

Artificial Intelligence Healthcare Chatbot System (Medimate-AI)

Safwan Bebal¹, Muzakkir Siddique², Nazneen Pinjari³, Danish Fakira⁴, Shrinidhi Gindi⁵

Students, Department of Information Technology^{1,2,3,4}

Assistant Professor, Department of Information Technology⁵

M. H. Saboo Siddik College of Engineering, Byculla, Mumbai, India

¹safwan.612014.it@mhssce.ac.in, ³nazneen.612042.it@mhssce.ac.in, ⁴danish.612017.it@mhssce.ac.in,

²muzakkir.612058.it@mhssce.ac.in, ⁵shrinidhi.gindi@mhssce.ac.in

Abstract: *With the increasing population of India, increasing birth rate and decreasing death rate due to advancement in the medical field, it's found that the number of doctors is less to serve the needs of the increasing population. This scenario can be better understood while walking through the city's government hospitals where the less availability of the doctors is the major cause behind the improper treatment of the patients and in certain scenarios the resultant death. To encounter such cases there is a need for the smart and Intelligent chatbot who can provide advice to the doctors and sometimes even patients about what to do in such cases which ultimately results in saving the life of hundreds of people. The AI based medical chatbot (Medimate-AI) on which this research topic is based deals with providing medical. The Medimate-AI interact with potential patients visiting the site, assisting them with finding specialists and getting them admittance to the right treatment*

Keywords: Generative AI, Natural Language Processing (NLP), Large Language Models (LLMs), Healthcare AI, chatbot, disease ,symptoms

I. INTRODUCTION

Chatbots, as a part of AI devices, are natural language processing structures performing as a digital conversational agent mimicking human interactions. While this generation remains in its developmental phase, fitness chatbots may want to probably growth get right of entry to healthcare, enhance doctor– affected person and clinic–affected person verbal exchange, or assist to control the growing call for fitness offerings consisting of through faraway testing, remedy adherence tracking or teleconsultations.

Through chatbots one can communicate with text or voice interface and get replies through artificial intelligence. Typically, a chat bot will communicate with a real person. Chat bots are used in applications such as ecommerce customer service, call centers and Internet gaming.

1.1 Objectives:

The motivation behind the development of MediMate-AI stems from the pressing need to address the growing demand for accessible, reliable healthcare information and services. With the proliferation of online platforms and the increasing reliance on digital technologies for healthcare guidance, there exists a critical gap in the availability of user-friendly, AI-powered solutions that can effectively interpret and respond to diverse medical queries.

The primary objective of MediMate-AI is to bridge this gap by offering a sophisticated yet user-friendly healthcare chatbot that empowers individuals to make informed decisions about their health and well-being. By harnessing the capabilities of state-of-the-art AI models such as GPT-3.5 and Llama2 70B, MediMate-AI aims to provide accurate symptom analysis, disease prediction, and personalized preventive healthcare recommendations in real-time.

1.2 Key Features and Functionality:

MediMate-AI encompasses a range of key features and functionalities designed to enhance its utility and effectiveness as a healthcare assistant. These include:

1. Natural Language Understanding: Through the integration of GPT-3.5, MediMate-AI possesses advanced natural language understanding capabilities, enabling it to comprehend and interpret diverse medical queries expressed in natural language.
2. Symptom Analysis and Disease Prediction: Leveraging the vast knowledge base encoded within the Llama2 70B model, MediMate-AI can accurately analyze user-provided symptoms and predict potential underlying diseases with a high degree of accuracy.
3. Preventive Healthcare Guidance: Based on the identified symptoms and predicted diseases, MediMate-AI offers tailored preventive healthcare guidance, including recommended precautions, lifestyle modifications, and early intervention strategies to mitigate health risks.

Contributions and Organization:

This paper makes several contributions to the field of AI-driven healthcare assistance:

1. We introduce MediMate-AI, a novel healthcare chatbot powered by state-of-the-art AI models, GPT-3.5 and Llama2 70B, to address the need for accessible and intelligent healthcare guidance.
2. We describe the architecture and functionality of MediMate-AI, highlighting its key features and capabilities in symptom analysis, disease prediction, and preventive healthcare.

