



# **AI-Powered Symptom Checker & Diagnosis Assistant System**

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**ABSTRACT:** The massive growth in the sector of Artificial Intelligence has significantly impacted and influenced the healthcare sector of India and the whole world by enabling Intelligent and Data-driven solutions for early diagnosis and faster assistance of a patient. The current study presents an AI-powered Symptom Checker and Diagnosis Assistant designed to analyze the inputs from a user that includes the symptoms and provide preliminary medical insights. The system utilizes supervised machine learning techniques, particularly the Random Forest algorithm, to predict probable diseases based on symptom patterns. In addition to disease prediction, the proposed system introduces a severity classification mechanism that categorizes conditions into mild, moderate, and severe levels using confidence-based analysis. Further ahead, it provides decision support by suggesting appropriate actions such as first-aid guidance, doctor consultation, or emergency response. The newly made model is trained on a “symptom–disease” dataset and based on it, processes user inputs through data preprocessing and binary encoding techniques to ensure consistency and accuracy. The system is developed and deployed as a mobile-based application. The newly made system is highly integrated with the backend APIs to get the real-time prediction and based on it, the required response to the user. With the required response, both the doctor and the patient can take the necessary actions further. The results indicate that the proposed system offers reliable predictions with improved usability and supports early health awareness. Overall, the development enhances accessibility to preliminary healthcare recommendations at the same time emphasizing that final medical decisions should be made by qualified professionals and well-experienced individuals.

**KEYWORDS:** AI, Machine Learning, Symptom Analysis, Disease Prediction, Healthcare, Random Forest, Diagnosis System

## **I. INTRODUCTION**

Artificial Intelligence (AI) has emerged as a powerful technology enabling the machines and software systems to mimic human intelligence through learning, reasoning, and decision-making. In last years, AI has significantly made attempts to transform the healthcare sector to improve and enhance patient engagement, diagnostic accuracy and enabling faster access to medical information. The increasing demand for accessible and reliable healthcare services, combined with the limitations of traditional systems such as delayed diagnosis and lack of medical awareness, has created the need for intelligent solutions that can assist users in understanding their health conditions at an early stage. This study presents an AI-powered Symptom Checker and Diagnosis Assistant designed to analyze user-input symptoms and provide preliminary medical insights using machine learning techniques. The system utilizes algorithms such as Random Forest to do the identification of probable diseases based on symptom patterns and does the further classification about the severity of the condition into mild, moderate, and severe levels using confidence-based analysis. In accordance to the prediction, the system offers decision support by suggesting us suitable actions such as first-aid guidance, doctor consultation, or emergency response, thereby helping users make informed healthcare decisions. Even though the AI provides significant advantages in terms of speed, efficiency, and scalability, excessive reliance on automated systems may lead to challenges such as prediction inaccuracies, lack of contextual understanding, and reduced human interaction. Therefore, the proposed system is designed to support, rather than replace, professional medical advice, ensuring that final decisions remain under the supervision of healthcare professionals. Furthermore, the growing integration of AI in healthcare emphasizes the importance of data privacy, ethical considerations, and system reliability. A balance of all approach which combines AI capabilities with human expertise can enhance early diagnosis, improve healthcare accessibility, warn user about health risks, prevent future harm and promote responsible and effective use of intelligent systems.

## II. LITERATURE SURVEY

Existing research on AI-based healthcare systems demonstrates the growing use of machine learning and natural language processing for improving patient interaction and disease prediction. Ahmed et al. (2024) developed a cloud-based healthcare chatbot system capable of real-time symptom analysis and patient communication. Their system utilized scalable architecture and predictive models to improve response time and system performance. However, the primary focus of the system was on symptom analysis, but lacked severity classification and actionable decision support. Similarly, Gupta et al. (2023) proposed an AI-powered Virtual Health Assistant using machine learning techniques for disease prediction and multilingual interaction. While the system achieved high accuracy in identifying basic diseases like common illnesses, it did not provide clear guidance regarding the seriousness of conditions or required medical actions. Further studies by Kumar and Bansal (2022) introduced a reinforcement learning-based chatbot capable of adapting to user interactions and improving prediction accuracy over time. Although the system enhanced user engagement, it mainly concentrated on conversational improvement rather than decision-making support. Saha and Pal (2022) explored the use of NLP and decision tree algorithms for symptom-based diagnosis and achieved high accuracy in identifying probable diseases. However, their approach lacked a comprehensive system that integrates severity assessment and real-time user guidance.

