

Health DiagoBot: A Medical Chatbot for Diagnosing Disease and Prescribing Medicines

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Abstract: *The paper presents a medical Chatbot. This Chatbot is designed for conversational purposes which will be used to give prescriptions, suggestions for basic medical aid for the patients. For a little complications' patients need to directly consult with doctors due to hectic schedules. So Medical Chatbot is a great solution for them. Medical Chatbot acts as a medical consultancy. The bot will diagnosis the disease by the inputted symptoms of the patients and suggest to them the general prevention for it. The Medical Chatbot operates with the help of natural language processing which will help the users to give in their symptoms of the disease faced. Through this Chatbot, users can directly ask for inquiries about personal health problems and get medical consultancy without physically going to the hospital. The Chatbot gets inquiries and sends the related result to the user or the first necessary preventive measure.*

Keywords: *Medical Chatbot, Natural Language Processing, Medical Consultancy, Query*

1. INTRODUCTION

For a healthy and long life, our healthcare is important. But for a small common health problem, some people cannot be able to consult directly with the doctor. So, to meet this requirement, the idea is proposed to create a system with Natural language processing. This ChatBot is developed to reduce the cost of healthcare and for improving accessibility to medical knowledge. [2] This project implements a ChatBot which can be used in the medical sector. The ChatBot is build using Machine Learning and the analysis is done using data mining. Machine learning helps to build a ChatBot which processes the natural language of the user and responds to the human input in a human-understandable format. This creates a conversational flow or a chat between a user and a ChatBot. ChatBot smartly analyses the given patterns as input and responds to these patterns. ChatBot also does all the information gathering and using data mining algorithms it does all the processing and prediction. The overall application of ChatBot is to minimize the hectic job tasks of humans or perform repetitive actions. In the same way, Medical ChatBot can interact with the user have a conversational flow, diagnose the symptoms of the user, and then provide medical aid.

2. MOTIVATION

In general, many of us aren't conscious of symptoms of viral, or common diseases and treatment for them. Unhealthy conditions of the patient could also be assumed as a significant disease without analyzing the symptoms. This fear of the patient causes to satisfy the doctor physically and waiting within the queue at the hospital. To avoid all this chaos and to urge medical care and preventive measures for common diseases to enhance health conditions this Chatbot is introduced. Our aim is to develop a Chatbot which can be a text-to-text conversational bot with natural language processing. This bot diagnosis patient. to get an honest diagnosis, the system backups the last responses and asks more specific questions. The three main parts of our system are (1) to urge the symptoms for the disease (2) precise leveling of withdrawn symptoms to the dataset (3) Suggesting the disease and prescribing the medicines for it [2][3].

3. IMPLEMENTATION

A. PROJECT SCOPE:

This chatbot could also be used for specialized diseases and analysis of complex diseases. With the greater implementation of processing of the test samples and mining the test samples for complex and uncommon diseases, this chatbot is often implemented in hospitals to review the physical health of the patient and effective treatment of the complex diseases.

B. USER CLASS AND CHARACTERISTICS:

The following description defines the varied groups of users who are going to be using our software. the aim of this classification is:

- 1)make sure that the software appropriately fills the requirements of every class.
- 2)it helps to make sure whether the requirements are taken under consideration when designing the software.

USER CLASS	CHARACTERISTICS
Patient (primary user)	<ol style="list-style-type: none">1) Patient can log in to the app2) Patient can provide the symptoms (present health condition) and get the consultancy accordingly3) Patient can directly order the prescription generated online or communicate with the local pharmaceutical4) Patient can also directly communicate to specialists of every domain in case of very serious conditions

Doctor (Specialists)	<ol style="list-style-type: none"> 1) Doctors can review certain serious conditions which were sent them by the patients for real time consultancy 2) Doctors can provide schedule or prescription or plan for further diagnostics based on the received request by the patient
Pharmaceuticals(medicals/chemist s/ druggists)	<ol style="list-style-type: none"> 1) Medical vendors will receive the prescriptions (online/locally) generated by the chatbot or by doctor (in some serious conditions) 2) Medical vendors can provide medicines written in the prescription and continue towards transaction

Table 1: User class and characteristics

C. OPERATING ENVIRONMENT

This project can have cross-platform applications and can not be restricted to at least one platform. the acceptable operating environment can as follow:

