DOC-BOT : A Personal Healthcare Chatbot for Medicine Recommendation and Doctor Consultancy

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Abstract

In response to growing healthcare challenges resulting from population growth and increasing patient burden, the proposed system integrates artificial intelligence, natural language processing, machine learning, and computer vision to improve communication between patients and doctors. The system uses a chatbot to assess the patient's problems and recommend specific medications. This approach, especially relevant to situations like the COVID-19 pandemic, is well-suited to the growing trend of virtual care. This study includes a literature review on chatbots in healthcare. Previous research in the field of drug recommendation system (RS) chatbots has focused on improving drug suggestions using predictive modeling and data-driven methods. In particular, the integration of computer vision enhances the user experience by facilitating image sharing, allowing users to share photos of medications or symptoms for accurate identification and personalized recommendations. This holistic technology approach aims to improve the overall quality of healthcare delivery in the face of increasing demand.

1. INTRODUCTION

The healthcare industry is undergoing significant change, especially as the world's population grows. However, as the number of patients increases, problems arise in effective communication between patients and doctors, affecting the overall quality of care. Recognizing this, there is a critical need for innovative solutions to streamline healthcare processes and improve patient care. The proposed solution is to develop a sophisticated healthcare chatbot system using artificial intelligence and natural language processing. The chatbot aims to facilitate communication between patients and the healthcare system and ultimately recommend specific doctors based on preliminary diagnoses. The COVID-19 pandemic has seen a significant increase in the adoption of virtual care and robotics technology in healthcare settings. The proposed Doctor Recommendations chatbot goes one step further by incorporating machine learning and computer vision into its functionality. Existing research on drug recommendation system chatbots mainly focuses on improving drug suggestions using predictive modeling and data-driven approaches. Integrating computer vision into chatbots improves the user experience by enabling image sharing, allowing users to visually communicate medication details or symptoms. The chatbot encourages users to express their health concerns in text format. The chatbot then processes this information using advanced algorithms to provide customized solutions. If the problem exceeds the chatbot's capabilities, it intelligently recommends consultation to a specific doctor. This approach not only ensures effective communication, but also allows the chatbot to serve as a preliminary diagnostic tool.

2. LITERATURE SURVEY

The healthcare chatbot system achieves 80% disease prediction accuracy, progressing through information gathering, symptom extraction, diagnosis, and medical advice phases. Prioritizing security via user registration, it prompts symptom input upon login, delivering personalized recommendations with 82% accuracy. This user-friendly platform enhances preliminary health assessments with tailored guidance. This paper introduces a healthcare chatbot utilizing GPT-3.5 for seamless user interaction in symptom articulation and disease assessment. Employing TF-IDF and advanced algorithms, it enhances disease prediction precision, efficiently correlating user queries

with symptom databases. Results highlight its value in promptly addressing health concerns and streamlining communication amid rising hospital patient loads. [1]

This research integrates sentiment analysis and drug recommendation, utilizing advanced text vectorization methods like Bag of Words, TF-IDF, and Word2Vec. Manual feature engineering enhances accuracy, with Logistic Regression and Random Forest classifiers employed. Linear SVC achieves 93% accuracy in sentiment analysis. The study aims for further optimization in drug recommendation.[2]

The paper introduces a deep feedforward multilayer perceptron for an AI-based medical chatbot, improving infectious disease prediction. Leveraging NLP and LSTM algorithms, it enhances database interaction. Tkinter is used for interface creation. LSTM achieves 94.32% accuracy with 0.1232 loss. Emphasizing COVID-19 challenges, it highlights chatbots' potential in disease prediction, aiming to advance healthcare technology.[3]

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3. SOFTWARE REQUIREMENTS SPECIFICATION

3.1.1 Functional Requirements

User authentication and authorization: User registration and login functions. A secure authentication mechanism that ensures user privacy and data protection. Handling user input: Natural language processing (NLP) to understand user queries and requests. The ability to analyze user input to identify symptoms, medical history, and other relevant information.

