



HEALTH CARE ASSISTANCE CHAT BOT USING NATURAL LANGUAGE PROCESSING

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Abstract

Medical advancements have shown that there aren't enough doctors in India to meet the demands of the growing population despite the country's expanding population, rising birth rate, and declining mortality rate. A clever and intelligent chatbot that can advise physicians and perhaps even patients on what to do in such instances would be useful in overcoming such a situation and benefiting the patients. This would eventually save the lives of hundreds of people. Using text messages, apps, or instant chatting, chatbots are computer programs that can converse with users and aid. The goal is to develop a medical chatbot that can identify the illness and provide a preliminary diagnosis without a doctor's intervention. Via a medical chatbot, this will lower healthcare expenses and increase accessibility to medical information. It also suggests the precautions to be taken, leading to a faster recovery. Natural Language Processing Technique, which is an application of AI, is used to build the chatbot. The Deep Learning Keras Sequential Model is used to train the model. The project aims at overcoming the disadvantages of regular doctor – patient interaction.

Keywords: *NLP, Sequential model, Chat box-self assistance, Disease prediction, Artificial Intelligence, Deep learning.*

1. Introduction

Nowadays, practically all industries employ chatbots to direct users depending on their needs. These may be found at banks, IRCTC under the moniker "Disha chatbot," and several online travel agencies like MakeMyTrip. The market's need for chatbots is steadily rising as we go towards digitalization. The necessity for a medical chatbot in the medical business is mostly driven by India's growing population and the shrinking number of doctors available to meet the needs of that population. Even medical professionals can err when determining the origins of the symptoms, endangering the patient's life. Mohammed Benaziza, sometimes known as Mohammed Benaziza, was a prominent figure in the 1990s, when he was in the bodybuilding world, "Giant Killer" was one of the most powerful competitors. Due to hypokalemia, or a high potassium level in the body, he passed away. Due to this overindulgence, He typically has bodily cramps due to a low potassium level.

The physicians couldn't figure out what was exactly going on, but they eventually concluded that Mohammed's bodily spasms were being caused by a potassium deficiency. As a result, physicians gave him additional potassium injections, which caused the spasm to travel to his heart and finally resulted in his death. Even physicians are prone to errors in other situations. A medical chatbot that can guide professionals on what to do in such critical situations is thus necessary to avoid this from happening. Its application is not limited to those in the medical field; a regular person may also make use of it, as in the example When there is an emergency, it can advise the user on the initial therapies the patient should get. Also, if a user is afflicted by a certain ailment,



the chatbot may identify the disease by merely responding to a few questions posed by the user. Following that, if someone is interested in learning about the precautions and treatments they should use, the chatbot may also give them information.

Motivation

The goal of creating this chatbot was to offer a more straightforward and practical replacement for current healthcare delivery methods. This chatbot is being created with the intention of delivering assistance to everyone to lessen their pain and improve their quality of life. Everyone should have the equal right to get medical care, regardless of who they are. So, we want the initiative to have a big influence on society such that the chatbot may fill in for a doctor if necessary.

Objectives

The objectives of the project include the following: 1. to develop a healthcare chatbot to detect disease based on the symptoms taken as input. 2. to prescribe the drugs that the patient must consume based on the disease that is detected. 3. to provide the users with a time-efficient chatbot that helps patients in an emergency.

Problem Statement

The health of the community is only influenced by the health of the individual. There aren't enough doctors in India to meet the demands of the growing population due to the country's rising birth rate, declining mortality rate, and rising population. In rare instances, even doctors fail to administer the proper care, which results in the patient's death. With the current system, getting a prescription from a doctor requires a trip to the clinic, which takes time. A clever and perceptive chatbot that can provide patients with information without them first needing to visit the hospital might be useful in preventing such situations. This The idea suggests a chatbot that uses the user's specified symptoms to anticipate the ailment and then prescribes the appropriate medications to the patient.