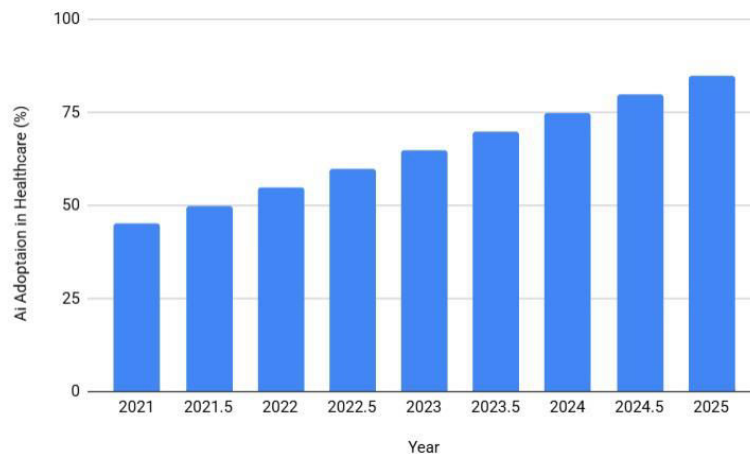


Fig 1. Year-wise growth of AI adoption in healthcare (2021–2025)

In spite of all these advancements, currently most of the existing systems focus primarily on disease prediction and do not integrate severity classification and amendable recommendations such as first-aid, doctor consultation, or emergency alerts which require immediate and constant actions. This disadvantage reduces the practical usability or execution of such systems in real-world scenarios. To overcome these challenges, the proposed system introduces an AI-powered symptom checker that not only predicts diseases using machine learning algorithms but also classifies severity and provides decision support. This approach improves early treatment, improves user awareness, and in the end supports informed healthcare decision-making while ensuring that final medical advice remains under well-experienced and professional supervision.

## III. SYSTEM ARCHITECTURE AND METHODOLOGY

The proposed system ensures efficient communication between the frontend, backend, and machine learning components by following a layered architecture. The frontend is developed using Flutter, which provides a user-friendly interface for entering symptoms and health-related details. The backend is implemented using Node.js, which handles API requests, validates user inputs, and manages communication between different modules. An independent machine learning service built using Flask API of Python, processes the input data from the user and performs disease prediction. In the system to improve the quality of output, various external data sources such as medical datasets and clinic/hospital databases are also integrated. This architecture ensures modularity, scalability, and secure data handling by separating user interaction, processing logic, and prediction mechanisms.

The system operates through a well-structured AI-integrated workflow. It starts with collection of the user’s symptoms and basic details, which are then preprocessed and converted into a structured format using binary encoding techniques. When the data is processed, it is then sent to the machine learning model, specifically a Random Forest algorithm, which does the task of analyzing symptom patterns and eventually predicts possible diseases along with confidence scores. Based on the prediction results, a decision engine categorizes the severity of the condition into mild, moderate, or severe levels using rule-based logic combined with model confidence and prediction analysis. The system then generates appropriate guidance, such as first-aid suggestions for mild cases, certain medical recommendations, doctor consultation recommendations for moderate cases, and emergency alerts for severe conditions. The backend further enriches the response by adding relevant information such as nearby clinics and healthcare support options. All the interactions and resulting outcomes are looked upon and managed through the advanced APIs to ensure real-time communication and system efficiency.

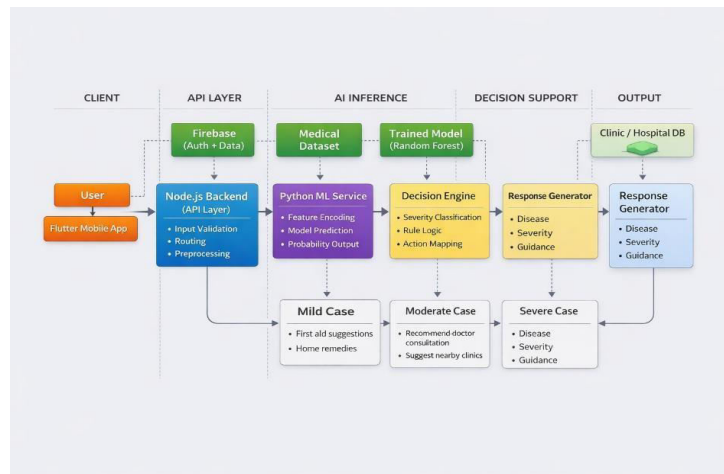


Fig 2. Data flow of AI Powered Symptom Checker System

The system is designed to continuously upgrade the performance by utilizing updated datasets and optimizing model accuracy. It ensures a consistent form of reliability by maintaining a balance between automated AI predictions and human medical oversight, where final decisions are expected to be validated by healthcare professionals. Data privacy and security are maintained throughout the process by handling user data carefully and limiting exposure to only necessary components. Logging mechanisms can be incorporated to track system activity and improve transparency. Overall, the proposed system provides an efficient, scalable, and intelligent solution for early symptom analysis and healthcare decision support while maintaining user trust and system reliability.