Medical Recommendations: You can access our extensive drug database including indications, contraindications, side effects and dosage. It is an algorithm that recommends appropriate drugs based on the user's symptoms, medical history, and other situational factors. Consider allergies, drug interactions, and other individual patient factors when recommending medications.

Disease prognosis: It is integrated with machine learning or statistical models trained on medical data to predict disease. This function predicts potential diseases or conditions by analyzing the user's symptoms and medical history. The level of confidence or probability associated with the prognosis of each disease.

Make an appointment with a doctor: Integration with your scheduling system makes it easier to schedule an appointment with your doctor. Schedule availability of physicians and specialties. A booking engine that allows users to select their preferred appointment time and date. A notification system that reminds users of upcoming meetings.

Feedback and Improvements: A mechanism that allows users to provide feedback on the chatbot's recommendations and predictions. We continuously monitor and improve chatbot performance based on user feedback and usage data.

Integration with external systems: Integrates with pharmacy systems to fulfill prescriptions. Integrates with laboratory systems for diagnostic testing and results. Integration with telehealth platforms for virtual consultations.

Emergency response: Provide clear instructions and advice to users in the event of a medical emergency, including when to seek immediate medical attention.

Effectiveness: Design considerations to make your chatbot accessible to users with disabilities, including support for screen readers and alternative input methods.

Scalability and Performance: The architecture is designed to be scalable to handle large numbers of users simultaneously. Monitor system performance to ensure responsiveness and stability.

3.1.2 Nonfunctional Requirements

Response Time: Requirement: The chatbot should respond to user queries within a specified timeframe to maintain an interactive and engaging user experience.
Response time should be measured from the moment a user submits a query to when they receive a response from the chatbot.

Resource Utilization: Requirement: The website should efficiently utilize hardware resources, such as CPU, memory, and network bandwidth, to ensure optimal performance and responsiveness.
Measurement: Resource utilization metrics, such as CPU usage, memory usage, and network throughput, should be monitored and optimized to prevent bottlenecks and maximize efficiency.
conditions.
Load Testing:
Requirement: The website should undergo load testing to assess its performance under simulated high traffic conditions.
Measurement: Load testing involves simulating concurrent user interactions to measure the website's response time, throughput, and scalability under different load levels.
Latency Reduction:
Requirement: Minimize network latency to ensure fast data transmission and response times between the client and server.
Measurement: Latency is measured as the time it takes for data packets to travel between the client's device and the server.
Caching and Content Delivery:
Requirement: Implement caching mechanisms and content delivery networks (CDNs) to improve website performance and reduce server load.
Measurement: Cache hit rates, CDN latency, and content delivery times are measured to assess the effectiveness of caching and CDN strategies.
Optimized Code and Assets:
Requirement: Develop optimized code and assets, including HTML, CSS, JavaScript, and media files, to minimize file sizes and improve page load times.
Measurement: Page load times and file sizes are measured using performance monitoring tools and browser developer tools.

Monitoring and Alerting:
Requirement: Implement monitoring and alerting systems to continuously monitor website performance metrics and detect anomalies or issues in real-time.
Measurement: Key performance indicators (KPIs), such as response time, uptime, error rates, and resource utilization, are monitored and analyzed using monitoring tools and dashboards.

4. DATASETS USED

Training.csv- The data on which the machine learning model will be trained where we have nearly 132 symptoms by which 40 diseases are mapped .
Symptom_severity.csv-Based on the severity of the Symptoms the bot recommends either a medicine or doctor consultancy
Symptom_description.csv-When a disease is predicted this csv file gets called and description of the disease is presented to the user
disease-symptom-db
Med.csv- It consists of a list of 3 medicines for each disease hence when any disease is predicted this csv file helps to attach medicine for it.
Symptom_precaution-similar to description csv what precaution should be taken for the disease to not grow is mentioned in this file.