II. Literature Review

[1] Artificial intelligence-powered medical chatbot that allows for self-diagnosis S. Divya, V. Indumathi, S. Ishwarya, M. Priyasankari, and S. K. Devi are the authors. published in the web design and development journal According to the study's findings, a chatbot-based mobile healthcare service might respond quickly to errors that occur in daily life and to changes in a patient's condition if they have a chronic disease. Moreover, it offers a framework for human-robot interactions that will aid in the effective implementation of the chatbot service. The work contains a technique for string searching that finds substrings in natural language text input that describe symptoms. The condition is then determined by comparison with the dataset's symptom. The three key components of our system are as follows: (1) user A personalised diagnosis is created after validating and extracting symptoms from the user's conversation, accurately mapping extracted symptoms (which may be ambiguous) to recorded symptoms and their corresponding codes in our database, and, if necessary, referring the patient to the proper specialist. It is a text-based bot, while having all complex features.

[2] An artificial intelligence-powered chatbot for the healthcare industry was published in the International Journal of Advancing Research, Ideas, and Innovations in Technology by C.R. Murthy and B.R. Kavitha. Users should be able to understand their symptoms and get a rough diagnosis for any probable ailments with the aid of our chatbot. The chatbot stores the information in the database so that it may extract the keywords from the phrases, choose how to respond to the question, and give an answer to this. The response will be given based on the user's query and the knowledge base. The crucial keywords may be discovered in the sentences and answers to those phrases. If a match is made or a crucial response is provided, the provided or equivalent the replies are displayed. This chatbot's



smart UI is a drawback. Also, it doesn't specifically respond to the user's query. Instead, it displays a list of queries and replies that are analogous to the query.

[3] A sophisticated chatbot for primary care, MANDY The authors are L. Ni, J. Liu, and N. Liu. International Symposium on Knowledge and Systems Sciences This study's text-to-text conversational interface queries the user about a health concern. The user can engage in discussions that seem to be happening in real life. The bot proposes many symptoms to help diagnose and characterise the ailment after asking the user a series of questions about their symptoms. In this study, NLP is applied using the Word2Vec method, and a similarity comparison technique called Positive-Negative Matching Feature Count is proposed. A symptom-to-cause mapper for determining likely reasons, an analytical engine for understanding patient symptom descriptions, and a diagnostic module all contribute to the diagnostic component of the chatbot. a program that produces questions for interviews for you. The system blends knowledge-driven diagnostic skills with data-driven natural language processing power. There isn't much information provided by this chatbot. The paper does not include elements like symptom duration, symptom intensity, etc.

[4] On UMLS, a chatbot named MedChatBot for medical students was created. Zeesha Memon, B.S. Chowdhry, and Hameedullah Kazi are the authors. Published in the International Journal of Computer Applications An open source AIML framework called ChatterBean was used to build a chatbot for medical students, according to the study report. The chatbot, which is built on AIML, has been enhanced to convert user input into appropriate SQL queries. Using the Unified Medical Language System, questions are responded to (UMLS)Five samples totaling 97 potential questions were gathered, and each sample was subsequently classified according to its category. The order of the resultant categories was decided by the number of questions in each category. 47% of the enquiries were questions based on inquiries. In some areas, we observe 7% or less.

Existing System

In the existing system, one must get an appointment from the doctor, go to the clinic, and wait for a long time to get the prescription from the doctor, which is a time-consuming process. In rare instances, even doctors fail to administer the proper care, which results in the patient's death.

Disadvantages of the Existing System

- Consumes a lot of time and money.
- requires a chaperone who must accompany the patient to the hospital.
- It is not easy for differently abled people to go to the hospital.

III. Proposed System

The chatbot in our suggested system is created using a natural language processing approach. The chatbot allows for text-based communication from the user. The chat box is used by the user to enter his or her symptoms. The chatbot will then utilize the NLP approach to extract the user messages' symptoms and subsequently make a diagnosis of the patient's ailment. It also recommends the right medications for the patient to take to cure them of the illness they are experiencing.

