

AI DRIVEN PUBLIC HEALTH CHATBOT: A WEB-BASED SYMPTOM ANALYSIS AND PREVENTIVE HEALTHCARE SYSTEM

Ms.D.Renuka

Assistant Professor

Department of Computer Science and Engineering
Mahatma Gandhi Institute of Technology
Hyderabad 500075, India
drenuka_cse@mgit.ac.in

Rithvika Reddy Barla

Department of Computer Science and Engineering
Mahatma Gandhi Institute of Technology
Hyderabad 500075, India
reddybarla_cse2405x8@mgit.ac.in

Ms.K.Shirisha

Assistant Professor

Department of Computer Science and Engineering
Mahatma Gandhi Institute of Technology
Hyderabad 500075, India
kshirisha_cse@mgit.ac.in

Siri Gottipati

Department of Computer Science and Engineering
Mahatma Gandhi Institute of Technology
Hyderabad 500075, India
sgottipati_cse2405y5@mgit.ac.in

Abstract—The rapid advancement of artificial intelligence (AI) has significantly transformed the healthcare sector by enabling intelligent, accessible, and efficient solutions. This project presents the design and development of an AI-driven public health chatbot aimed at providing preliminary medical assistance and health-related guidance to users. The chatbot interacts with users through a conversational interface, collects symptoms, and analyzes them using machine learning techniques and predefined medical knowledge bases to suggest possible conditions and basic remedies. The system is designed to bridge the gap between patients and healthcare services, especially in areas with limited medical access.

It offers features such as symptom checking, disease prediction, general health advice, and awareness of preventive measures. By utilizing natural language processing (NLP), the chatbot ensures user-friendly and effective communication, making it accessible to individuals with minimal technical knowledge.

Index Terms—Artificial Intelligence (AI), Public Health Chatbot, Disease Awareness, Symptom Analysis, Machine Learning, Natural Language Processing (NLP), Healthcare Assistance, Disease Prediction, Preventive Healthcare, Digital Health Systems.

I. INTRODUCTION

In recent years, the integration of Artificial Intelligence (AI) in healthcare has brought significant advancements in the way medical services are delivered and accessed. With the increasing demand for quick and reliable health information, AI-driven solutions such as chatbots have emerged as effective tools for providing preliminary healthcare assistance. An AI-driven public health chatbot is a conversational system designed to interact with users, understand

II. LITERATURE SURVEY

With the growth of digital healthcare technologies, numerous web-based and mobile health applications have been developed

to provide symptom-based assistance and medical guidance.

These systems aim to reduce the gap between patients and healthcare services by offering quick and accessible solutions.

their symptoms, and provide relevant health-related guidance in a simple and accessible manner.

Public health awareness plays a crucial role in preventing diseases and promoting healthy lifestyles. However, many individuals lack immediate access to reliable medical information, especially in remote or underserved areas. This gap often leads to delayed diagnosis, misinformation, and unnecessary panic. The proposed AI-driven public health chatbot aims to address this issue by offering real-time disease awareness and basic health recommendations based on user input.

The chatbot utilizes technologies such as Natural Language Processing (NLP) and Machine Learning (ML) to interpret user queries and analyze symptoms. By comparing the input data with a structured medical knowledge base, the system can predict possible health conditions and suggest preventive measures. It also educates users about common diseases, their symptoms, and precautionary steps, thereby enhancing overall public health awareness.

Furthermore, the system is designed to be user-friendly, accessible, and efficient, ensuring that individuals with minimal technical knowledge can easily interact with it. While the chatbot does not replace professional medical consultation, it serves as a supportive tool for early-stage health assessment and awareness. This contributes to reducing the burden on healthcare systems and encourages individuals to seek timely medical attention when necessary.

Overall, the AI-driven public health chatbot represents a cost-effective and scalable solution that leverages modern technology to improve healthcare accessibility, promote disease awareness, and support preventive healthcare practices in society.

Chat Ella – AI Chronic Disease Assistant	2020	Assists with chronic disease assessment using LLM	Limited to chronic diseases only
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Many existing systems utilize **rule-based approaches or machine learning models** to predict diseases based on user-input symptoms. While these platforms provide diagnostic suggestions, they often lack emphasis on **preventive healthcare and lifestyle-based recommendations**.

Some applications offer general health tips; however, they do not incorporate **personalized health data**, such as user medical history, medications, or habits. This limitation reduces the effectiveness and relevance of recommendations.

