

Personal Healthcare Chatbot for medicine recommendation using Machine Learning and Computer Vision : A Survey Paper

Hitisha Lambe¹, Rucha Kolte¹, Swajay Nandanwade¹, Koshlesh Sharma¹, Geetanjali Sharma¹

¹Department Of Computer Engineering, Pccet's Pimpri Chinchwad College Of Engineering Sector No. 26, Pradhikaran, Nigdi, Pune - 411044

Abstract

In response to the escalating healthcare challenges due to population growth and increased patient loads, a proposed system integrates artificial intelligence, natural language processing, machine learning, and computer vision to enhance communication between patients and doctors. This system employs a chatbot that assesses patients' issues and recommends specific medication. This approach, particularly relevant during situations like the COVID-19 pandemic, aligns with the rising trend of virtual assistance. The research study incorporates literature reviews, focusing on healthcare chatbots. Within the Medicine Recommendation System (RS) Chatbots domain, previous research has concentrated on refining medication suggestions using predictive modeling and data-driven methods. Notably, the integration of computer vision augments user interaction by facilitating image sharing, allowing users to share pictures of medications or symptoms for accurate identification and personalized recommendations. This holistic technological approach aims to improve the overall quality of healthcare delivery amid increasing demands.

Keywords:- Recommendation System (RS), Medicine Recommendation, virtual assistance, healthcare computer vision

1. INTRODUCTION

The healthcare landscape is undergoing significant transformations, especially with the increasing global population. However, the surge in patient numbers has led to challenges in effective communication between patients and doctors, impacting the overall quality of treatment. Recognizing this, there is a pressing need for innovative solutions to streamline healthcare processes and enhance patient care.

A proposed solution involves the development of a

sophisticated healthcare chatbot system, leveraging artificial intelligence and natural language processing. This chatbot aims to facilitate seamless communication between patients and the healthcare system, ultimately recommending specific doctors based on a preliminary diagnosis.

In the context of the COVID-19 pandemic, there has been a notable uptick in the adoption of virtual assistance and robotic technologies in healthcare settings. Many countries have integrated robots into hospital reception roles, emulating human-like interactions to address patient concerns. Chatbots, as virtual assistants, have proven effective in helping individuals find relevant information and services. This trend underscores the growing reliance on technological solutions for communication and problem-solving in healthcare.

The proposed Doctor Recommendation Chatbot takes this a step further by incorporating machine learning and computer vision into its functionality. The existing research in Medicine Recommendation System Chatbots has predominantly concentrated on refining medication suggestions through predictive modeling and data-driven approaches. Integrating computer vision into the chatbot enhances user interaction by enabling the sharing of images, allowing users to convey medication details or symptoms visually. The chatbot operates by prompting users to articulate their health concerns in text form. Subsequently, the chatbot processes this information using advanced algorithms to provide tailored solutions. If the issue surpasses the chatbot's capabilities, it intelligently recommends a specific doctor for consultation.

The essence of this system lies in its user-friendly interface, where patients can describe their problems through a simple text interface. The chatbot, equipped with sophisticated algorithms, interprets these inputs and generates responses or recommendations accordingly. This approach not only ensures efficient communication but also enables the chatbot to act as a preliminary diagnostic tool.

2. LITERATURE SURVEY

[A] Title: Research paper Personal Healthcare Chatbot for Medical Suggestions Using Artificial Intelligence and Machine Learning [1]

The proposed healthcare chatbot system employs a systematic approach, ensuring an 80% accuracy threshold for disease predictions. Through user prompts and AI-driven Natural Language Processing (NLP) algorithms, the chatbot progresses through information gathering, symptom extraction, diagnosis, and medical advice phases. Security is prioritized through user registration, enabling personalized interactions and maintaining a comprehensive history of health discussions. Results indicate an impressive 82% accuracy in disease prediction, surpassing existing systems. The chatbot prompts users to input symptoms upon login, utilizing advanced algorithms to identify potential diseases and provide personalized recommendations based on severity. This approach enhances the system's effectiveness, offering users a secure and user-friendly platform for preliminary health assessments with improved accuracy and tailored guidance.