5. PROPOSED WORK

Doc-Bot is designed to provide users with a simple and effective way to evaluate health problems, get medication recommendations, and even schedule doctor appointments if necessary.
A conversation with Doc-Bot begins with the user starting a conversation to share their symptoms. The system initially prompts the user to enter two symptoms. Based on these techniques, Doc-Bot uses predictive models to identify symptoms and predict potential infections. If a match is found, the discussion continues with the introduction of drugs relevant to the identified condition.
However, if the prediction is vague or ambiguous, Doc-Bot will search for more information by asking the user to provide 10

additional symptoms. This additional information increases the accuracy of the forecast. Once enough symptoms are recorded, Doc-Bot first processes the data to identify the most common disease.

In terms of predicting disease, Doc-Bot has two diagnostic options. The recommended medication is based on established clinical guidelines and is appropriate for the predicted disease.

Once the appointment is confirmed, Doc-Bot will create a confirmation email containing the details of the appointment and send it to the user. This enables effective collaboration between users and providers.

Doc-Bot, in essence, provides solutions to health problems and user-friendly solutions by analyzing symptoms and disease predictions, medication recommendations and doctor appointments. With its smart and flawless features, Doc-Bot aims to change the way people access healthcare services and make services easier and more accessible than ever.

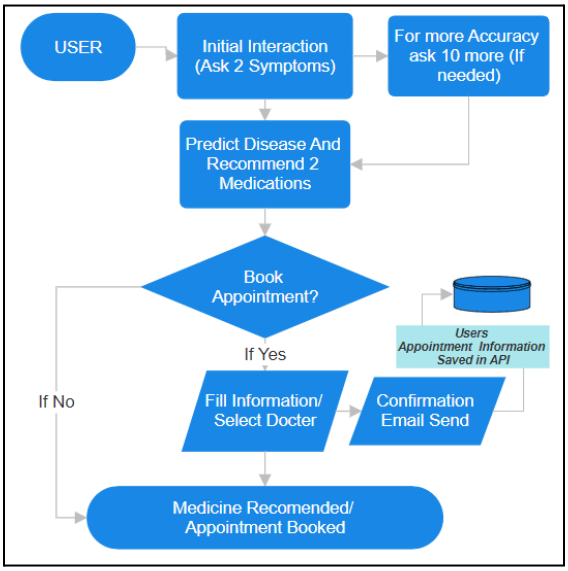

Figure 5.1 Module

6. GUI

For Doc-Bot, we integrated a graphical user interface (GUI) using Tkinter, a powerful tool for creating user-friendly interfaces in Python applications. Tkinter provides tools and effective tools to create simple connections, improving the user experience and usability of the Doc-Bot medical chatbot system.

In addition, Tkinter provides many documents and resources so that developers can easily learn and use various GUI concepts and functions. This accessibility allows us to quickly iterate and iterate interface designs to ensure they meet our users' unique needs and preferences.

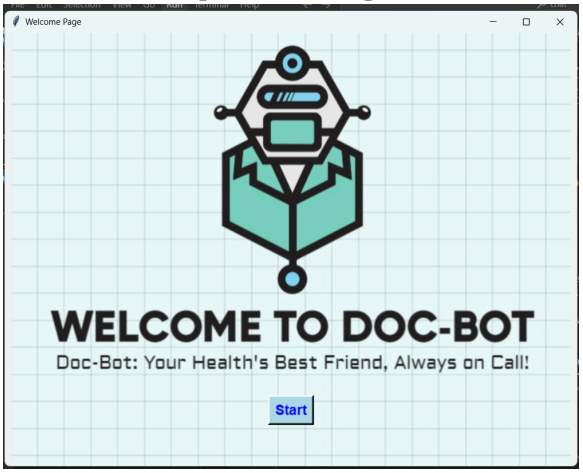

Figure 6.1 Initial Load Page

Overall, Tkinter has been a key tool in the development of the Doc-Bot Healthcare chatbot system, allowing us to create an intuitive, user-friendly interface and overall functionality that improves overall usability and usability. application. . We believe that through the power of Tkinter, Doc-Bot will provide users with a seamless and understandable medical consultation, ultimately improving patient outcomes and satisfaction.