II. LITERATURE SURVEY

D. Madhu, C. J. N. Jain, E. Sebastain, S. Shaji and A. Ajayakumar, "A novel approach for medical assistance using trained chatbot"

Build a simple and interactive real time chat system, Age based Medicine dosage details, Dedicated system which is able to solve all the queries regarding a medicine. Designed in such a way that it should work in cross platform devices.

L. Athota, V. K. Shukla, N. Pandey and A. Rana, "Chatbot for Healthcare System Using Artificial Intelligence,"

To create a medical chatbot using Artificial Intelligence that can diagnose the disease and provide basic details about the disease before consulting a doctor. To reduce healthcare costs and improve accessibility to medical knowledge through medical chatbot.

Dange Anas , Digole Suhas , Thakur Manthan , Mendapara Harsh , "AI Based Healthcare Chatbot System Using Natural Language Processing."

The main idea here is to make a healthcare chatbot based on Artificial Intelligence using NLP that can diagnose the disease and provide required details about the specific disease before consulting or visiting a doctor . This chatbot uses Natural language processing

2. Proposed system

Objectives

The motivation behind the development of MediMate-AI stems from the pressing need to address the growing demand for accessible, reliable healthcare information and services. With the proliferation of online platforms and the increasing reliance on digital technologies for healthcare guidance, there exists a critical gap in the availability of user-friendly, AI-powered solutions that can effectively interpret and respond to diverse medical queries.

The primary objective of MediMate-AI is to bridge this gap by offering a sophisticated yet user-friendly healthcare chatbot that empowers individuals to make informed decisions about their health and well-being. By harnessing the capabilities of state-of-the-art AI models such as GPT-3.5 and Llama2 70B, provide accurate results.

III. WORKING

1. Sarah, a 35-year-old working professional, has been experiencing persistent headaches and nausea over the past week. Concerned about her symptoms, she decides to seek medical advice but finds it challenging to schedule an immediate appointment with her primary care physician due to her busy schedule. Instead, Sarah turns to her smartphone and opens the MediMate-AI application, a healthcare app, she is greeted by an inviting interface prompting her to describe her symptoms.
2. Sarah types, "I've been having headaches and feeling nauseous lately. What could be causing this?"

3. MediMate-AI, powered by the sophisticated GPT-3.5 and Llama2 70B APIs, swiftly analyzes Sarah's input and generates a response tailored to her query:

"Hello Sarah, I'm sorry to hear that you're not feeling well. Based on the symptoms you've described, there are several potential causes, ranging from benign factors like stress or dehydration to more serious conditions such as migraine headaches or viral infections.

4. To provide you with a more accurate assessment, could you please specify any other symptoms you're experiencing?"

Impressed by the prompt and personalized response, Sarah elaborates on her symptoms, mentioning that she has also been experiencing fatigue and sensitivity to light.

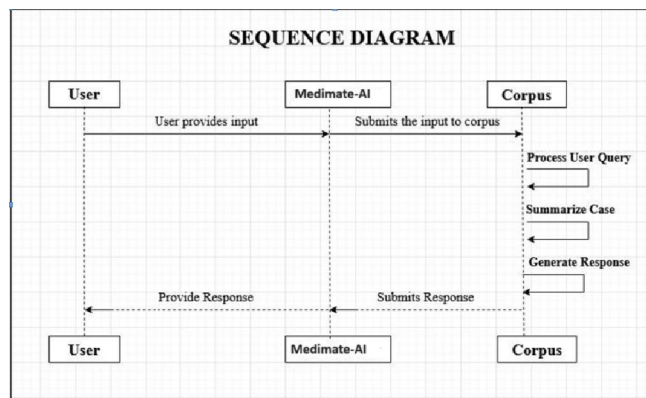
MediMate-AI promptly processes Sarah's additional input and continues the conversation:

"Thank you for providing more details, Sarah. Based on the symptoms you've described, along with your sensitivity to light, there's a possibility that you may be experiencing migraines. However, I would recommend consulting with a healthcare professional for a definitive diagnosis. In the meantime, you may find relief by practicing relaxation techniques, staying hydrated, and avoiding triggers such as bright lights or certain foods. If your symptoms persist or worsen, please consider seeking medical attention for further evaluation and treatment."