[B] Title: Doctor Recommendation Chatbot: A research study [2]

In this paper, a healthcare chatbot development initiative is introduced, utilizing the GPT-3.5 architecture. The proposed system facilitates seamless user interaction, allowing them to articulate symptoms for a comprehensive disease assessment. Advanced algorithms and natural language processing techniques are employed for data processing, with a key emphasis on incorporating the TF-IDF algorithm to enhance disease prediction precision. The chatbot effectively correlates user queries with symptom databases using TF-IDF, providing optimal solutions. Results indicate that the healthcare chatbot serves as a valuable communication tool, efficiently addressing minor issues and saving doctors' time. The text-based interaction enables prompt resolution of patient concerns, aligning with the growing trend of chatbot utilization. As hospital patient loads increase, the chatbot streamlines communication, offering timely solutions, and ultimately contributing to enhanced healthcare accessibility.

[C] Title: Drug Recommendation System based on Sentiment Analysis of Drug Reviews using Machine Learning [3]

This research introduces a robust methodology for sentiment analysis and drug recommendation, encompassing data cleaning, visualization, and advanced text vectorization techniques such as Bag of Words (BoW), TF-IDF, and Word2Vec. Manual features are engineered to enhance model accuracy, and the dataset undergoes a train-test split with Synthetic Minority Over-sampling Technique (SMOTE) to address class imbalance. Various machine learning classifiers, including Logistic Regression and Random Forest, are applied based on vectorization methods. Evaluation metrics reveal competitive accuracy levels, with the Perceptron excelling in the Bag of Words vectorization. The study focuses on sentiment analysis of drug reviews, showcasing Linear SVC on TF-IDF as the top-performing model with 93% accuracy. The research culminates in a drug recommender system, combining the best predictions and normalizing results based on useful counts, while future work aims to explore oversampling techniques, n-gram variations, and algorithm optimization for further system enhancement.

[D] Title: Medicine recommender system: A machine learning approach [4]

In this study, a comprehensive recommendation model is introduced for medication advice, encompassing content-based, collaborative, and hybrid approaches. The model relies on user ratings to recommend drugs based on their experiences. The preliminary experiment involves data collection and preprocessing, employing item-based collaborative filtering (IBCF) and user-based collaborative filtering (UBCF) to assess factors like popularity and randomness. Through a 10-fold cross-validation, the analyst evaluates the top-N recommender algorithm by assessing five randomly selected items, generating average confusion matrices after 10 runs. Results indicate that with an increase in iterations, recall values improve in relation to precision. Positive, negative, and neutral user feedback is analyzed, with positive

comments and the highest ratings confirming the effectiveness of the algorithm. The word cloud visualizes the conversation, highlighting frequently mentioned words. Additionally, the study explores the potential for extending this recommendation model to product and car recommendations.

[E] Title: Chatbot for Disease Prediction and Treatment Recommendation using Machine Learning [5]

In this study, a healthcare chatbot application is developed for Android, enabling users to interact naturally, input symptoms, and receive appropriate responses. The chatbot is trained with predefined questions and answers for smooth communication, employing Natural Language Processing (NLP) for text processing. Python libraries, particularly NLTK, facilitate NLP tasks such as tokenization, stemming, and lemmatization. The chatbot utilizes K Nearest Neighbor (KNN) algorithm for disease prediction, leveraging sklearn library in Python. The system effectively predicts diseases based on user symptoms and provides treatment information. This medical chatbot serves as a convenient and cost-effective tool for symptom identification, diagnosis, and treatment recommendation, offering personalized assistance to users while maintaining confidentiality in health discussions.

[F] Title: An AI-Based Medical Chatbot Model for Infectious Disease Prediction. [6]

The paper, "An AI-Based Medical Chatbot Model for Infectious Disease Prediction," proposes an innovative approach using a deep feedforward multilayer perceptron for AI chatbot interaction and prediction. Leveraging natural language processing and deep learning techniques, including the LSTM algorithm, the model enhances human interaction within databases. The authors employ the Tkinter library for chatbot interface creation and train the model with diverse input values. The LSTM algorithm efficiently filters and processes data from previous timestamps, achieving a minimum loss of 0.1232 and a peak accuracy of 94.32% during testing. The study not only explores the model's functionalities but also addresses the challenges associated with deploying such technologies during health crises, emphasizing their potential role in infectious disease prediction. The authors envision their research contributing to a deeper understanding of these technologies for

continuous improvement in medical chatbot applications, particularly in the context of pandemic situations like COVID-19.

