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International Journal on Advanced Computer Engineering and Communication Technology

ISSN: 2278-5140
Volume 14 Issue 01, 2025

Natural Language Processing Prediction based Healthcare Virtual Assistant

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Peer Review Information

Submission: 15 Feb 2025
Revision: 23 March 2025
Acceptance: 27 April 2025

Keywords

Artificial Intelligence
Natural Language Processing
Healthcare Chatbot

Abstract

One of the most significant domestic issues facing in our country is health care. Healthcare is crucial to a healthy start in life. However, it can be very challenging to see a doctor if you have any health concerns. The plan is to use natural language processing, a branch of artificial intelligence, to develop a healthcare chatbot that can perform basic medical functions like disease diagnosis. The purpose of the healthcare chatbot is to lower healthcare costs and increase accessibility to medical information.

INTRODUCTION

A Healthcare Virtual Assistant System is a software agent that can perform various tasks or services for users in the healthcare industry. It can be integrated with telehealth systems, allowing for long-distance patient and clinician contact, care, advice, reminders, education, intervention, monitoring, and remote admissions. Virtual assistants use natural language processing (NLP) to match user text or voice input to executable commands. Some continually learn using artificial intelligence techniques including machine learning and ambient intelligence. A healthcare virtual assistant can significantly enhance patient engagement and streamline administrative tasks. By focusing on functionality, security, and user experience,
you can create a system that improves access to care and supports health management effectively.

Key Features of the System:

- Symptom Recognition (NLP) -Extracts symptoms from user input using AI.
- Disease Prediction (ML) -Suggests possible diseases based on symptoms.
- Medical Advice & Recommendations -Offers basic guidance and next steps.

LITERATURE SURVEY

Health Assistant Bot: A Personal Health Assistant for the Italian Language.

According to the authors, Marco Polignano and his team, this survey paper explores the concept of a health assistant bot. In 2022, the authors addressed the problem of developing an intelligent virtual assistant that can understand patient symptomatology, suggest doctors, and monitor treatments and health parameters, using techniques such as Natural Language Processing (NLP) for symptoms analysis and machine learning for disease inference, with a future scope of improving sequence accuracy and adapting to new programming languages.

Generative AI for Transformative Health care: A Comprehensive Study of Emerging Models, Applications, Case Studies, and

Limitations
According to the authors, J. Zhang and his team, this survey paper explores the concept of generative AI for transformative healthcare. In 2022, the authors addressed the problem of detecting plant diseases through CNN models and image classification, aiming to improve early identification and prevent crop damage, using techniques such as CNN models like VGG16, ResNet, and Inception, which employed transfer learning and data augmentation to improve accuracy, with a future scope of utilizing other CNN models and expanding the dataset with more plant images to enhance accuracy and applicability in real farm conditions.[2]

A Priority Based Energy Efficient Meta heuristic Routing Approach for Smart Healthcare System (SHS)
As per the authors, Bharti Rana and her team, this survey paper explores the concept of a priority-based energy-efficient metaheuristic routing approach for smart healthcare systems. In 2024, the authors addressed the problem of delays and energy degradation in healthcare services by proposing a priority-based Duty-Cycled Ant Colony Optimization Routing (DC-ACOP) mechanism to prioritize critical healthcare data for timely delivery and efficient energy usage, using techniques such as healthcare data packets based on patient criticality for timely and energy-efficient delivery in Smart Health care Systems (SHS), with a future scope of improving energy efficiency and data prioritization in evolving Smart Health care Systems.[3]

Med Meta verse: Medical Care of Chronic Disease Patients and Managing Data Using Artificial Intelligence, Blockchain, and Wearable De vices State-of the-Art Methodology
According to the authors, Dileep Kumar Murala and his team, this survey paper explores the concept of Med Metaverse for managing chronic diseases. In 2023, the authors addressed the problem of developing a technical framework for managing chronic diseases using wearable technologies, using techniques such as Artificial Intelligence (XAI) for analyzing patient data and predicting disease progression within a Metaverse environment, with a future scope of enhancing the integration and scalability of Metaverse-based healthcare solutions and improving XAI algorithms.[4]