5. Encouraged by the helpful guidance provided by MediMate-AI, Sarah feels reassured and empowered to take proactive steps towards managing her symptoms. She follows the chatbot's recommendations and begins implementing lifestyle modifications to alleviate her discomfort while also scheduling a follow-up appointment with her doctor for a comprehensive evaluation.

6. In this scenario, MediMate-AI demonstrates its ability to deliver personalized healthcare guidance in real-time, leveraging advanced AI technologies to interpret user input, analyze symptoms, and provide tailored recommendations. By offering timely assistance and actionable advice, MediMate-AI enhances Sarah's healthcare experience, facilitating informed decision-making and promoting proactive self-care.

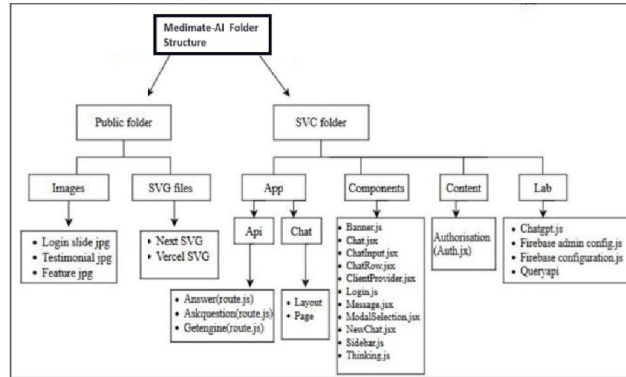
SEQUENCE DIAGRAM



IV. METHODOLOGY

Development of Medimate-AI:

MediMate-AI's development revolves around the integration of the Llama2 70B and GPT-4 APIs, with a specific emphasis on enhancing healthcare assistance within the context of medical scenarios. The decision to leverage these APIs is grounded in their robust natural language processing capabilities, a crucial factor for accurately interpreting medical queries and ensuring contextually relevant responses. This section delves into the practical aspects of incorporating these APIs and the preprocessing steps taken to optimize the performance of MediMate-AI on healthcare-related datasets.



The Next.js Framework

The MediMate-AI application utilizes the Next.js framework, a production environment for static web pages based on React, to enhance loading speeds through server-side rendering. Next.js is chosen for its scalability, user-friendly nature, and ability to deliver a smooth and interactive user experience. Its capability to facilitate the integration of API routes simplifies backend integration for applications like MediMate-AI, which rely on language models such as Llama2 70B and GPT-4.

Folder Structure

The folder structure implemented in the MediMate-AI application, powered by the Next.js framework, demonstrates a thoughtful approach to organizing the application's assets and codebase, ensuring sustainability, maintainability, and efficiency. Below is a description of the folder structure based on the public and source (src) folders, along with their respective components:

Public Folder:

In Next.js projects, the public folder serves as a standard directory for files accessed similarly by a browser, containing static files accessible directly. Resources such as images, icons, and other assets generated from the React component tree are stored here.

Images:

This directory exclusively contains image files used in various dynamic views of the MediMate-AI application as a whole.

This structured approach to organizing assets and codebase within the MediMate-AI application contributes to its maintainability, scalability, and overall efficiency.

testimonial.jpg:

A longstanding feature utilized for displaying testimonials from users or endorsements, contributing to building credibility and providing security to users.

features.jpg:

This image illustrates the features of MediMate-AI, showcasing components that may appear in feature descriptions, such as details of user-completed tasks.

next.svg and vercel.svg:

SVG files representing the technologies employed in the project – Next.js and Vercel.

Source (src) Folder:

The src directory houses the React and JavaScript directives associated with the majority of the application.

App Folder:

This folder comprises functional units pertaining to the core functionality of the application.

API files like answer, ask a question, and getengine.route.js may be hosted in this directory, playing a critical role in processing user queries and interactions with the chatbot.

Chat:

Includes page and layout files essential for page arrangement and sustaining chat interface pages.

Components Folder:

Reusable React components are available under this directory. Files such as Banner.js, Chat.jsx, ChatInput.jsx, and ChatRow.jsx correspond to various UI elements such as chat interfaces, input boxes, and message displays.

