Industrial Engineering Journal
ISSN: 0970-2555
Volume : 53, Issue 4, April : 2024

ML-based Medi-Bot

[1]Y Satyanarayana Raju, [2]Ch Dhaathri Hanvika Sri, [3]SBV Pavan, [4]RSS Manoj Kumar, [5] ISS Manohar

[1]Assistant Professor, Department of Computer Science and Engineering,
Raghu Engineering College, Visakhapatnam, India
Affiliated to JNTUGV
Email: ysnrajub4u@gmail.com

[2]Student, Department of Computer Science and Engineering,
Raghu Engineering College, Visakhapatnam, India
Affiliated to JNTUGV
Email: dhaa3hanvika9@gmail.com

[3]Student, Department of Computer Science and Engineering,
Raghu Engineering College, Visakhapatnam, India
Affiliated to JNTUGV
Email: pavansravanam5137@gmail.com

[4]Student, Department of Computer Science and Engineering,
Raghu Engineering College, Visakhapatnam, India
Affiliated to JNTUGV
Email: ssmanojkumar.reddy@gmail.com

[5]Student, Department of Computer Science and Engineering,
Raghu Engineering College, Visakhapatnam, India
Affiliated to JNTUGV
Email: manoharmanu1021@gmail.com

Abstract - The current situation regarding people's ability to lead a healthy lifestyle can vary greatly depending on factors such as location, socioeconomic status, access to healthcare, and individual circumstances. Most of the people continue to face challenges in maintaining a healthy lifestyle due to pandemic restrictions. It is very difficult to obtain the consultation of the doctor for every health problem. The aim of this project is to create a Medi-Bot using Machine Learning that can diagnose the disease based on the given symptoms. This ML-based Medi-Bot is a web-based platform designed to facilitate medical consultation and recommendations through an intuitive chatbot interface. Leveraging machine learning methodologies, users can input their symptoms and receive accurate predictions regarding potential diseases, along with recommendations for appropriate hospitals and ayurvedic care. The platform allows users to explore symptoms associated with specific prognosis. Additionally, it offers a unique feature, known as Body Mass Index (BMI) which measures body fat based on height and weight that applies to adults.

***Key Words*:** Healthcare-Recommendations, Medi-Bot, Chatbot, Machine Learning, Web-based, Predictions, BMI

I. INTRODUCTION

In today's fast-paced world, access to reliable healthcare guidance is more important than ever. This ML-based Medi-Bot is a web-based chatbot that emerges as a fundamental solution, blending the power of machine learning with intuitive interface design to revolutionize the way individuals approach medical inquiries and consultations.

A chatbot is a computer program designed to simulate conversation with human users, typically through text-based or voice-based interactions. However, this paper focuses on text-based conversations only.

The ML algorithms, specifically a Random Forest Classifier is used in this project. This enables the chatbot to engage in dynamic conversations with users, interpreting their symptoms and providing accurate predictions regarding

potential prognosis. Based on Feature Extraction, it specifies the symptoms to the user-given disease.

The process to the web-based interface begins with seamless user authentication, ensuring a personalized experience tailored to each individual. Users can register and log in to access features aimed at empowering them with medical insights and hospital and ayurvedic recommendations.

Once logged in, users can interact with the chatbot, inputting their symptoms and concerns in natural language. Then the chatbot employs its machine learning model to analyze these inputs, comparing them against vast datasets of medical knowledge to generate informed predictions about potential diseases. This not only offers users valuable insights into their health but also provides recommendations for appropriate hospitals or healthcare facilities based on their location and specific ayurvedic needs.