Understanding Physician's Experience with Conversational Interfaces During Occupational Health Consultation
According to the authors, Gabriele Spina and his team, this survey paper explores the concept of conversational interfaces in occupational health consultations. In 2020, the authors addressed the problem of enhancing occupational health consultations by using conversational interfaces (CIs) with chatbots to provide real-time suggestions, using techniques such as web-based information dashboards with two types of chatbot interactions—proactive and on-demand—to support physicians in occupational health consultations and improve workflow efficiency, with a future scope of integrating advanced AI capabilities for enhanced decision support and expanding the application of conversational interfaces in various healthcare settings.[5]

Chatbot for Healthcare System Using Artificial Intelligence
The paper by Kavitha B. R. and his team, published in 2019, addresses the problem of lack of personalized attention and accessibility in healthcare systems, leading to poor patient outcomes and inefficient use of healthcare resources. The techniques used include machine learning, NLP, computer vision, and budget-friendly and proximity filters. The future scope of the paper includes improving chatbot accuracy and personalization, expanding healthcare services integration, enhancing user experience, and addressing data privacy and security concerns.[6]

A Smart Chatbot Architecture based NLP and Machine Learning for Health Care Assistance
The 2020 paper by Boudhir Anouar Abdelhakim, Mohammed Benhmed, and Soufyane Ayanouz addresses limited access to timely healthcare due to overburdened systems. It uses NLP and machine learning to provide personalized responses, and its future scope includes improving diagnosis accuracy, integrating with IoT devices, personalizing responses, ensuring regulatory compliance, and providing multilingual support.[7]

Building A Chatbot For Healthcare Using NLP
The 2023 paper by Bruce Kevin, Brikesh Vikin, and Manju C Nair addresses the need for an efficient healthcare system, where patients receive timely and accurate medical assistance. It uses NLP and machine learning to develop a chatbot that understands and responds to patient queries. The future scope includes enhancing query interpretation, personalization, and IoT integration, expanding multilingual support, and ensuring regulatory compliance to improve diagnostic accuracy.[8]

A Medical Chatbot

According to the Authors Mrs. Rashmi Dharwadkar, Mrs. Neeta A. Deshpande in Survey paper A Medical Chatbot **Year** 2021. **The Problem is Addressed** Normally Users are not aware about all the treatment or symptoms regarding the particular dis ease. For small problem user have to go personally to the hospital for check-up which is more time consuming. **Techniques are Used** Based on AIML (Artificial Intelligent Markup Language) structure for training the model, Natural language processing used for understanding and Microsoft speech recognition is used in speech recognition. **And the Future Scope is** by taking the advantage of the extensibility of the system in future, it will be used as voice and face recognition to mimic a counsellor, also interacting with the patient at deeper levels. [9]

Mobile Devices or Head Mounted Displays: A Comparative Review and Analysis of Augmented Reality in Healthcare

The 2024 paper by Ahmed Oun, Nathan Hager Dorn, Caleb Schei Deger, and Xiangyi Cheng addresses the lack of clear guidelines on using mobile devices or head-mounted displays (HMDs) for augmented reality (AR) in healthcare. It conducts a comparative review of 43 studies to evaluate AR applications, benefits, limitations, and challenges, helping users choose the most suitable device. The future scope includes expanding AR functionality and addressing challenges like cost, accessibility, and integration into clinical workflows.[10]

Limitations of Existing Work

- **Data Quality Issues:** Inaccurate, incomplete, or outdated patient data.
- **Scalability Constraints:** Limited computational resources and infrastructure.
- **Clinical Context Limitations:** Lack of access to full clinical context.
- **Lack of Human Oversight:** Limited human review and oversight.
- **Complex Case Handling:** Difficulty handling complex or unusual cases.
- **Workflow Disruptions:** Disruption of existing clinical workflows.
- **Training and Education:** Need for training and education on AI-driven chatbots

PROPOSED SYSTEM

Symptom Recognition (NLP):

- Utilizes Natural Language Processing (NLP) to extract symptoms from user input.
- Processes text or voice input to identify relevant health-related information.

Disease Prediction (ML):

- Uses Machine Learning (ML) techniques to predict possible diseases based on extracted symptoms.
- Provides users with potential diagnoses to assist in understanding their health condition.

