Healthcare Chatbot using Decision Tree Algorithm

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Abstract:- **Artificial Intelligence(AI) and Machine Learning(ML) has become an integral part of our day to day life. A large number of technologies are coming forth to help us and make our life easier. Chatbot or virtual assistant is a technology that is coming forward in this regard. Previously, we had simple questions and answers or FAQsin the name of assistant, but now the chatbot will diagnose the disease based on queries answered by the users.**

The model will be trained by using a highly diversified and accurate database with symptoms and diseases.The proposed model uses a decision tree algorithm to initiate a top down follow up and identify the complexity of the patient and produce a outcome.The user is provided a question and answer approach and a preferable and highly accurate diagnosis is produced.

Keywords:- Healthcare Chatbot, Artificial Intelligence, Machine Learning,Decision Tree Algorithm.

I. INTRODUCTION

We live in the information age, the business with more information survives the market. AI plays a vital role in streamlining the data into the computer which gives a useful result to make human life easier. AI stands for Artificial Intelligence, the science which allows machines to improve capabilities of average human intelligence. In today's world, self-driving cars have come into existence. This shows the immense possibilities in development of machines which would help humans in large scales. At this stage AI is the way to explore the limits of technology. Over the last decade, people and organizations have gained trust on AI.
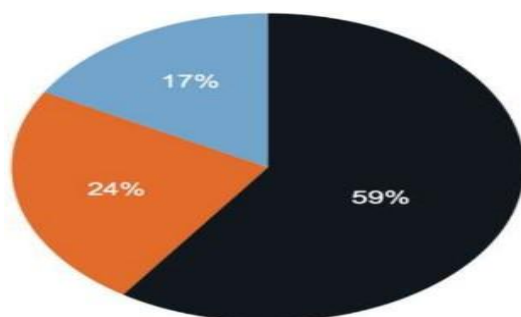

Fig. 1: Trustworthiness of AI

The above chart shows that 59% of the population agrees with the fact that AI has been helping the human world in various ways, while 24% of the population did not have the idea about the roles of AI, the other 17% of the population were clueless.

The chatbot is simply a code that runs on a software by copying human conversation and infer a fruitful result.The user will be given queries and they will answer based on which symptoms will be diagnosed and a disease or health dilemma will be understood. This will help the patient to refer to the specific specialist. For instance, the patient can refer to a cardiologist if a heart problem is diagnosed by the chatbot.The design of the chatbot will suit the user and they can get a quick and accurate diagnosis based on the symptoms they produce in the questionnaire.

II. LITERATURE SURVEY

For our project we took into account several other previously successful works on the chatbots from the healthcare domain.This paper focuses on our model which resorts to question and answer patterns with the user.The user will feel that they are having a dialogue with another person and not a chatbot.

The diagnosis done by our chatbot will be more accurate than the existing models as our dataset is more enriched and factual. Our dataset gives accurate conclusions and better outputs with proper diagnosis.

The chatbot uses a decision tree classifier as the algorithm and gives proper diagnosis.The algorithm is quick and gives better conclusions.

S. No.	Paper Title	Year	Journal	Technique Used
1.	HEALTHCARE CHATBOT	2021	International Journal of Creative Research Thoughts[IJCRT]	The conversational service for health care based on symptoms recognition methods and chat assistant platform.
2.	MEDICAL CARE CHATBOT RESEARCH FROM A BEHAVIOUR CHANGE PERSPECTIVE	2020	ResearchGate Conference Paper	The user query is scanned for similar words from the database which is achieved through **spatial-temporal context analysis**.
3.	MEDICAL CHATBOT	2019	International Journal of Computer Trends and Technology	SVM algorithm is used to predict disease. Online Google API is used for voice-text and text-voice conversion.
4.	ARTIFICIAL INTELLIGENCE BASED SMART DOCTOR USING DECISION TREE ANALYSIS	2019	ITB Journal of Information and Communication Technology	The user input is searched from a knowledge base using tree search algorithm. The technique used here is **Decision Tree analysis**. In case of complex disease with several symptoms, the node structure would help us derive the prediction.

Table 1: References from previous papers

III. PROPOSED WORK

The model we proposed has an interactive chat window that connects with the patient and gives them the feel as if they are talking to a person.

The chatbot provides a question and answer pattern to the user and asks them about the symptoms, intensity of the symptoms, number of days they are facing those symptoms and finally the chatbot gives a diagnosis.

The user gets the idea about which specialist they should visit and the severity of their situation can also be understood by them. Our idea is to build a dataset that is very accurate and very close to the actual medical diagnosis performed by a doctor. The chatbot would be very user friendly and easy to use, it would have a very attractive interface.

problems, however it is more preferable for classification problems.

IV. IMPLEMENTATION

The plan to implement the HealthCare chatbot is to use Python based libraries. The chatbot will be implemented as a Python application.

