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MediBot: A Primary Telemedicine Approach for Basic Ailments

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Abstract - *A Medical Chatbot gives patients the accessibility to a doctor's advice while sitting at home for minor or major health-related issues. This efficacious technique records the input given by the patient in the form of audio or text and gives an audio-visual output to the patient which consists of information or medical measures that have to be taken for the patient to be cured at home. In this manner, the patient does not necessarily have to visit the doctor for major or minor health ailments and can be rehabilitated by taking generalized medicines or home remedies. This approach includes implementing a real-time medical chatbot using Python programming. It is a software program that is used to interact with patients using Natural Language Processing via text or text to speech format or speech to speech format. This chatbot records text and audio signals and gives an auditory and visual output which provides information to the patient about what should be done and what care and medicines should be taken for the symptoms provided by the patient. This approach aims to solve real-life problems like delayed diagnosis, inadequate patient engagement and struggles to meet the growing demand for medical services which often result in long waiting times and detained treatments which could at times be very vital when it comes to a patient's health.*

Key Words: **Medical Chatbot, Natural Language Processing (NLP), Python Programming**

1. INTRODUCTION

In recent times, the need for a dependable and unerring diagnosis without the need to physically consult a doctor dictates the need for medical devices such as a chatbot. The basic principle of a chatbot is to reciprocate the discussion that occurs between a doctor and a patient when the patient is not feeling well [1]. Chatbot was derived to represent two main accredits mainly instead of the conversational attributes and "bot" is the short form for robot. They are automated programs that execute a certain set of instructions according to the convenience of the user [2]. If we take the COVID-19 scenario into play, providing healthcare and facilities to a huge number of people that too at once had become one of the major problems faced by a substantial number of countries. Timely treatment when not provided to people affected by the pandemic also increased the death count or mortality [3]. Chatbots have been prevailing for a long time and since the development of Eliza in 1960, they have been used for a variety of purposes and in many domains [4]. In India, the condition of rural areas is drawing increased attention to the use of medical chatbots. The natives in India suffer to a huge extent and end up losing their lives to preventable and curable diseases due to a lack of efficient systems or availability of doctors. The country is in the midst of an epidemiological transition, whereby poverty-linked infectious, maternal and nutritional diseases exist in conjunction with non-communicable chronic illnesses [5]. Not only India, but most of the countries in the world face problems when it comes to challenges in transport and communication and scarcity of doctors and other health professionals in the rural and remote parts of a particular country [6]. Implementation of this approach provides the basis for solving these real-time problems by engendering an easy telemedicine system that can be used by people for prevention or early treatment of some of the minor or major health issues that do not need physical consultation sessions with a healthcare professional.

1.1 Related Works

Mohammed Juned et al. proposed a system wherein an AI healthcare chatbot was implemented as a web application to provide medical assistance to patients with some common diseases such as colds, flu, typhoid, malaria, jaundice, etc. without the need to physically visit the health centers. This chatbot uses algorithms such as SVC, Gaussian NB and Random Forest Classifier which will be up and running 24/7 [7].

Riddhi Shetty et al. proposed a system for an AI healthcare chatbot that uses TF-IDF and Cosine Similarity algorithms. This system asks a set of questions to the users to get a clear and proper understanding of the symptoms and then categorizes them into major or minor diseases and provides suggestions accordingly [8].

Papiya Mahajan et al. proposed a system where the user can chat with the bot regarding a query through voice or text. Users can also view available doctors for that particular disease. This approach uses algorithms like N-gram, TF-IDF and Cosine Similarity to create a user-friendly chatbot so that people do not have to visit the hospitals for smaller problems [9].

Rashmi Dharwadkar et al. proposed a system that uses Support Vector Machine, Naïve Bayes and KNN algorithms to predict a particular disease based on the symptoms entered by the user. The algorithms were first trained on existing data and then tested on the data entered by the user. The SVM method gave the highest accuracy of 94% among the three algorithms used [10].

2. METHODOLOGY

The presented approach combines voice recognition technology, natural language processing, and a user-friendly graphical interface to represent an innovative approach to disease prediction and healthcare support. We have used Python as a real-time software programming tool over other programming language [11]. The system enables patients to verbally communicate their symptoms using PyAudio, a pre-trained voice recognition model. pyAudioAnalysis can be used to extract audio features including speech and audio processing [12]. Figure 1 below illustrates a summary of how this approach is implemented.