- Python – Implementing Machine Learning
- Android – Development of an application
- Windows – Development/Platform for application

D. SYSTEM FEATURES

Functional requirements –

- 1) The bot should answer any input it receives. All use cases
 - a. If the bot doesn't understand the input, it should invite more simplified input.
 - b. If the bot understands the input, it should respond with correct information.
 - c. If the bot needs more information to seek out a solution, it should invite more information.
 - d. The bot should use a text recognition API to know the input.
- 2) The bot should be ready to send users data in the following ways:
 - a. the info is often sent as a text message.
 - b. the info is often sent as a QR code accompanying text if requested by the user.
- 3) The bot should be ready to query the info from the Waldrum REST API.

Non-functional requirements –

Performance Requirements: The chat-bot must be efficient with little or no lag in reaction time for example not than 5 seconds to reply to a user message. The chat-bot must reliable with next to no faults or bugs.

Security Requirements

- The chatbot must be secure as sensitive data is getting used, Google 2-Factor Authentication is going to be implemented as an additional security feature.

- END-TO-END ENCRYPTION: E2EE system provides secure communication by encrypting messages or the knowledge that's transferring through the channel. Only the sender and therefore the recipient can read the information; no third-party can view or intercept the transmitted data.
- TWO-FACTOR AUTHENTICATION: Two-factor authentication or two-way verification is another method to make sure security. this system involves requiring users to verify their identity through two separate channels, to access a chatbot.

E. SYSTEM ARCHITECTURE

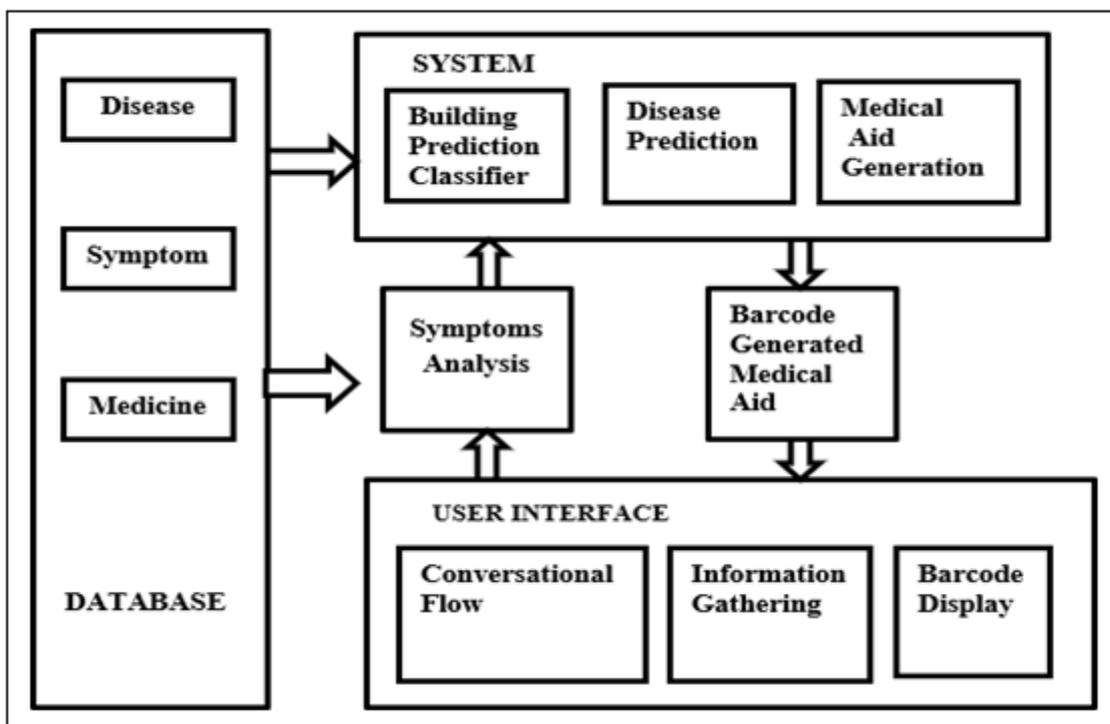


Fig.1 System architecture

The system architecture exists of three main functionalities called User-Interface, System, and Database (as shown in Figure 1).