Purpose

Disease identification and appropriate drug as well as diet recommendation has become one of most prominent tasks in today's world for the health and well-being of human beings. The purpose of building this chatbot is to offer healthcare services to people without charging any cost. The service will be available for them no matter wherever they are. All they need is a device that can connect to the internet.

System Architecture

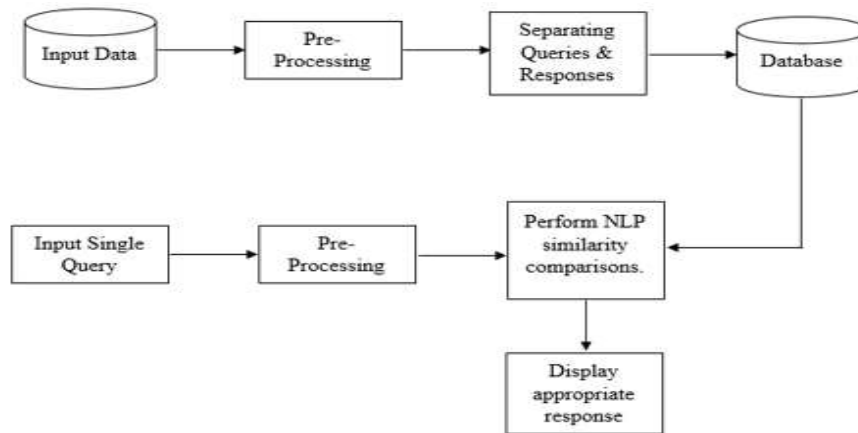


Fig 1. Architecture Diagram

UML Diagram

Use-case diagram

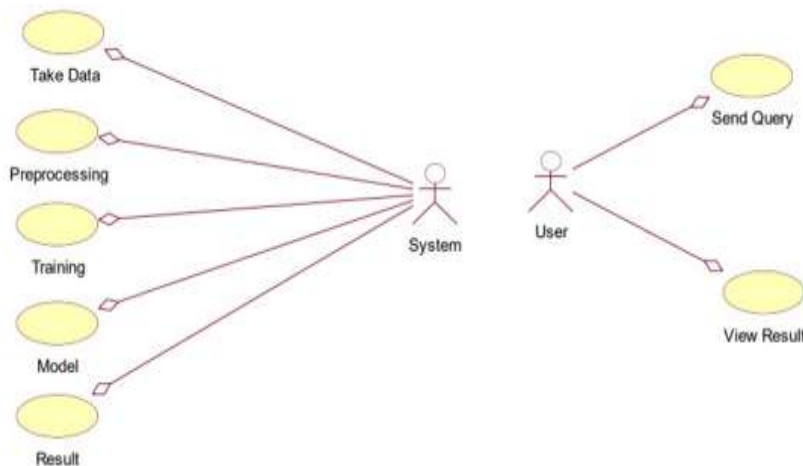


Fig 2. Use-case diagram

IV. Model Implementation

Hardware requirements

- Processor - i3/Intel Processor
- RAM - 4GB (min)
- Hard Disk - 128 GB
- Operating System - Windows 7+, Linux

Software requirements

- Programming Language -Python
- IDE - PyCharm
- Libraries Used - nltk, pandas, numpy
- API - Keras
- Framework – Flask

Functional Requirements

The phrase "functional requirements" describes the features or functionalities of a product that designers must create to help users efficiently carry out their duties. To make sure that the product satisfies the needs and expectations of consumers, it is crucial to convey these requirements clearly to the development team and other stakeholders. Functional requirements must be communicated clearly for the development team to have a complete grasp of what needs to be done and to design and create



the product appropriately. As a result, the likelihood that the final product will satisfy consumer needs and find success in the market is increased.

Input: User Queries

Output: Disease and Drug Recommendation

User Interface: a simple chatbot user interface

Non-Functional Requirements

Non-functional requirements are a collection of limits and standards that a system must follow in accordance with the project agreement. They are also known as system characteristics. Non-functional requirements, as opposed to functional requirements, are concerned with the overall performance, security, dependability, usability, and other quality qualities of the system. Non-functional requirements give recommendations for the development team to guarantee that the system fulfils the essential standards in terms of performance, scalability, maintainability, and other critical characteristics that contribute to the overall quality of the system. These criteria are more concerned with the system's overall performance, dependability, security, and usability than with any features or functions. Response time, scalability, and maintainability are a few examples of non-functional needs. Different projects implement these factors to different degrees or with different priorities. Additionally known as non-behavioural requirements.