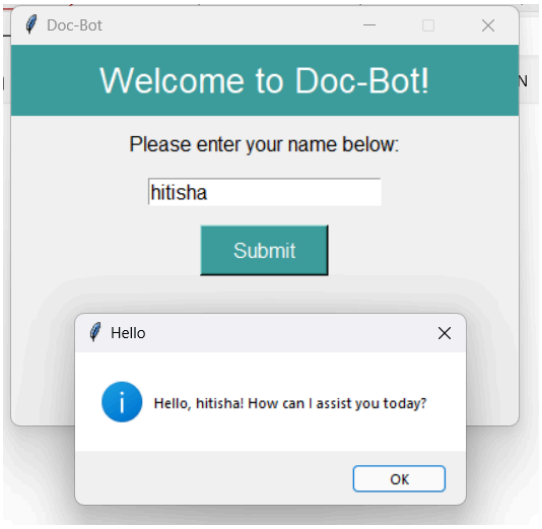

Figure 6.2 Initial

Login

The home page of our chat bot is designed using Tkinter, offering a welcoming interface that instantly engages users. Upon accessing the home page, users are greeted with a friendly alert message, creating a warm and inviting atmosphere for interaction. This alert serves as a delightful introduction, setting the tone for the user experience ahead. Through the simplicity and intuitiveness of Tkinter, we ensure that users feel immediately comfortable and encouraged to engage with the chat bot. With its sleek design and user-friendly interface, our Tkinter frontend not only provides a visually appealing introduction but also lays the foundation for seamless communication and interaction with the chat bot's functionalities.

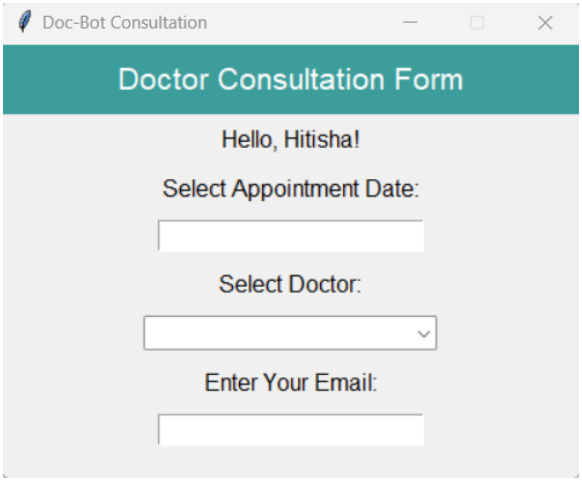

Figure 6.3 Doctor-Appointment

The Tkinter frontend for the doctor consultant page provides a user-friendly interface for individuals seeking medical advice. Upon accessing the page, users are presented with a form that allows them to input their email data and relevant information about their medical concerns. The form includes fields for users to specify their symptoms, medical history, and any additional details they wish to provide. Additionally, users can select the preferred doctor specialization or indicate if they prefer a specific healthcare provider. The Tkinter frontend ensures smooth navigation and intuitive interaction, guiding users through the process of submitting their consultation request efficiently.

7. MODEL USED

In our Doc-Bot project, we are exploring various machine learning models to improve the accuracy of disease prediction and medication recommendations. After rigorous evaluation, the K-nearest neighbor (KNN) algorithm emerged as the most efficient model for our purposes.

There are several steps to using KNN in our project:

Data pre-processing: We preprocess the dataset with symptom-drug pairs to ensure consistency and accuracy of features. These steps include cleaning data, handling missing values, and coding categorical variables.

Selection Method: Select relevant features (such as symptoms) to enter into the KNN model. These features play an important role in determining the consistency of events.

Model training: The KNN model is trained on previous data from which it learns the relationship between symptoms and medications. During training, the model calculates the distance between samples to determine the nearest neighbors.