ClientProvider.jsx:

Likely provides context or state management for client data throughout the application.

Login.js:

Message.jsx, ModalSelection.jsx, NewChat.jsx, Sidebar.js, Thinking.js:

These files handle aspects of inter-user communication such as logging in, displaying messages, and managing the UI of a chat.

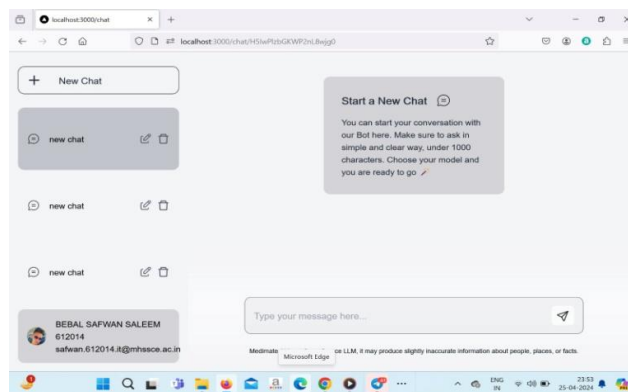
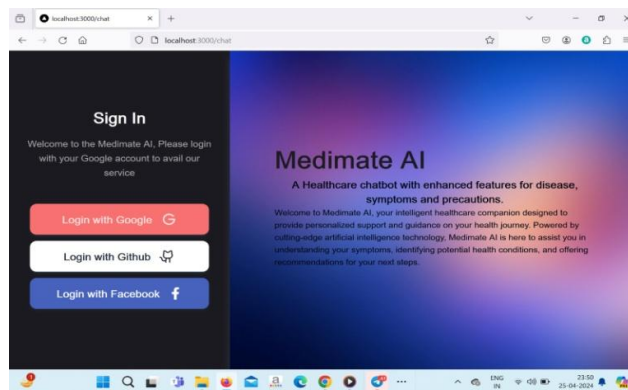
Context Folder:

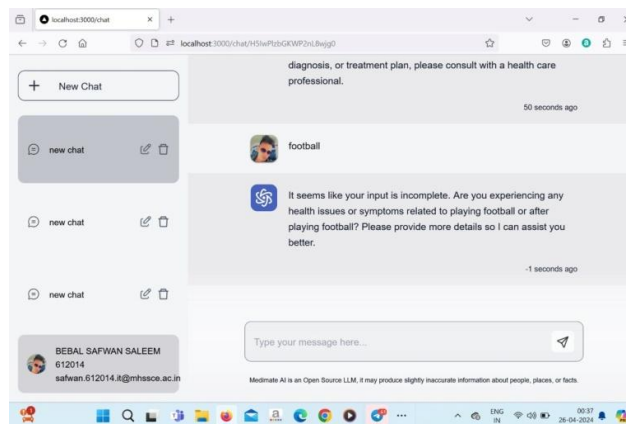
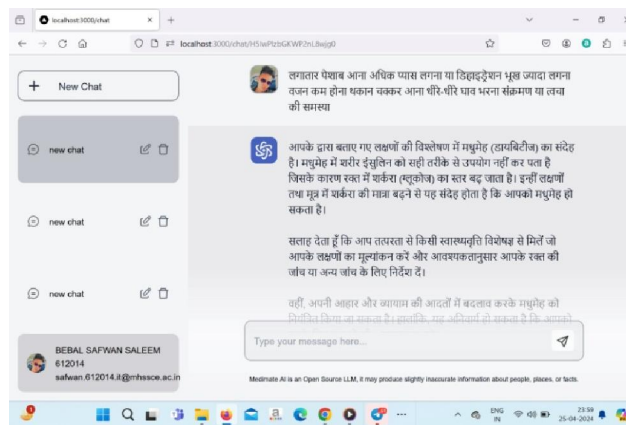
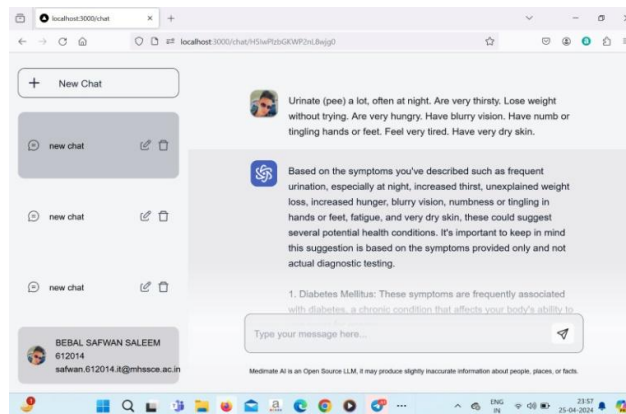
Houses the application's context files, such as Auth.js, which manages authorization and authentication context to allow components to share user data through the component tree without prop drilling.