User-Interface -

This functionality contains features like conversational flow, operation. Conversational flow is liable for having interactive communication with the user. The operation may be a phase of gathering and identifying entities like symptoms from the conversation. The Barcode display feature is employed to supply the medicines in barcoded form as a prescription under the doctor's observation.

System -

This functionality contains features like Building Prediction classifier, Disease Prediction, Medicinal aid Generation.

Database -

This dataset holds Disease, Symptoms, and Medicines.

F. ALGORITHM USED:

Decision Trees Algorithms are a supervised learning method used for classification and regression purposes. The general reason for using the Decision Tree Algorithm is to generate a training model that will predict the class or value of designed variables by learning decision rules derived from the training dataset. Decision trees learn from the dataset and form then if-then-else decision rules for the data. As the tree grows deeper, the principles are more complex and thanks to this, the model is more accurate.

The processing level of the Decision Tree algorithm is so easy compared with other classification algorithms. The decision tree algorithm tries to solve the problem, by using a tree structure. It splits datasets into smaller and smaller subsets and also at an equivalent time-related decision tree is incrementally developed. The output generated is a tree with decision nodes and leaf nodes. Decision tree algorithm can process on both, categorical and numerical datasets.

The main problem within the decision tree algorithm is to identify which attributes can be selected as the root node and at each level. Handling this is often referred to as attribute selection. We have various attribute selection methods to identify the attribute which may be considered as the root note at each level. The famous attribute selection methods are 1) information gain and 2) gini index

Steps for the algorithm:

1. Select the best attribute of the dataset for the root node of the tree.
2. Split the training dataset into subsets. Subsets should be created in such a manner that every subset contains data of the same value for the selected attribute.
3. Redo step 1 and step 2 on each created subset until we find leaf nodes in all the branches of the tree.

Following is the dataset structure and according to the structure, the decision tree format is generated(Fig.2 Tree format)

ID	Disease	Fever	Tight sensation in head	Medicine
1	Viral Fever	1	0	Paracetamol
2	Headache	0	1	Crocin plus

Table 2: Dataset structure

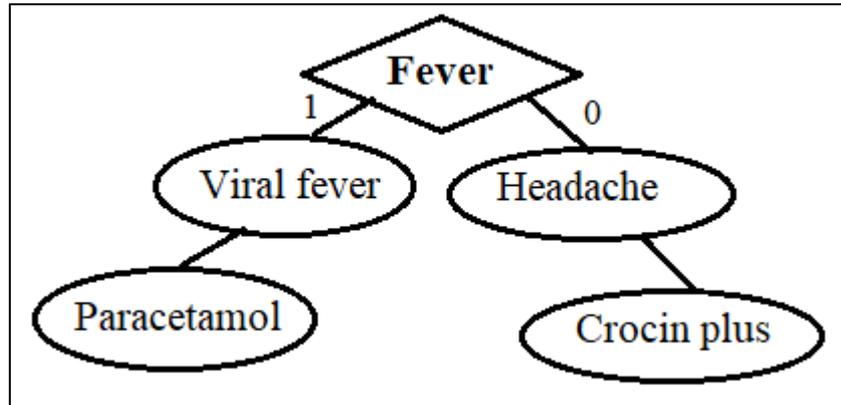


Fig.2 Tree format

5. RESULTS

As per the planned modules, after the execution of the primary module successfully the Chatbot communicates with humans, proceeds with an interactive chat. Once a conversational flow is established it gathers information and symptom necessary for data processing and defining labels to the disease or prediction of disease. this is often integrated with the database which provides results for disease labels after mining on datasets with the assistance of symptoms as entities. this is often considered a results of the second module i.e. integration of dataset with Chatbot. After integration, the datasets are analyzed for corresponding symptoms and medicines and their prescriptions are generated (user expert observation if needed).

6. CONCLUSION AND FUTURE SCOPE

The results provided to the user are completed with the assistance of machine learning algorithms which was the main area of study. This medical care and effective treatment or cure are given the assistance of machine learning terms like pattern matching, data-mining, etc. This ChatBot could also be used for specialized diseases and analysis of complex diseases. With the greater implementation of processing of the test samples and mining the test samples for complex and uncommon diseases, this Chatbot is often implemented in hospitals to review the physical health of the patient and effective treatment of the complex diseases.

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