Additionally, most systems do not include a **clear severity classification mechanism**, making it difficult for users to understand the seriousness of their condition. Although some platforms include reminders or tracking features, they are primarily focused on fitness rather than integrating symptom analysis with healthcare guidance.

The proposed system addresses these gaps by integrating:

- Personalized health record management
- Symptom-based analysis
- Severity classification (Green, Yellow, Red)
- Preventive healthcare recommendations
- Reminder and notification system
- Administrative data management

This combination makes the system more **comprehensive, user-centric, and effective** compared to existing healthcare applications.

Table I: Literature Survey

System	Prediction Likelihood	Focus	Limitations
Innovative Healthcare Chatbot (JIRASET)	2024	Uses Machine Learning and Neural Networks for disease diagnosis	Focuses mainly on diagnosis, not awareness
Health Buddy – AI Chatbot for Public Health Awareness	2022	Provides general disease information and awareness	Basic responses and limited interaction

III. METHODOLOGY

The AI-Driven Public Health Chatbot follows a structured approach to provide disease awareness and preventive healthcare guidance. Initially, users register and log in to the system, allowing secure access and personalized interaction. Users then input their symptoms and basic health details, which are processed by the chatbot using a predefined dataset and rule-based analysis.

The system analyzes the symptoms and classifies the health condition into different severity levels, helping users understand the seriousness of their condition. Based on this classification, the chatbot generates appropriate responses, including disease awareness information, preventive measures, and basic health recommendations.

Additionally, the system provides alerts in critical cases, suggesting medical consultation when necessary. This methodology ensures a smooth flow from user input to analysis and output, making the chatbot an effective tool for early disease awareness and preventive healthcare support.

Table II: Diagnosis Classification

Zone	Prediction Likelihood	Symptoms
Red	High likelihood	Matches the most
Orange	Moderate likelihood	Partial Symptom Match
Green	Low likelihood	Minimal Severe Condition

Table I represents the **diagnosis classification mechanism** used in the AI-Driven Public Health Chatbot to evaluate and categorize user health conditions based on symptom analysis.

The system determines the likelihood of a disease by comparing user-input symptoms with a predefined dataset and assigns them to different severity zones.

The **Red Zone** indicates a **high likelihood of disease**, where the user's symptoms closely match known patterns of serious conditions. In such cases, the chatbot provides immediate alerts and strongly recommends consulting a medical professional.

The **Orange Zone** represents a **moderate likelihood**, where there is a partial match between user symptoms and disease patterns. The system advises users to monitor their condition, follow precautionary measures, and seek medical advice if symptoms persist or worsen.

The **Green Zone** indicates a **low likelihood of serious disease**, where symptoms are mild or do not strongly match critical conditions. In this case, the chatbot suggests basic remedies, preventive care, and lifestyle improvements.

This classification system helps users quickly understand the **severity of their condition**, supports informed decision-making, and ensures that appropriate actions are taken based on the level of risk.

IV. SYSTEM ARCHITECTURE

The system architecture of the AI-Driven Public Health Chatbot is designed as a **three-layer model** consisting of the **presentation layer, application layer, and database layer**. This architecture ensures smooth interaction between the user, chatbot processing system, and health data storage.

The **presentation layer** acts as the user interface, where users can register, log in, enter symptoms, and interact with the chatbot. It is developed using web technologies such as **HTML, CSS, and JavaScript**, providing a simple and user-friendly platform for disease awareness and preventive healthcare guidance.

The **application layer** is the core processing unit of the system. It handles user requests, symptom analysis, disease prediction, and response generation. This layer uses **AI-based logic, rule-based processing, or machine learning techniques** to compare user symptoms with the stored dataset and classify the diagnosis into severity zones such as Red, Orange, and Green. It also generates recommendations, precautionary measures, and alerts for medical consultation when required.

The **database layer** stores user profiles, symptom data, disease information, precautionary measures, and chatbot responses. A database such as **SQLite or MySQL** can be used to manage this information efficiently. This layer helps in retrieving previous records and supporting personalized healthcare suggestions.

Overall, the system architecture provides a structured flow from **user input to intelligent analysis and result generation**, making the chatbot effective for early disease awareness and public health support.