II. LITERATURE SURVEY

The idea of this paper is to create a medical chatbot using Artificial Intelligence that can diagnose the disease and provide basic details about the disease before consulting a doctor. The application uses a question and answers protocol where it consists of login page, where the user needs to give the details to register in the application if you are a new user. The answer for the query is available in the database or displays similar answers for the query. The expert answering page where experts answer directly to the user's question. The application uses n-gram for text compression using bigram and trigram for faster execution of the query. The N-gram, TF-IDF, and cosine similarity to convey the answers to the users. [1]

A voice-based medical chatbot that can diagnose the disease and provide basic details about the disease before consulting a doctor. After predicting the disease, the bot will give a basic description about the disease. Bot will respond to everything in voice, for that they have used pyttsx3. Unlike alternative libraries, it works offline and is compatible with both Python 2 and 3. The proposed Chatbot system functions based on a Decision Tree algorithm. It generates responses for the user queries based on the given method. [2]

The main idea of this paper is to make a healthcare chatbot based on Artificial Intelligence using NLP (Natural Language Processing). The final web healthcare chatbot application is hosted on localhost server. In addition, several user interface test cases were carried out for creating test case reports. By using diagnosis software, the results are generated accurate and fast. [3]

The aim of this article is to report the components necessary for implementing the interactive healthcare advisor model (IHAM) and chatbot-based IHAM. The biological information of target users used in the research, including body temperature, oxygen saturation (SpO2), pulse, electrocardiogram (ECG) and etc., was measured and analysed with biological sensors based on oneM2M platform, as well as using interactive chatbot to analyse the everyday biophysical conditions. [4]

The system aims to classify diseases as severe or negligible, providing medical suggestions accordingly. With stored data aiding in keyword identification, the chatbot offers text-based assistance, medical prescriptions, and alternative treatments such as Ayurvedic and Homeopathy remedies. The proposed chatbot model exhibits superior performance, with an accuracy of 82%. [5]

The system will assist users in identifying illnesses, providing comprehensive information about symptoms, and suggesting appropriate actions before seeking medical assistance. The implementation of the proposed healthcare chatbot system involves processing user input through various ML algorithms and NLP techniques to accurately identify diseases based on symptoms. The system then provides personalized advice and precautions for major and minor ailments. Additionally, seamless integration with Google's Dialogue Flow and a robust audit trail ensures reliable and efficient operation, offering users a user-friendly interface. The model is capable of displaying the Disease, Analgesics, Diet, Doctor details near to users based on their symptoms. [6]

The chatbot system effectively streamlines the process of symptom identification and disease categorization, providing users with prompt and accurate responses. By suggesting nearby doctors and offering medication and dietary recommendations, the system enhances user experience and promotes proactive healthcare management. In this proposed system the user can chat with the bot regarding the query through voice or text. [7]

This article aims for the ability to monitor and display patient's vital parameters like BP, heart rate (HB), ECG, and body temperature locally on the LCD display. Continuous monitoring of the patient's parameters and transmission of data to the IoT server over Wi-Fi using the ESP8266 module. The system successfully demonstrated the integration of multiple health monitoring sensors into a single portable IoT-enabled device, addressing the need for remote patient monitoring in areas with limited healthcare access. The use of the Arduino platform and off-the-shelf components like the ESP8266 Wi-Fi module helped in achieving a low-cost and affordable solution. [8]

The results demonstrate a successful implementation of an AI-based healthcare chatbot capable of predicting diseases

Industrial Engineering Journal
ISSN: 0970-2555
Volume : 53, Issue 4, April : 2024

from symptoms and providing relevant doctor information. The integration of machine learning, web technologies, and natural language processing techniques enables an interactive and user-friendly experience for users seeking medical assistance. [9]

III. EXISTING SYSTEM

Many of the existing systems are potential for erroneous information and time taking. Because of the delay in chats, the users cannot get the information in time. The systems are trained on limited number of diseases from the datasets which can cause lack of proper information to the user.

IV. PROPOSED SYSTEM

The proposed system deals with the web-based chatbot which allows for user authentication through registration and log in. The chatbot predicts the prognosis based on symptoms and provides disease related hospitals near user location and suggests ayurvedic remedies. It also gives the symptoms if user asks for a specific disease. This chatbot replies instantly to the user making it time efficient.