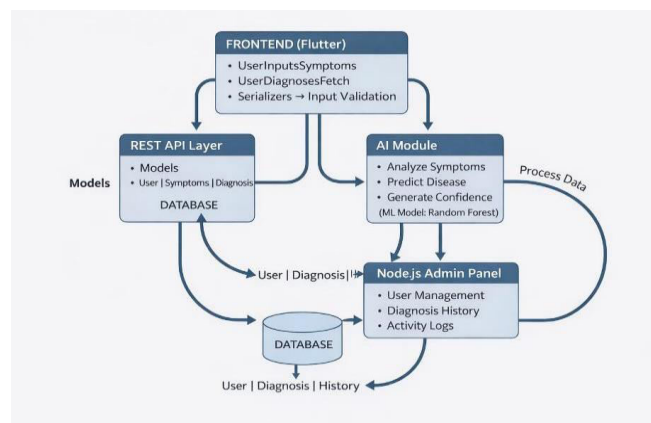


Fig 3. Architecture

#### IV. IMPLEMENTATION

The recently proposed AI-Powered Symptom Checker and Diagnosis Assistant System is put in exercise using a modular architecture that does the integration of advanced tools like Flutter-based mobile frontend, a Node.js backend, and a Python-based machine learning services. The system allows users to input symptoms and basic health details through an intuitive interface, after which the data is sent to the backend via RESTful APIs for validation and preprocessing. The processed data is then converted into a structured and organized format using techniques such as binary encoding and then forwarded to the machine learning module developed using Flask, where a trained Random Forest model analyzes the symptoms and predicts possible diseases along with confidence scores. Based on these predictions, a decision support mechanism classifies the severity of the condition into mild, moderate, and severe levels using confidence-based and rule-based logic. The system then generates appropriate guidance such as first-aid suggestions, medical recommendations, doctor consultation recommendations, or emergency alerts, and may also include nearby clinic or hospital information to enhance usability. All designed components communicate through well-defined APIs to ensure scalability and efficient data flow, while input validation and controlled data handling maintain system reliability and user privacy. The execution is developed for supporting decision-making in healthcare sector. Its main goal is not to replace professional medical advice, but bring improvements. Overall, it ensures equilibrium between automated intelligence and human oversight.

#### V. RESULTS/OUTPUT

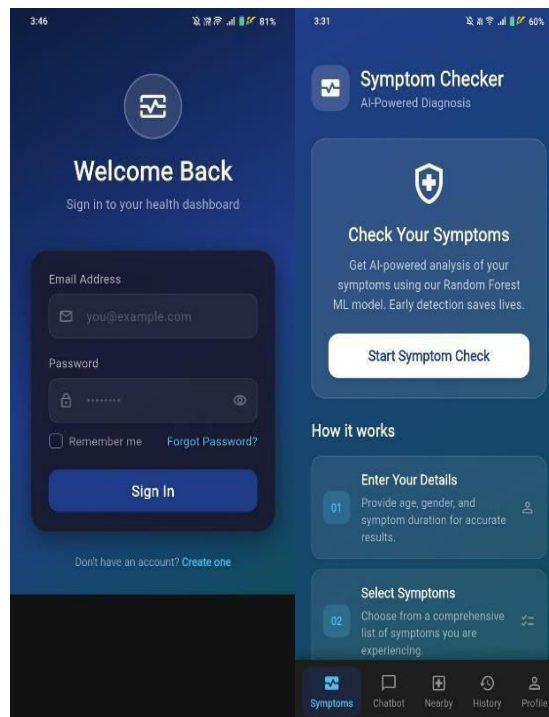


Fig 4. Sign in page

Fig 5. Home page (Dashboard)

**Figure 4** and **Figure 5** shows the initial interfaces of the AI-Powered Symptom Checker system, including the sign-in and home page. The sign-in page enables secure user authentication, while the home dashboard provides access to the “Start Symptom Check” feature and other options like chatbot, nearby services, history, and profile. These interfaces ensure secure access and easy navigation.

