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A Medical Chatbot Assistant Using Artificial Intelligence

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Abstract

The importance of being able to access healthcare is paramount to living a healthy life. But to get a doctor's opinion when one is so sick is really difficult. The proposed methodology is to apply artificial intelligence to create a medical chatbot that can diagnose the disease and provide minimal information about the disease before consulting with a doctor. Chatbots are the computer programs which use the natural language to communicate with the users. In order to reduce the costs associated with healthcare and to improve the availability of medical knowledge, the medical chatbot has been built. The proposed methodology also allows users to seek the medical advice or medical information at any time they want. Some chatbots may be knowledge-based, and their goal is to help the patient become more knowledgeable about their disease and assist them in improving their well-being. Through the database, the chatbots stores the details or the information which is collected and then provides the answer to the question asked by the users. The methodology uses natural language algorithm and machine language to gather the dataset. Thus, the users will be informed about their health status and will have adequate protection.

Keywords: *Artificial Intelligence, Natural language processing, medical chatbot.*

1. Introduction:

Computer software with textual or voice interaction capabilities is called a chatbot. Instead of really participating in a discussion, these machines mimic human speech. The dialog system leverages chatbots to automate several useful functions, such as gathering of data and customer service. Most chatbots evaluate user input and deliver the relevant response by utilizing natural language processing. A human input is compared to the chatbots knowledge base.

The proposed work developed the chatbots using primary technology artificial intelligence to further the field of health informatics. The low degree of patient participation that occurs after patients are released from clinics or hospitals is sometimes blamed for the high cost of the

healthcare system. Numerous studies in this field have demonstrated that chatbots may deliver healthcare at a reasonable cost and with better results. There are very few chatbots in the medical area, however if the patient and doctor stay in contact after the appointment to address inquiries from consumers, a chat agent is used.

A text-to-text conversational agent in the suggested system asks about the user's health issue. The user may feel that person is talking to a human being. The next step in the interaction with that user is the bot will ask a number of questions about the symptoms of the illness. It helps in the clarification of the illness by providing suggestions about the different signs. The response regarding the user shows the specific disease, which has been diagnosed and suggests the doctor, who should be consulted as an acute illness.

The proposed system composed of two main parts: Some of the expected outcomes include the following: (1) Mapping of extracted symptoms to those entered or registered with the system and their codes (2) confirmation by the system users on the extracted symptoms as well as the extraction of symptoms from the users' dialogue. As it is, the proposed methodology would focus on advertising bot as the first line of communication for individuals who would like to seek its services rather than consulting a physician.

2. Related Work

Marco Polignano et al., [1] proposed an intelligent virtual assistant able to talk with patients to comprehend their symptomatology, counsel doctors, and monitor treatments and health parameters. By utilizing a natural language-based interaction, the system lets the user to form their health profile, describe their symptoms, search for doctors, or remember a treatment to attend. As a future scope, they want to boost the performance of the Complaint Checker module by adding information on the rarity of the diseases; automatic suggestions of nourishment and actual action to perform depending on the consumer's health conditions.

Duckki Lee, [2] explains how artificial intelligence based chatbots make use of conversation systems to have conversation with people with natural language using voice or text or both. The article examines how AI based chatbot are used in healthcare industry. It further states that what are the limitations of AI based health care and identifies the advantages. In this natural language algorithm and machine learning algorithm is used.

Md Meem Hossain etal., [3] describes about how people visit the hospitals for basic health issues which can be commonly cured by using the medical chatbots. In this the medical chatbot provides the basic details regarding the illness that the users are suffering from. In this paper artificial intelligence is used to predict the symptoms and RAD is used.

Divya Madhu et al., [4] proposed that it is feasible to regularly analyze a person's body to find any possible problems before they worsen and begin to affect the body. AI is able to recognize diseases based on symptoms and present a list of possible treatments The report does not address the challenges that customized medicine must overcome to be properly adopted. These include costs related to implementation and research.

Saurav Kumar Mishra et al., [5] claims that the chatbot will act as an online physician and help patients and physicians communicate. The construction of this chatbot used pattern matching algorithm and natural language processing. Python was the language utilized in its development. According to the survey, 20% of participants received a vague or incorrect response from the chatbot, whilst

the remaining 80% received the correct response. The results of the research and chatbot poll indicate that this application can be used as a virtual doctor, to teach primary care, and to raise awareness.