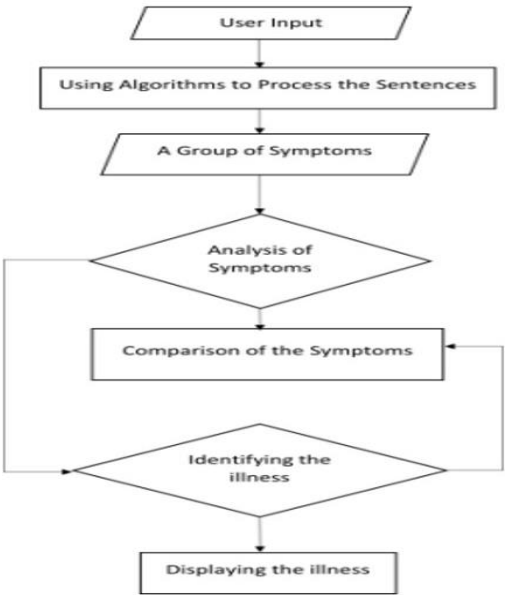
Medical Advice & Recommendations:

- Offers basic medical guidance and recommendations based on identified symptoms and predicted diseases.
- Provides next steps such as self-care instructions, when to seek medical attention, or referral to healthcare professionals.

Remote Patient Monitoring:

- Allows for continuous monitoring of patient health parameters remotely.
- Alerts users and healthcare providers about critical changes or deviations from normal health parameters.

FLOWCHART



Working of Proposed System:

The flow diagram represents the process of symptom analysis and illness identification in the Healthcare Virtual Assistant System. Here's a step-by-step explanation:

Step 1: User Input

- The user provides input, typically in the form of text or voice, describing their symptoms.
- Example: "I have a fever, headache, and sore throat."

Step 2: Using Algorithms to Process the Sentences

- Natural Language Processing (NLP) algorithms analyze the user's input.
- The system extracts relevant keywords related to symptoms.

Step 3: A Group of Symptoms

- The extracted symptoms are grouped and

structured.

- Example: The system identifies "fever," "headache," and "sore throat" as symptoms.

Step 4: Analysis of Symptoms

- The system analyzes the symptoms and checks their significance.
- It determines whether the symptoms are related to a single disease or multiple conditions.

Step 5: Comparison of the Symptoms

- The identified symptoms are compared with a medical database or trained machine learning model.
- The system looks for diseases that match the given symptom set.

Step 6: Identifying the Illness

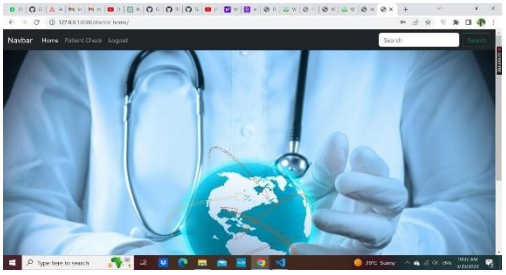
- Based on the symptom comparison, the system predicts the most probable illness.
- Example: If the symptoms match a flu pattern, the system identifies "Influenza" as a possible illness.

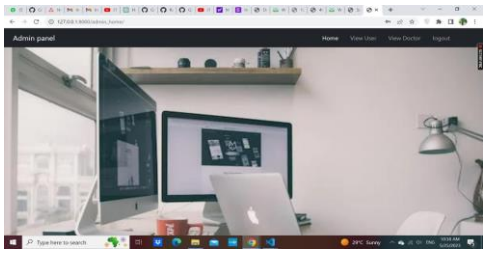
Step 7: Displaying the Illness

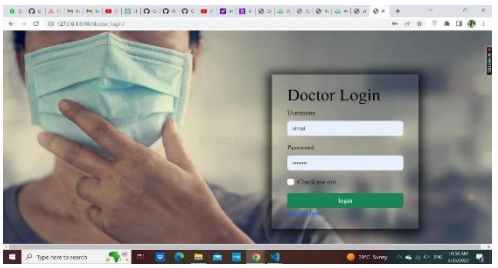
- The predicted illness is displayed to the user.
- The system may provide additional information, such as possible causes, recommended actions, and when to seek medical attention.

Natural Language Processing Prediction based Healthcare Virtual Assistant effectively a analyzes user symptoms and provides accurate health recommendations.

RESULTS/ OUTPUTS







CONCLUSION

Healthcare chatbots are AI-driven digital tools that are increasingly popular in the healthcare industry to improve patient care and administrative processes. They serve a range of functions, including patient engagement, education, administrative support, and even mental health assistance. By offering personalized advice, automating administrative tasks, and ensuring data security, healthcare chatbots are revolutionizing the healthcare industry. As a dynamic and
evolving field, these chatbots continue to play a crucial role in enhancing the healthcare experience for both patients and providers

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