V. SYSTEM ARCHITECTURE

Fig. 1 illustrates the outline prognosis prediction. The user can input queries through the chatbot after registration and logging into the web application. The web page is designed using HTML, CSS, JavaScript and Bootstrap. The registration details will be stored in the SQLAlchemy connected to the database. In the system side, the raw dataset is cleaned and pre-processed for training. Using label encoding, the dataset can be trained. The trained model can be fitted into the Random Forest Classifier which is stored in the pickle. This model gives 97% accuracy which predicts the potential prognosis based on user symptoms. CountVectorizer is used for token counts. Cosine Similarity is then applied on the vectorized data for information retrieval. This information can be used to specify diseases based on user-given prognosis. The flask helps in connecting the backend to the web server.

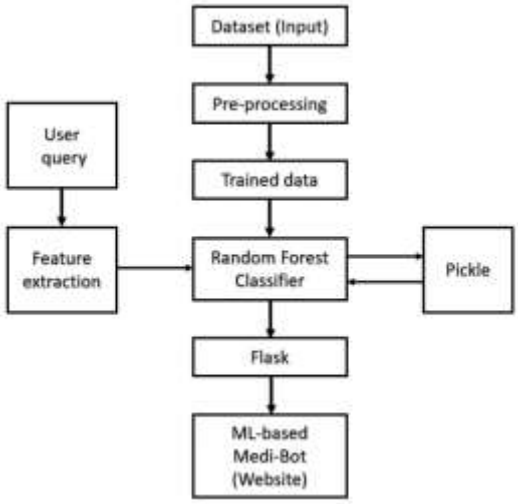

Fig. 1: Block Diagram of Proposed System

VI. RESULTS AND ANALYSIS

This ML-based Medi-Bot needs to be registered first if you are a new user in order to access the features of the application. Once logged in, you can explore the website for self-diagnosis. After choosing the first option of 'Predict Disease', the chatbot displays a list of symptoms in the new tab to choose and select from them. After selecting, you can add more symptoms or proceed with the option. Then it predicts the prognosis with the accuracy of 97% which predicts the most likely possible disease. When you choose the second option of 'Check Disease Symptoms', it asks you for the disease name and displays the symptoms of the associated disease. Users can check their body mass index through BMI section of the website. Below are the results of this system.

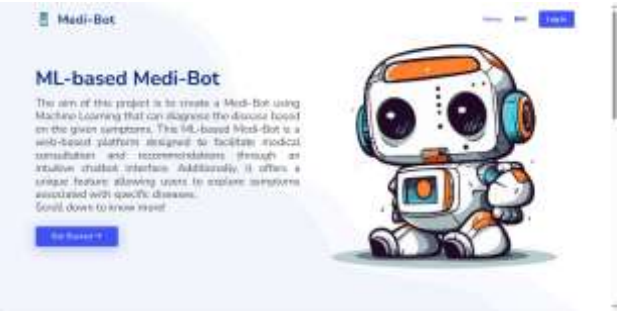

Fig. 2 displays the web interface of the Medi-Bot application.

Industrial Engineering Journal
ISSN: 0970-2555
Volume : 53, Issue 4, April : 2024

Fig. 3 displays the registration form and login of the user to the application.

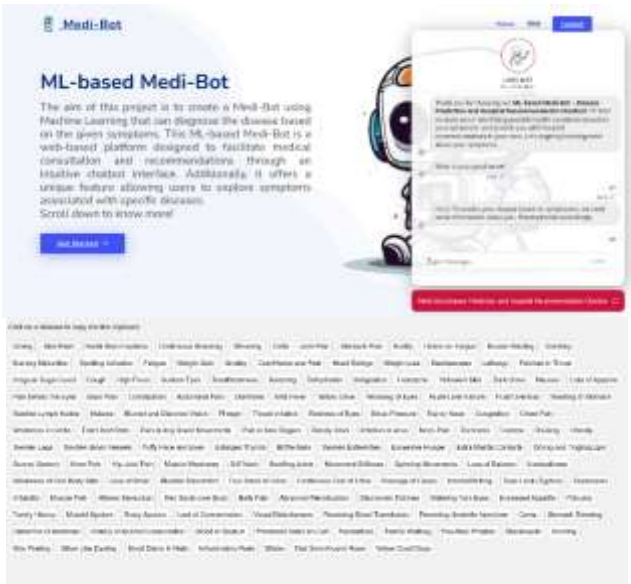

Fig. 4 displays the chatbot with which the user interacts and self-diagnose the prognosis by choosing the symptoms displayed on the screen that the user relates to.