Harsh Mendapara et al., [6] describes that without visiting a doctor a user may utilize the chatbot to discover more about their particular illness and likely take care of it on their own. The writers trained the chatbot with AI assistance by using the chatbot library. Additionally, they have trained the chatbot to recognize a few words and phrases to completely comprehend the user's intention. Subsequently, the system receives the gathered data. The user's submitted personal information it will be included in the database. The chatbot will use natural language processing (NLP) for questions about symptoms. It will enumerate potential ailments and provide treatments for those who already have an existing disease. From the system, one can be booked for a clinic appointment. M. V. Patil et al., [7] designed an artificial intelligence assisted health care chatbot system. The proposed medical chatbot is an expert system for medical advice, decision making based on patient's request and using comparisons in the form of dialogues. To achieve this, a database is constructed. This will be done using a search engine where the user will be provided with the information that is not already in the database. Three different experimental outputs are used to test the proposed system performance as a way of identifying common symptoms and illness. However, there is no guideline indicated to support the performance assessment from the writings of the writers.

Papiya Mahajan et al., [8] proposed a healthcare chatbot based on natural language processing for 2020. Sometimes the chatbot system may also offer voice or text support. The developed chatbot is said to be able to offer information on various illnesses depending on the symptoms input by the user. The three algorithms involved in this method to develop a medical chatbot system include Cosine similarity algorithm, TF-IDF algorithm, and N-gram algorithm. The system also avails the doctor's information. In this way, the people will be protected and mindful of their health as needed. According to the authors, their chatbot offers individualized diagnosis depending on the patient's present symptoms. However, to support this assertion, no performance assessment measure has been availed to the public.

Lekha Athota et al., [9] developed a chatbot that can diagnose a disease and provide information prior to consulting a physician. The parameters employed in the text similarity computation performance assessment include N-gram, TFIDF, and cosine similarity. A third party handles the queries, and the data is stored in a database. The terms are provided in order for the appropriate answer to the question might be answered. There is also a web interface available to users. The authors claim that their chatbot application has been enhanced in terms of security and effectiveness by safeguarding user privacy, character integrity, and retrieving relevant information in response to queries. However, no performance assessment criteria are provided to back up the claims made by the writers.

Bushra Kidwai and Nadesh R K, [10] in the context of symptom diagnosis and mapping, a decision tree technique is applied. After the system has acquired all the information on diseases and related symptoms, it can apply NLP to interpret questions and provide appropriate answers. The data was extracted from a medical database that contained information on 150 different diseases. To mimic the doctor-patient interaction, the chatbot poses a lot of questions. These questions are built based on patient's past medical history and prefilled conditions; depending on the answers provided, a probable diagnosis is made. They say that the

system may be interactive. The performance assessment parameter that is used is round-trip time.

3. Proposed Methodology

3.1 Input from the user: The user provides the input either by typing the text or by speech, where the user provides the description of symptoms.

3.2 Preprocessing the string: The preprocessing the string includes various steps like removing the unwanted symbols, removing repeated words then it is tokenized and vectorized.

3.3 Cleaned data: After the preprocessing of the text cleaned data is obtained after removing the symbols, removing repeated words.

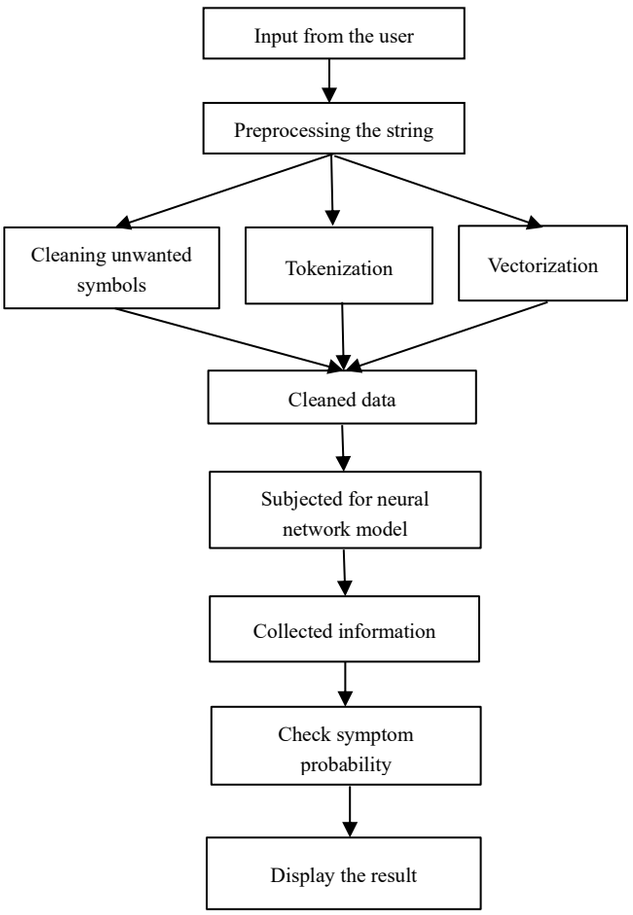

Figure 1: Flow Diagram

3.4 Subjected for neural network model: The cleaned and processed text is now fed into the neural network model. The RNN model has been trained to recognize the patterns and make the predictions based on the input data provided by the user.