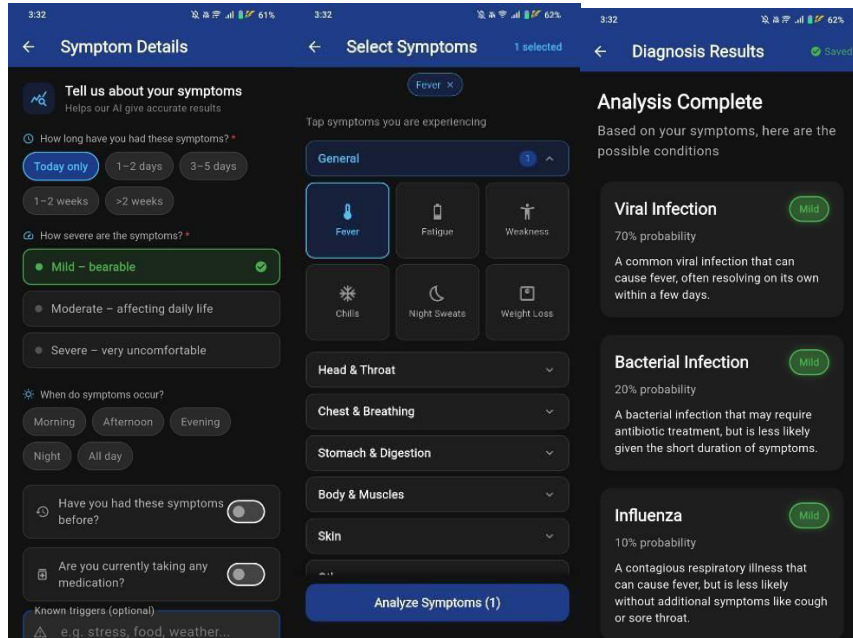


Fig 6. Symptom Details Fig 7. Symptom Selection Interface Fig 8. Diagnosis Results InterfaceSeverity Input Interface

Figure 6, Figure 7, and Figure 8 show the symptom input, symptom selection, and diagnosis result interfaces of the AI-Powered Symptom Checker system. Users first provide details such as symptom duration and severity, then select symptoms from a categorized list. Based on this input, the system analyzes the data and displays possible diseases along with probability scores and severity levels. These interfaces enable accurate data collection and effective AI-based diagnosis.

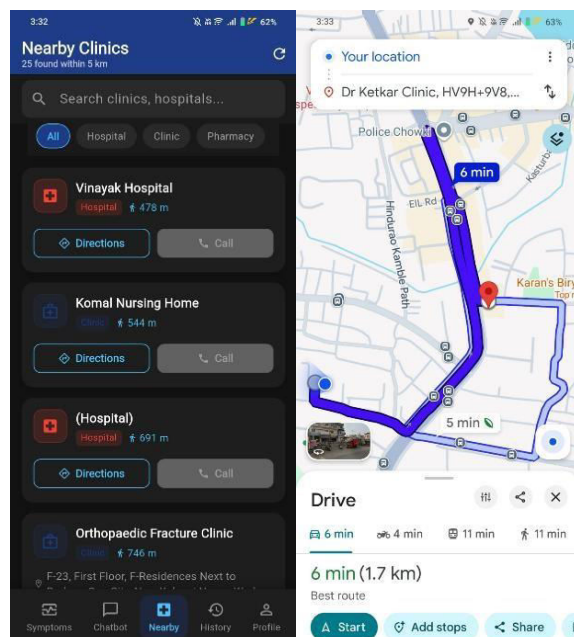


Fig 9. Nearby Clinics Interface Fig 10. Navigation and Direction Interface

**Figure 9** and **Figure 10** show the nearby clinics and navigation interfaces of the AI-Powered Symptom Checker system. The system displays nearby hospitals and clinics based on the user's location and provide options such as directions and contact details. It also integrates map services to show routes, distance, and travel time, helping users reach healthcare facilities quickly and easily.

## VI. CONCLUSION

The proposed AI-powered Symptom Checker and Diagnosis Assistant provide a highly integrated platform for early health analysis, intelligent prediction, and user-friendly healthcare support. It delivers a very accurate decision predictions, severity assessment, and actionable guidance through well-structured decision support system combining machine learning techniques. The system reduces dependency on manual symptom interpretation and enables users to make informed health decisions through real-time analysis and personalized recommendations. Its modular and scalable architecture ensures flexibility for future improvements and integration with advanced healthcare technologies. Therefore, the solution demonstrates massive potential in enhancing healthcare accessibility, improving early diagnosis, and supporting reliable, efficient, and user-centered medical assistance.

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