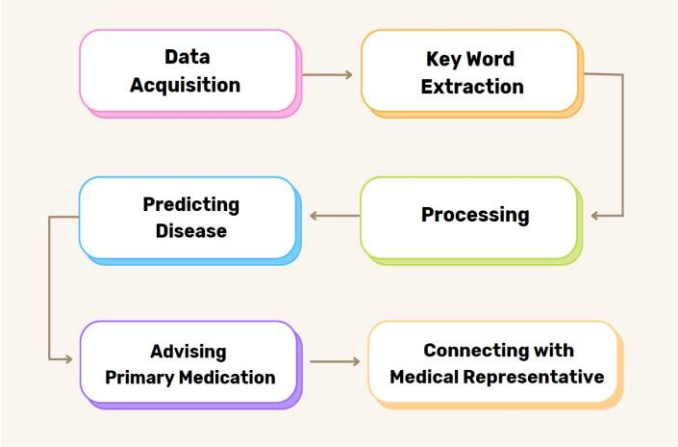

Fig -1: Methodology Block Diagram

Patients can convey their symptoms to the chatbot in an auditory as well as written form. Because of the diversified ways of entering inputs, people with different communication preferences can use the system without any inconvenience. A complex backend algorithm serves as the system's central component. This algorithm works similarly to a decision tree diagram's if-else logic. It analyses the patient's symptoms and systematically assesses the significance of each symptom to the potential disease. The algorithm advances through a series of logical branches based on the patient's input, navigating the symptom-to-disease relationship until it arrives at a definitive diagnosis. Throughout the entire diagnostic process, the Graphical User Interface (GUI) is crucial in improving user interaction and comprehension [13]. Through the GUI, patients converse verbally with the system, and the system responds with voice and visual cues. In addition to increasing user engagement, this two-way interaction helps people comprehend how diseases are predicted. Figure 2 depicts the GUI which is used in this approach.

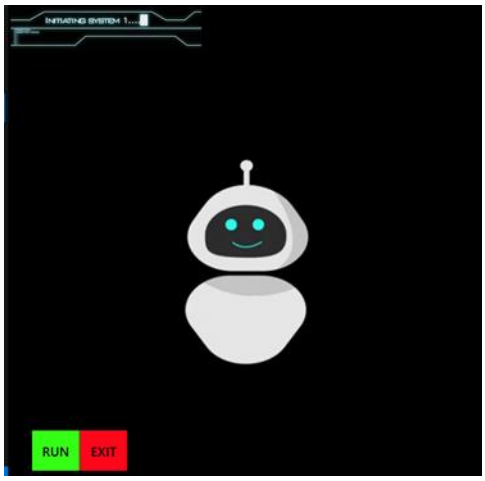

Fig -2 GUI Module for users

The algorithm begins by executing an initial set of instructions proceeding onto an if-else iterative conditional structure. A generalized depiction of the algorithm used in this approach is shown in Figure 3 below. It checks if the person has a fever, confirms it if detected, and assesses symptoms. The algorithm ends the iteration if a person replies no to fever. On the other hand, it continues the iterations as per the flowchart depicted in the figure below. At the last stage, the algorithm compares the symptoms and the inputs provided by the person and provides analysis accordingly.

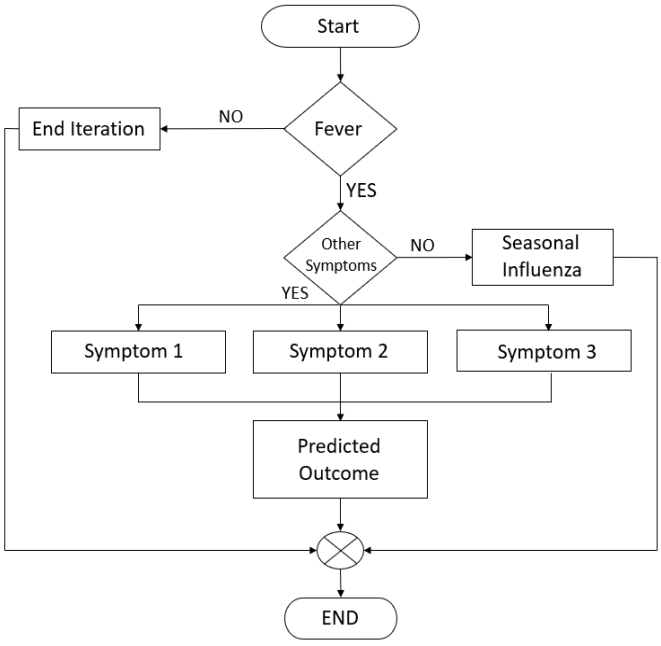

Fig -3 Algorithm working flowchart

3. RESULTS

The algorithm informs the patient via voice output once it has concluded the potential disease. The GUI simultaneously shows a picture of the recommended medication on the screen. With this multi-modal approach, patients receive a precise verbal diagnosis as well as a visual guide for the suggested course of action. The four diseases—malaria, typhoid, seasonal influenza, and diarrhea —have predefined symptom databases in the system. The patient is given the choice to schedule an appointment with the appropriate doctor if the software is unable to diagnose a particular disease. He/she is then redirected to a Google form which gives the patient an option to choose between one of the recommended hospitals. This approach does not collaborate with any specific hospitals.

4. CONCLUSION

The Automatic Telemedicine Announcement System, which provides several benefits that improve healthcare accessibility and convenience, is poised to have a significant impact on the lives of its users. With the introduction of the freedom of 24/7 medical consultation, including, when necessary, access to actual doctors, this ground-breaking system serves as a personal health assistant. The Automatic Telemedicine Announcement System is a technological advancement that also transforms patient empowerment and healthcare accessibility. By addressing both individual health needs and more general healthcare challenges, this system has the potential to become a vital tool in the healthcare industry. Some of the limitations that this system comes across such as the system's susceptibility to outside noise are one of its major drawbacks. In noisy settings, voice recognition systems, including the PyAudio pre-trained model used in this project, can have difficulty deciphering voice signals. Another restriction is the need for patients to accurately describe their symptoms using particular words or phrases. To understand user input, voice recognition models typically rely on recognizing predefined keywords or phrases.

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