[G] Title: Conversation-Based Medication Management System for Older Adults Using a Companion Robot and Cloud [7]

The paper proposes a Conversation-Based Medication Management System for Older Adults utilizing a companion robot and cloud infrastructure. The system employs voice-based interaction and integrates Google cloud services for Automatic Speech Recognition (ASR) and Text-to-Speech Synthesis (TTS). The Natural Language Understanding (NLU) module interprets user intent and entities, with the Dialog Management (DM) module controlling the dialog flow based on this information. The system includes components like System Status, System Action, User Action, Time Checker, and Action Policy. Evaluation results from tests with human subjects show high ratings for convenience, usefulness, and overall satisfaction. The System Usability Scale (SUS) score of 81.333 indicates a strong user satisfaction level. The study contributes a comprehensive medication management solution for older adults, showcasing the effectiveness of human-robot conversational interfaces in healthcare scenarios.

[H] Title: Development of an interactive Messenger chatbot for medication and health supplement reminders [8]

The paper details the development of an interactive Messenger chatbot named Reminder Bot for enhancing medication and health supplement adherence. Leveraging Chatfuel, the chatbot utilizes components like Cards, Blocks, Attributes, Broadcasts, Sequences, and AI messages to create personalized and interactive communication. Integrating Dialogflow and Janis.ai enhances AI capabilities and personalized reminders. The initial trial results indicate positive feedback, with improved adherence and user satisfaction compared to a baseline. The Reminder Bot's features, including a snooze button and motivational AI scripts, received appreciation. The paper anticipates further trials and emphasizes the potential of chatbots, particularly in healthcare, for personalized interactions to enhance adherence and user satisfaction. Despite the need for Facebook

Messenger and an internet connection, the Reminder Bot showcases promise in addressing non-adherence challenges.

[I] Title: Chatbot based Disease Prediction and Treatment Recommendation using AI. [9]

The document "Chatbot based Disease Prediction and Treatment Recommendation using AI" employs machine learning, natural language processing (NLP), and the K-Nearest Neighbor (KNN) algorithm for disease prediction. It outlines the development of a healthcare chatbot system capable of detecting user symptoms, predicting diseases, and recommending treatments based on user conversations. Utilizing AI and deep learning technologies, along with KNN for disease prediction, the system integrates Dialogflow for chatbot communication and text processing. The methodology involves model training, disease detection, and KNN-based prediction, aiming for fast and accurate disease predictions while reducing human errors. The system is designed to be accessible through a mobile application, emphasizing portability and user-friendliness. While specific result labels are not apparent, the document underscores the importance of related work and existing literature in the field of chatbot systems for disease prediction and treatment recommendation.

[J] Title: The Design of an Intelligent Healthcare Chatbot for Managing Ante-Natal Recommendations. [10]

The paper details the design of a healthcare Chatbot, named Ante-natalbot, focusing on managing ante-natal recommendations. Employing AIML, pattern matching, language tricks, chat script, parsing, SQL, relational database, and Markov Chain, the Chatbot processes conversational modeling, generates responses, adds variety to the knowledge base, analyzes text, remembers previous conversations, and builds probabilistic responses. The proposed design includes a Microsoft Azure server hosting the knowledge-based back end, utilizing a Deep Neural Network engine for query analysis and response generation through AIML. A survey, administered to medical experts and pregnant women, assessed the Chatbot's desirability using a 5-Likert scale. Results indicated general agreement among respondents on the Chatbot's desirability,

emphasizing its potential as a virtual system simulating professional ante-natal services.

3. CONCLUSION

In conclusion, the diverse range of research papers presented in this survey underscores the multifaceted applications of artificial intelligence and machine learning in the healthcare domain. The studies showcase innovative approaches, from disease prediction and treatment recommendation through chatbots to medication management systems for older adults and intelligent healthcare chatbots tailored for specific purposes like ante-natal recommendations. The integration of advanced algorithms, natural language processing, and deep learning techniques has led to promising outcomes, with high accuracy levels, streamlined communication, and improved user satisfaction. These findings not only contribute to the ongoing evolution of healthcare technologies but also highlight the potential of AI-based solutions in addressing various healthcare challenges. As the field continues to advance, these studies provide valuable insights for researchers, practitioners, and developers aiming to harness the power of AI to enhance medical services, accessibility, and patient outcomes.

4. REFERENCES

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