Fig. 1. System Architecture of Ai Driven Public Health Chatbot

“As shown in Fig. 1, the system follows a structured multi-layer architecture that enables efficient processing of user health data and generation of meaningful healthcare responses. The application layer performs core operations such as symptom analysis, intent recognition using Natural Language Processing (NLP), and disease prediction using AI/ML models. Based on the analysis, the system generates personalized recommendations including home remedies, dietary suggestions, yoga practices, and preventive measures. In critical cases, the system produces alerts advising users to seek professional medical consultation.

The data layer utilizes a medical knowledge base and database system (such as SQLite) to store user information, health records, symptom datasets, and disease-related information. This ensures efficient data management and quick retrieval of relevant information for generating accurate and personalized responses. Additionally, the system incorporates an admin module that allows administrators to manage user data, update medical content, and maintain the knowledge base, ensuring that the system remains reliable and up to date.

Overall, the architecture enables a smooth flow of data from user input through processing and analysis to response generation, making the system efficient, scalable, and suitable for providing intelligent healthcare support and disease awareness through digital platforms.”

V. FLOW CHART

The flowchart represents the working process of the AI-Driven Public Health Chatbot for disease awareness. The process starts when the user opens the chatbot and enters symptoms or a health query. The input is processed using Natural Language Processing (NLP) to extract relevant symptoms and understand user intent. The processed data is then analyzed by a machine learning model to predict possible diseases. Based on this, the system searches the health database and generates an appropriate response, including disease information, preventive measures, and advice. Finally, the response is displayed to the user, completing the process.





Fig. 2. Flow chart/System Workflow Diagram

“As shown in Fig. 2, the system workflow of the AI-Driven Public Health Chatbot illustrates the sequential process from user interaction to response generation. The process begins when the user opens the chatbot and enters symptoms or a health-related query through the user interface. The input is then processed by the Natural Language Processing (NLP) module, which understands the text and extracts relevant symptoms and keywords.

The extracted information is passed to the machine learning model, where analysis is performed to predict possible diseases based on the input symptoms. Following this, the system searches the health database to retrieve relevant medical information, including disease details, preventive measures, and recommended actions.

Based on this analysis, the system generates an appropriate response that may include disease awareness information, precautionary tips, and health advice. The generated response is then displayed to the user through the interface. This structured workflow ensures efficient processing, accurate analysis, and timely delivery of healthcare guidance, making the system effective for disease awareness and preventive healthcare support.”

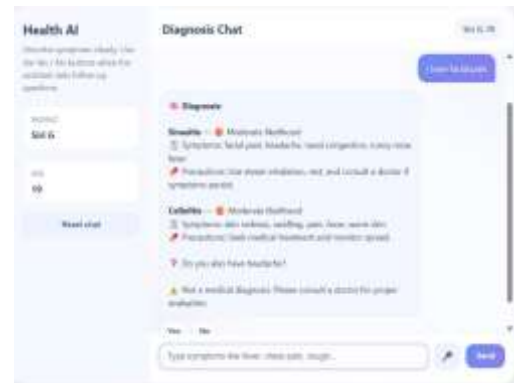
VI. RESULTS

The Digital Health Remedy Guide was implemented and tested using different symptom inputs and durations to evaluate its performance. The system was able to successfully classify user conditions into Green, Yellow, and Red zones based on severity and provide appropriate recommendations. Several test cases were considered to analyze the system behavior. For example, when a user entered symptoms such as mild headache or

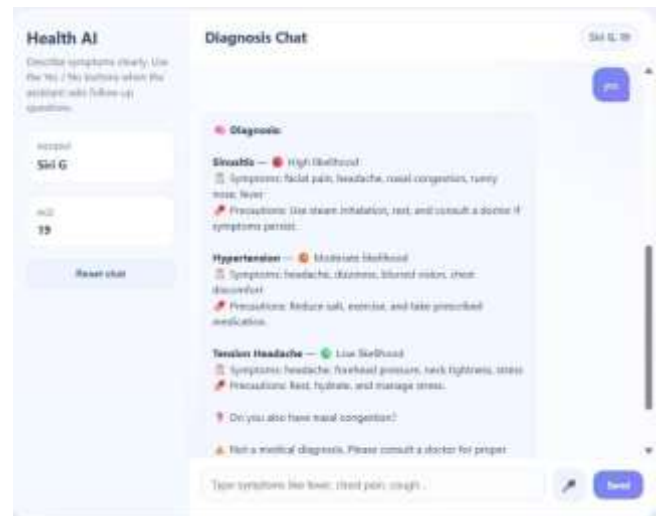
common cold for a short duration, the system classified the condition under the Green zone and provided suitable home remedies and lifestyle suggestions.