Python can be used to build GUI [Graphical User Interfaces] using the Tk GUI library. Tkinter acts as an interface to the Tk GUI library. Tkinter, an optimal GUI library in Python can be used efficiently to add GUI components in an easy way. It facilitates powerful object-oriented interconnectivity to the Tk GUI library.

In order to be helpful to the users, the chatbot will be fed with an enriched symptom mapped disease dataset which would help the learning algorithm to give appropriate results based on the symptoms a user query carries.
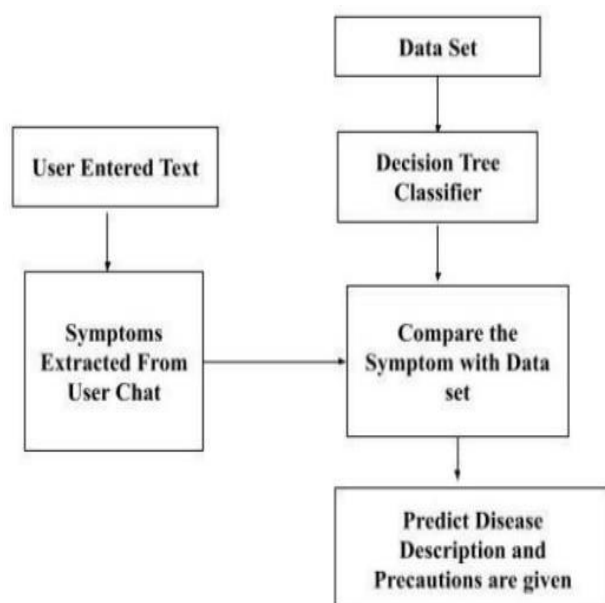

Fig. 2: Flowchart of proposed implementation

It is best to implement the learning algorithm using Python libraries such as Scikit learn, matplotlib, numpy, pandas, etc. We clean the dataset and the exploratory data analysis is done using the mentioned libraries. After the data cleaning and analysis module, we move into the training phase of the learning model using the resultant data.

The **Decision Tree** classifier is used to train the model. A Decision tree classifier is a Supervised learning algorithm. It can be used to tackle both **classification and regression**
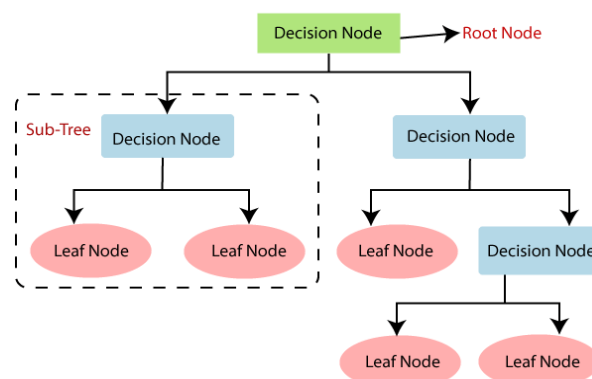

Fig. 3: Flowchart of Decision Tree

In a **Decision Tree** classifier which is a **tree-structured classifier**, the **interior nodes** represent the **features of the used dataset**. The **branches** in the tree structure are the **rules to make decisions and classify** them into predictions and the leaf nodes are the generated outcomes. The DecisionTree is a graphical representation to determine all the possible outcomes to a problem based on the training dataset. To form a tree structure, CART **Classification and Regression tree** algorithm is used. The tree formation is implemented by asking questions and based on the answer(Yes/No), the splitting off of the branches is done.

Decision Tree imitates human decision making, and therefore is pretty easy to understand.

Additionally we have another feature which would direct the patient to a specific doctor based on their disease. The input to the chatbot system will be mapped in the trainingdataset and accordingly the disease is predicted.

V. RESULTS DISCUSSION

The finished model of the healthcare chatbot is a functional system with a large dataset of human health problems. The chatbot gives a very accurate diagnosis of the current health problem of the user as per the given user query.The product produces a very accurate answer to the health problems in a very short period of time.The user gets a clear picture of his/her health scenario and get an idea of which specialist doctor to refer going forward.The machine learning algorithm used provides a very wholesome review on our dataset and helps diagnose the health situation of the user based on their reply to the predefined questionnaire about their symptoms.Hence, the resultant chatbot has a great scope going forward and achieving a pinnacle in the medicalfield.

VI. CONCLUSION

In the medical field, a chatbot could help panicked patients to get a specific prediction of the disease that they may have and a proper roadmap that would ensure their proper recovery. This project is a way to help the medical world by being an immediate repellant to the patients in emergency situations. Gradually we can enhance the dataset and do further study in order to increase intelligence of the system. From the survey taken in the population across the globe we found that trust on the artificial intelligence and machine learning algorithms has increased over the years. The chatbot has a huge role in the future in the medical and other surrounding fields,this also has a massive role in revolutionizing the way medical diagnosis as compared to the methods humans used previously.

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