Fig. 5 illustrates how the chatbot is interacting with the user by gathering name and age of the user. If the user wants the chatbot to predict the disease, the user gives symptoms and chooses the option of 'Predict Disease'. The chatbot uses Random Forest Classifier model to predict the disease.

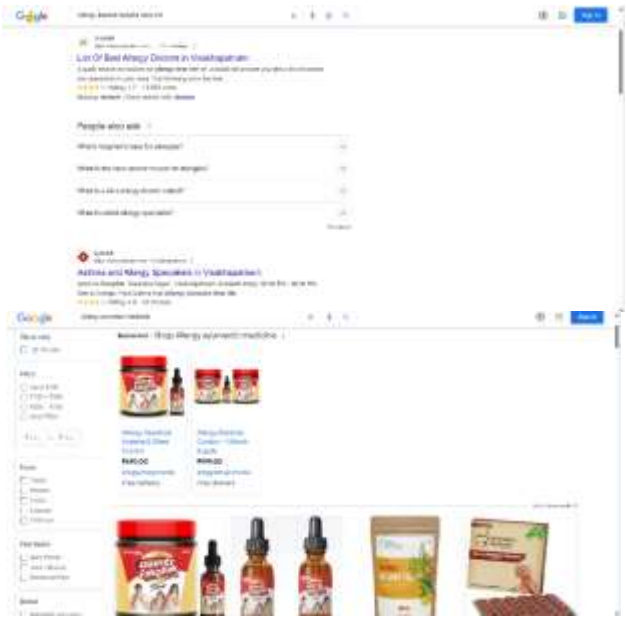

Fig. 6 shows the disease-related hospital near user location and suggests ayurvedic remedies to shop.

Fig. 7 demonstrates how the chatbot is identifying the

Industrial Engineering Journal
ISSN: 0970-2555
Volume : 53, Issue 4, April : 2024

symptoms of user specified disease. The user can input the disease by choosing the second option 'Check Disease Symptoms'. A matrix of token counts is created from a set of symptoms using CountVectorizer. In the final matrix, each row denotes a document (symptoms), and each column denotes a distinct token. When comparing the similarity of documents or text passages which are represented as vectors, Cosine Similarity is frequently utilized. It is widely used in document categorization, text clustering, and information retrieval.

Fig. 8 displays the feature of BMI calculation which is programmed using JavaScript.

VII. TESTING & VALIDATION

We tested different chatbots for our model estimation. The performance of our system is evaluated by comparing it to the existing models. The following are the existing chatbots:

1. Health Chatbot Using NLP for Disease Prediction and Treatment
2. AI Chatbots Provide Inconsistent Musculoskeletal Health Information
3. Personal Healthcare Chatbot for Medical Suggestions Using AI & ML

S. No	Year	Chatbot	Accuracy (%)
1	2021	Health Chatbot Using NLP for Disease Prediction and Treatment	87
2	2023	Personal Healthcare Chatbot for Medical Suggestions Using AI & ML	82
3	2024	AI Chatbots Provide Inconsistent Musculoskeletal Health Information	92
4	2024	Proposed Model	97

Table 1 – Performance Comparison of various existing models to our proposed model with respect to the year they were proposed.

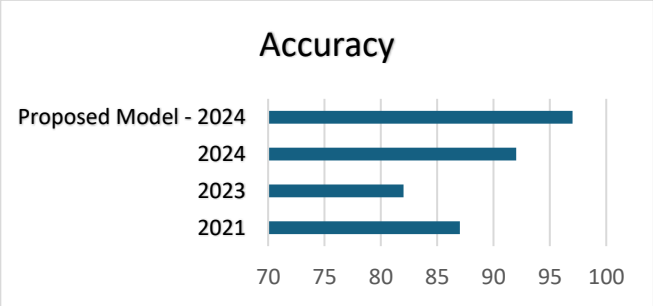

Fig. 9 illustrates the comparative analysis of existing models with our proposed model. As we seen, our model performs with the accuracy of 97% resulting in quicker results, accurate prognosis prediction.