To further evaluate the system, the following case scenarios were tested:

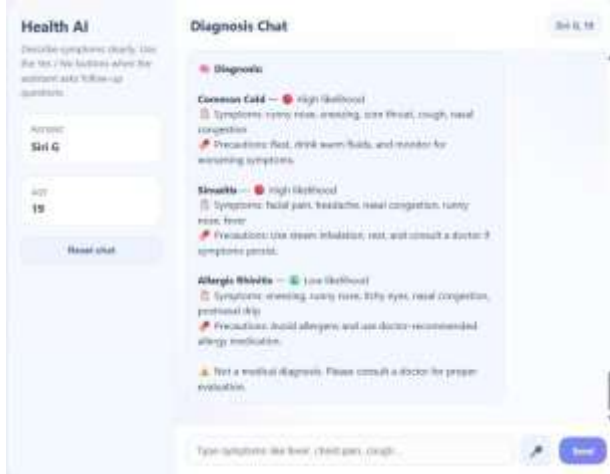
Case 1: Facial Pain → Symptoms gives disease detection



Case 2: Disease with mild likelihood → Orange Zone



Case 3: Disease with high likelihood → Red Zone



In cases where symptoms such as continuous fever or fatigue were entered for a longer duration, the system categorized them under the Yellow zone and suggested precautionary measures along with monitoring. For severe symptoms such as high fever for multiple days or chest discomfort, the system classified the condition under the Red zone and generated alerts recommending immediate medical consultation. The system demonstrated consistent performance across these test cases, achieving an approximate accuracy of around 80–85% in symptom classification based on the predefined dataset.

The recommendation module effectively generated relevant outputs, including home remedies, diet suggestions, and yoga practices. Additionally, the reminder and notification feature improved user engagement by encouraging regular follow-up of suggested remedies and healthy habits.

The user interface was found to be simple and easy to navigate, allowing users to interact with the system without difficulty. However, the system relies on predefined rules and datasets, which may limit its ability to handle complex or rare medical conditions. Despite these limitations, the system performs effectively as an initial healthcare support tool and promotes preventive healthcare awareness.

VII. ADVANTAGES AND LIMITATIONS

The AI-Driven Public Health Chatbot offers several advantages as a digital healthcare support system. It provides quick and accessible health guidance, enabling users to understand symptoms and take preventive measures without immediate medical consultation. The system enhances disease awareness through structured analysis and personalized recommendations. Additionally, it is user-friendly, scalable, and promotes preventive healthcare practices.

However, the system has certain limitations. It relies on predefined datasets and AI models, which may not accurately handle complex or rare medical conditions. The accuracy of results depends on correct user input, and incorrect information may lead to misleading recommendations. Furthermore, the chatbot does not replace professional medical diagnosis and should be used only as a preliminary healthcare support tool.

VIII. FUTURE SCOPE

The AI-Driven Public Health Chatbot can be further enhanced by integrating advanced machine learning algorithms to improve accuracy and provide more personalized predictions. The system can be extended into a mobile application for better accessibility and real-time support. Integration with wearable devices can enable automatic health data collection for more accurate analysis. Additionally, features such as telemedicine, real-time doctor consultation, and multi-language support can be added to make the system more comprehensive and user-friendly.

IX. CONCLUSION

The AI-Driven Public Health Chatbot is a reliable and efficient digital healthcare system designed to provide preliminary medical guidance through intelligent symptom analysis and disease awareness. By integrating user input, Natural Language Processing, and AI-based prediction techniques, the system is capable of identifying possible health conditions and categorizing them into different severity levels. This helps users clearly understand their health status and take appropriate actions based on the level of risk.

The chatbot not only predicts possible diseases but also promotes preventive healthcare by providing information such as causes, symptoms, precautions, and basic remedies. This approach encourages users to adopt healthier habits and respond to early symptoms in a timely manner. The system also improves accessibility to healthcare support, especially for individuals who may not have immediate access to medical professionals.

Although the chatbot does not replace professional medical diagnosis, it serves as an effective first-level decision support system. It reduces unnecessary hospital visits for minor conditions while ensuring that critical cases are identified and directed toward proper medical consultation. Overall, the proposed system demonstrates the potential of AI-driven technologies in enhancing disease awareness, improving healthcare accessibility, and supporting preventive healthcare practices in a simple, user-friendly, and scalable manner.

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