatbots could become a surrogate for nonmedical caregivers. Healthcare chatbots, can help with diagnostic decision support.

There are still some issues to be resolved about the uses of the technology. Chatbots suffer from performance issue due to limitations with their programming and training. Chatbots cannot display human emotion. Fears have been expressed that chatbots could eventually replace the physician or interfere with the patient-physician relationship. While chatbots can handle many simple or repetitive task, robots will never replace humans. Data security and personality are crucial elements for building user confidence in the chatbot. Building natural language interaction with a chatbot is still complicated.

CONCLUSION

Chatbots are becoming increasingly popular as a human-computer interface as well assmart healthcare tools. Chatbots in healthcare industry are still in early stage of implementation. Their future will largely depend on how they are perceived by healthcare professionals and patients. Future chatbots will reliably, accurately, and cheaply diagnose patients, recommend treatments, and even prescribe medication for the patient. More information on healthcare chatbots can be found in *Chatbots Magazine*.

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