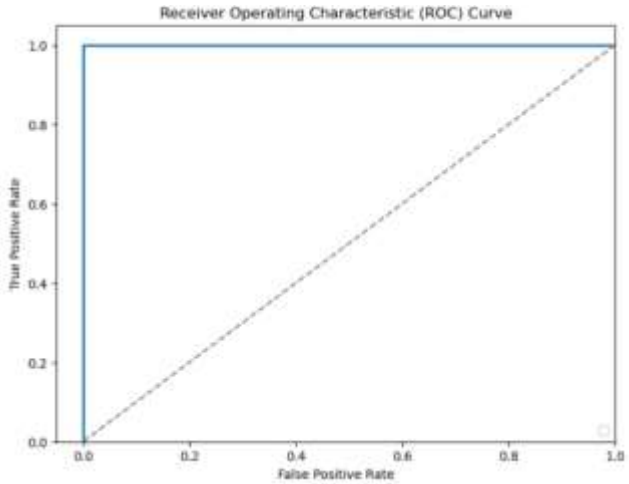

Fig. 10 shows the Region Operating Characteristic (ROC) curve for a binary classification. As a result, we can conclude that the classifier performs better as the closer the ROC curve is to the top-left corner, indicating a higher TPR for a given FPR.

VIII. CONCLUSION

Common people face challenges when seeking medical care for common ailments, often feeling unsure about which type of healthcare facility to visit for their symptoms, particularly when it comes to specialized hospitals. From children to old age people, this chatbot helps in providing basic details of the prognosis with the accuracy of 97% and recommends specialized hospitals near their location and suggests ayurvedic medicine for basic idea. This chatbot can be accessed from any device at any time including emergency situations.

IX. REFERENCES

[1] Lekha Athota, Vinod Kumar Shukla, Nitin Pandey, Ajay Rana, "Chatbot for Healthcare System Using Artificial Intelligence", IEEE, June 2020.

[2] Athulya N, Jeeshna K, S J Aadithyan, U Sreelakshmi, Hairunizha Alias Nisha Rose, "Healthcare Chatbot", IJCRT, October 2021.

[3] Harsh Mendapara, Suhas Digole, Manthan Thakur, Anas Dange, "AI Based Healthcare Chatbot System Using Natural Language Processing", IJSRED, April 2021.

[4] Tae-Ho Hwang, JuHui Lee, Se-Min Hyun, KangYoon Lee, "Implementation of interactive healthcare advisor model using chatbot and visualization", IEEE, August 2020.

[5] R Jegadeesan, Dava Srinivas, N Umapathi, G Karthick N Venkateswaran, "Personal Healthcare Chatbot for Medical Suggestions Using Artificial Intelligence and Machine Learning", ECB, September 2023.

[6] Jagbeer Singh, Vaibhav Deshwal, Sourabh Kumar, Manish Khaloria, Manish Yadav, Priyanshu Negi, "Healthcare Chatbot System Using Python and NLP", Journal of Pharmaceutical Negative Results, June 2022.

[7] Papiya Mahajan, Rinku Wankhade2, Anup Jawade, Pragati Dange, Aishwarya Bhoge, "Healthcare Chatbot using Natural Language Processing", IRJET, November 2020.

[8] Yedukondalu Udara, Srinivasarao Udara, Harish H, Hadimani H, "Health Monitoring System Using IoT", International Journal of Engineering and Manufacturing Science, August 2016.

[9] Mohammed Juned, Farhat Dalvi, Janhavi Kadam, Awais Khalifey, Sakshi Mane, Shaikh Mohd Ashfaque, Shaikh Afshan, "AI Healthcare Chatbot", JETIR, April 2022.