Performance: High speed performance of the system is expected.

Usability: It is very easy for the user to use the chatbot.

Compatibility: The chatbot is compatible with Windows and Linux Operating Systems

Technologies Used

Python

Python has a huge benefit in that it contains a large set of standard libraries that may be used for a variety of applications. These include machine learning and deep learning tools, open-source graphical user interface (GUI) apps like Kivy, Tkinter, PyQt, and prominent web frameworks like Flask and Django, which are utilised by big sites like YouTube, Instagram, and Dropbox. Furthermore, Python libraries are frequently used for image processing, web scraping, and testing via tools such as OpenCV, Pillow, Scrapy, BeautifulSoup, and Selenium, as well as test frameworks and multimedia file transmission.

Deep learning

Natural Language Processing

Artificial intelligence (AI) is a branch of computer science that aims to construct robots capable of mimicking human behaviour and intelligence. Natural language processing (NLP) is one of the applications of AI that focuses on enabling computers to connect with people through language. Even though NLP has been around since the 1950s, actual NLP systems were not established until the 1960s. Manual rule sets were the major technique employed in NLP systems in the past. NLP is separated into two categories: natural language output (NLO), which is concerned with creating natural language output, and natural language understanding (NLU), which is concerned with discerning the intended meaning from natural language utterances.

Keras Sequential Model

1.Keras is one of the most popular Python libraries for Deep Learning.

2.Machine Learning known as sequential model operate with data sequences as input or output.

3.These sequences could include time-series data, audio clips, video clips, text streams, and more.

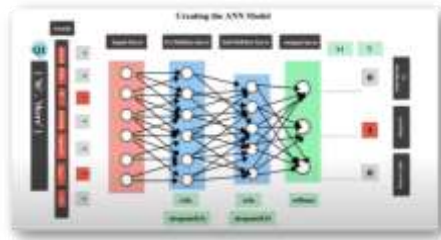


Fig 3. Keras Sequential Model

Modules

1. System

1.1 Take Data:

System will receive data from the user.

1.2 Pre-processing:

The system will undergo pre-processing.

1.3 Training:

The System will get trained.

1.4 Model:

The system will work based on model.

1.5 Results:

The system will deliver the output-user

2 User

2.1. Send Query:

User will send Query to the system.

2.2 View Query Result:

User will view his query result.

NLP Pipeline

Step-1: Sentence Segmentation

Step2: Word Tokenization

Step3: Stemming

Step 4: Lemmatization

Step 5: Identifying Stop Word

Step 6: Dependency Parsing

Step 7: POS tags

Step 8: Named Entity Recognition

Step 9: Chunking

V. Result Analysis

1st use-case : successful (prediction)





Chat bot responding to user given input query. It has responded to user given input query and returned adequate results after performing natural language processing technique.

2nd use-case : successful(drug recommended)



We have successfully displayed preventive steps and similar drugs for the given illness detected.

VI. Conclusion

1. The major goal of our proposed chatbot is to assist individuals by identifying the illnesses they are now experiencing and offering the best treatments.
2. By using this chatbot, people can get accompanied for the whole day, 24/7, It also avoids spending money.
3. We have used deep learning sequential model for training, the chatbot can answer the user queries perfectly with respect to medical healthcare.

VII. Future Scope

The dataset may be expanded to include a variety of illnesses. Create a user account that enables the user to keep track of their medical information and receive recommendations or assistance in connecting with the appropriate doctors or scheduling the necessary tests. Provide administrators the ability to add and remove the dataset that will be used to train the model. If age, blood pressure, body mass index, and cholesterol levels are considered for therapy in addition to the symptoms, the chatbot may also become more sophisticated.

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