3.5 Collected information: The RNN model processes the input text to extract the relevant information from the user such as identifying the symptom provided by the user.

3.6 Check symptom probability: The RNN model calculates the probability of the symptoms of various symptoms to see if it matches the input data which is provided by the user.

3.7 Display the result: The system displays the result, based on the analysis of the symptom and the probability of the symptom.

Natural Language Processing (NLP): Natural language processing plays an important role in the medical chatbot. Using NLP, a chatbot can parse and understand the content or context of the text or audio input from the user majority.

Tokenization: Tokenized text is broken down into more minor textual components referred to as ‘tokens’ from a text flow.

Stop words removal: Among the techniques applied in text preprocessing, stop word removal is a heading where all the unnecessary words and words that are too common to be significant are omitted.

Vectorization: It is the conversion of a text description of words and sentences into structures that are understandable to a computer.

Recurrent Neural Network (RNN): RNN stands for recurrent neural network. This particular type of neural network is particularly efficient to handle sequences in which the position of the elements is crucial as in the case of speech a rnn model is utilized to effectively manage discussion histories and user interactions in the setting of a medical chatbot system the rnn has a dynamic

each input has a hidden state that enables it to leverage prior session contexts for present answers.

4. Results and Discussions:

For an experimental result the propose work uses Kaggle dataset. The system correctly identifies diseases based on symptoms provided by the user. Gradio's deployment allows users to enter symptoms and interactively receive predictions and medical advice. The technology has the potential to assist patients and healthcare providers due to its rapid and precise disease detection.

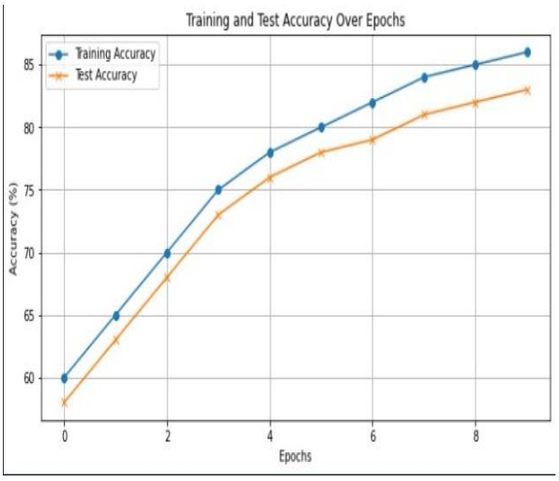

Figure 2: Accuracy Graph

The fig 3 shows how user interact by utilizing the chatbot and ask the questions then the user will get the answers considering the symptoms mentioned to the chatbot.

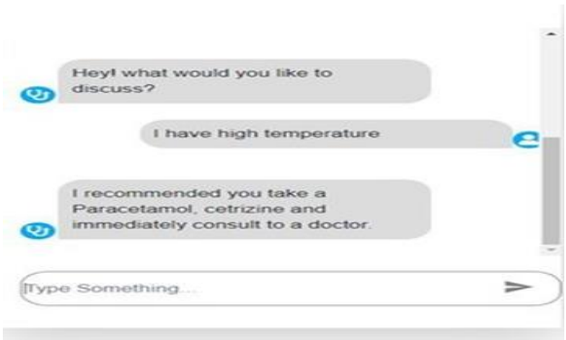

Fig 3: Model snapshot

5. Comparative Analysis:

Our proposed methodology got more accuracy than other proposed systems.

Author name	Technology used	Accuracy
10	Decision tree, Natural Language Processing (NLP).	75%
7	Artificial intelligence, Natural language processing (NLP).	87%
Our Methodology	Natural language processing (NLP), RNN model.	89%

Table 1: Comparative analysis

6. Conclusion and Future Scope:

It is determined from the examination of numerous papers that using chatbots is easy and accessible to all individual. Based on symptoms, a medical chatbot offers individualized diagnoses. Future developments in the bot's ability to recognize and diagnose symptoms could be substantially enhanced by supporting other medical features, such as the location, duration and strength of symptoms, as well as more thorough symptom descriptions. Training data and AI algorithms are critical to the implementation of personalized medical assistants. Finally, the successful application of personalized medicine would raise public awareness of health issues and successfully save a great number of lives. As mentioned **earlier messaging apps will dominate the** future as people are going to utilize more time on it than any other program. Medical chatbots hence have a very broad applicability. To make the medical chatbot more versatile in addressing various diseases, the efficiency can be improved by

introducing more word combinations and using databases. To make the system easier to use, voice communication can be included. The proposed methodology got 98% accuracy.

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