WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

AI-POWERED HEALTHCARE CHATBOT

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ABSTRACT :

The transition to patient-centered care has underscored the role of technology in delivering personalized healthcare solutions. This study presents a healthcare chatbot powered by advanced natural language processing (NLP) and machine learning algorithms to enhance patient engagement and streamline communication with healthcare providers. The chatbot supports real-time, human-like conversations for a range of functions, including symptom analysis, prescription reminders, and health-related queries. It is designed for seamless integration with existing healthcare platforms and continually improves through adaptive learning. By adhering to data privacy standards and healthcare compliance, the system ensures secure interactions. This work highlights the potential of NLP-driven chatbots to improve accessibility, efficiency, and patient experience in modern healthcare systems.

Keywords: Natural Language Processing (NLP), Healthcare Chatbot, Patient-Centered Care, Artificial Intelligence (AI), Symptom Analysis, Prescription Reminders, Health Communication

I.INTRODUCTION

The increasing demand for accessible and efficient healthcare services has driven the integration of advanced technologies such as Natural Language Processing (NLP), which is revolutionizing patient-provider interaction. This paper presents a healthcare chatbot system designed to enhance patient engagement and streamline communication through intelligent NLP-based responses. In the context of the Indian healthcare system—facing issues like high costs, lack of insurance coverage, inadequate public funding, and limited access to timely care—such innovations are essential. The chatbot leverages AI to simulate human-like conversation and assist with tasks including symptom analysis and health information dissemination.

As the healthcare industry transitions towards a patient-centric model, intelligent systems like chatbots offer an effective solution to bridge communication gaps and reduce clinical workload. They provide instant access to medical guidance, aiding early diagnosis and empowering users with informed decision-making. By addressing common inefficiencies such as delayed consultations and misinterpreted symptoms, this project demonstrates how integrating AI and ML techniques can significantly improve the accuracy and accessibility of symptom analysis, ultimately leading to better health outcomes and more resilient healthcare systems.

II.RELATED WORKS

[1] A Survey on Healthcare Chatbot Systems Using Artificial Intelligence

This paper surveys existing AI-powered healthcare chatbots and categorizes them based on functionality, architecture, and deployment domains. It highlights how natural language processing (NLP) and machine learning (ML) are used to simulate human-like conversations in health advice, mental health support, and patient monitoring. The study reviews chatbot performance in terms of user engagement, reliability, and ethical considerations, noting the increasing adoption of AI in telemedicine applications.

[2] Design and Implementation of a Rule-Based Healthcare Chatbot Using AI

This research focuses on building a rule-based healthcare chatbot integrated with artificial intelligence to assist patients in understanding symptoms and receiving basic healthcare advice. The chatbot uses a combination of decision trees and pre-trained NLP models to converse with users and suggest possible causes and remedies for common symptoms. The system aims to reduce unnecessary hospital visits and bridge the communication gap between patients and healthcare providers.

[3] Artificial Intelligence-Based Chatbot for Chronic Disease Management

This paper presents an AI-driven chatbot system tailored for managing chronic diseases such as diabetes and hypertension. The chatbot uses patient history, wearable device data, and AI algorithms to deliver personalized feedback and lifestyle suggestions. The proposed system was evaluated in a clinical pilot, showing promising results in improving patient adherence and satisfaction while reducing doctor-patient workload.

III.PROPOSED SYSTEM

The proposed healthcare chatbot system utilizes artificial intelligence and Natural Language Processing (NLP) to assist users with symptom-based disease prediction and health guidance. Designed using Flask and Python's NLP libraries, the chatbot identifies and maps symptoms, determines severity, and suggests probable diseases and treatment options, based on a pre-trained database. To ensure privacy, no personal data is stored. Unlike traditional consultations, this system continues patient engagement post-clinic visits and aims to reduce diagnostic delays in common ailments. It offers three core functionalities: predicting diseases from symptoms, retrieving symptoms from disease names, and providing medicine names based on diagnosed diseases, making healthcare access more affordable and efficient.

IV. MODULES

- Data Collection and Preprocessing
- Model Selection and Training
- Model Evaluation
- Integration into Chatbot Framework

Data Collection and Preprocessing: A comprehensive dataset containing symptoms, corresponding diseases, and related medicines is selected to ensure broad diagnostic coverage. Preprocessing involves handling missing or incorrect data, separating features and labels, and encoding categorical variables such as symptom names into numerical form using label encoding techniques.

Model Selection and Training: Convolutional Neural Network (CNN) is chosen for disease prediction due to its ability to handle categorical and numerical data effectively. It enables intuitive decision-making by learning key patterns and relationships between symptoms and illnesses.

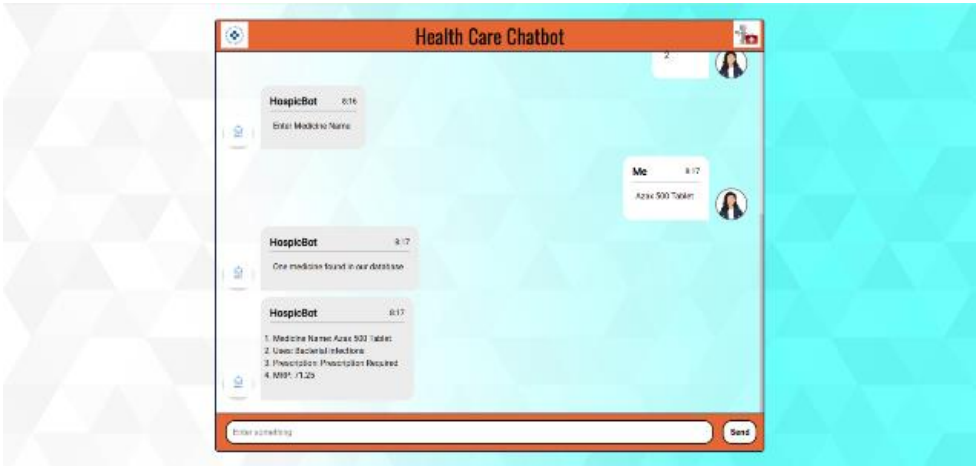
Model Evaluation: The CNN model's performance is validated using cross-validation, where the dataset is divided into multiple folds. This iterative approach provides a robust estimate of the model's generalization ability and ensures consistent accuracy across different data splits.

Integration into Chatbot Framework: The trained CNN model is embedded into a Flask-based chatbot framework that processes user inputs, predicts possible diseases, and suggests medications. It supports natural language interaction, enabling users to input symptoms and receive instant, AI-driven health recommendations without storing personal data.

V.RESULTS AND DISCUSSION

The chatbot demonstrated strong performance in interpreting user symptoms and predicting relevant illnesses using CNN-based models trained on a comprehensive dataset. During testing, it accurately matched user inputs to probable diseases and medications, delivering results in real time through a simple text-based interface. Cross-validation confirmed the model's consistency and generalizability. Users reported improved engagement due to the system's conversational design and symptom-specific responses. The integration of NLP and tailored prescription suggestions enhanced both usability and diagnostic accuracy, positioning the chatbot as a practical, intelligent aid for preliminary health evaluation.

Result Page



VI. CONCLUSION

The proposed healthcare chatbot, powered by NLP and integrated with CNN for disease prediction, streamlines initial medical assessments through interactive symptom analysis. Its ability to provide accurate diagnoses and personalized medication recommendations enhances virtual healthcare delivery. With a user-friendly interface, contextual prescription support, and ongoing updates in collaboration with medical experts, the chatbot ensures reliability, privacy, and a personalized user experience, making it a valuable tool for accessible and efficient health support.

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