Prediction: When a user enters their symptoms, the KNN model is trained to identify the "k" nearest neighbors from the dataset. According to most of the neighbor group, the model recommends the drug that affects the user's symptoms.

At Doc-Bot, we use the KNN algorithm to enable us to provide users with personalized and accurate recommendations based on their symptoms. KNN' s ability to detect similar situations makes it ideal for this task and provides valuable assistance in healthcare decision-making and user satisfaction for our chatbot service.

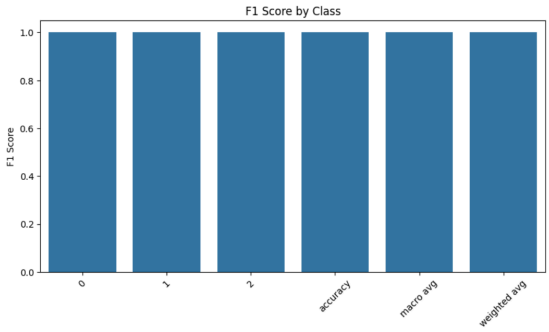

Figure 7.1

8. RESULTS

After starting , the user is presented with a welcome window containing an input field where he can describe his symptoms. When users enter symptoms, the chatbot uses the most effective language to make recommendations to better understand the user's health issues.
Additionally, if the user's symptoms indicate the need for further medical consultation, the chatbot offers the option to schedule a doctor's appointment directly from the interface. The chatbot integrates with the appointment system and displays the list of available doctors with their identification information and appointments. Users can choose their favorite doctor and schedule an appointment in a few clicks.

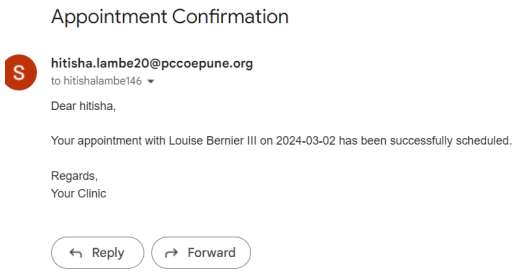

Figure 8.1

In summary, the Tkinter-based medical chatbot GUI offers users an easy and effective way to get medication recommendations and schedule appointments with doctors. By combining technology with intuition, chatbots increase the accessibility and efficiency of healthcare, ultimately helping to improve patient outcomes and satisfaction.
Once an appointment is made through the Tkinter frontend for the doctor consultant page, the relevant data is seamlessly added to the API (Application Programming Interface) for further processing and management. The data added to the API includes details such as the user's email, medical concerns, preferred doctor specialization, and any additional notes provided during the appointment booking process.

CONCLUSION

In summary, Doc-Bot represents a significant advance in medical technology and is designed to solve communication and accessibility problems in healthcare. As the global population continues to grow and the need for medical assistance continues to increase, innovative solutions like Doc-Bot are vital to improve processes and improve care.

Using artificial intelligence and word processing, Doc-Bot provides a great platform for users to express health concerns and receive personal information. Integration of machine learning algorithms such as K-Nearest Neighbors (KNN) can make accurate disease and medication recommendations based on the user's symptoms and treatment history of pain. This ensures users receive guidance based on their needs and circumstances.

Additionally, Doc-Bot's capabilities go beyond symptom analysis and medication recommendations to include supporting doctor appointments. By integrating with the appointment system, Doc-Bot simplifies the appointment process with doctors and makes it easier to access timely medical help when needed. These features improve the overall user experience and ensure continuity of care for individuals seeking additional counseling.

The solution is supported by research and existing data demonstrating the feasibility and effectiveness of similar healthcare systems. The study achieved good results in terms of predicting disease exposure and user satisfaction, demonstrating the impact of Doc-Bot in improving access to health and delivery.

In short, Doc-Bot represents a holistic consultancy system that combines advanced technology and smart algorithms, allowing users to manage their own health information cleanly and beautifully. Doc-Bot has the potential to revolutionize healthcare in the digital age and improve patient outcomes by bridging the gap between patients and healthcare systems.

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