Lib Folder:

Contains utility libraries or settings that provide backend and frontend capabilities. Includes JS files for interacting with ChatGPT and Firebase, as well as API querying capacities.

V. RESULT AND DISCUSSION





VI. DISCUSSION

MediMate-AI is a groundbreaking healthcare chatbot designed to revolutionize medical assistance and guidance. Leveraging cutting-edge AI technologies, including the GPT-3.5 and Llama2 70B APIs, it offers a wide range of functionalities tailored to address the diverse needs of users seeking healthcare information and support.

1. Multilingual Support:

One of the standout features of MediMate-AI is its robust multilingual support, allowing users to interact with the chatbot in languages such as Hindi and Marathi

2. Healthcare-specific Responses:

MediMate-AI is programmed to respond exclusively to healthcare-related queries, ensuring that users receive accurate and relevant information pertaining to their medical concerns

3. Symptom Analysis and Disease Prediction:

One of the core functionalities of MediMate-AI is its ability to analyze symptoms provided by users and predict potential underlying diseases.

4. Preventive Healthcare Guidance:

In addition to symptom analysis and disease prediction, MediMate-AI provides proactive preventive healthcare guidance to users. .

5. Intuitive User Interface (UI):

MediMate-AI boasts an intuitive and user-friendly interface reminiscent of ChatGPT, enhancing the overall user experience. .

6. Real-time Response and Engagement:

With its advanced AI capabilities, MediMate-AI delivers real-time responses to users' inquiries, ensuring timely assistance and engagement.

7. Scalability and Adaptability:

Its flexible framework allows for seamless integration of new features and enhancements, ensuring continuous improvement and relevance in addressing evolving healthcare challenges.

VII. CONCLUSION

In conclusion, the development and implementation of MediMate-AI represent a significant advancement in the field of healthcare chatbots, offering a comprehensive solution for personalized medical assistance and guidance. Leveraging state-of-the-art AI technologies, including the GPT-3.5 and Llama2 70B APIs, the chatbot provides users with multilingual support, healthcare-specific responses, symptom analysis, disease prediction, and proactive preventive healthcare guidance. The intuitive user interface enhances the overall user experience, making it easy and enjoyable for individuals to interact with the application.

MediMate-AI, positioning it as a valuable asset in the modern healthcare landscape.

REFERENCES

- [1]. Flora Amato, Stefano Marrone, "Chatbots meet eHealth: automat zing healthcare", proceeding of diet, May-2018.
- [2]. Benilde Leonor V. Comendador, "Pharmabot: A pediatric generic Medicine consultant Chatbot", proceeding of the JACE, April 2015.
- [3]. Divya, Indumathi, Ishwarya, Priyasankari, "A SelfDiagnosis Medical Chatbot Using Artificial Intelligence", proceeding MAT Journal, October-2017.
- [4]. Tobias Kowatsch, "Text-based Healthcare Chatbots Supporting Patient and Health", 01 October 2017.
- [5]. Chin-Yuan Huang, Ming-Chin Yang, Chin-Yu Huang, "A Chatbot-supported Smart Wireless Interactive Healthcare System for Weight Control and Health Promotion", Proceedings of the IEEE, April-2018.
- [6]. Boukricha, H., Wachsmuth, I.: Modeling Empathy for a Virtual Human: How, When and to What Extent. The 10th International Conference on Autonomous Agents and Multiagent Systems-Volume 3. International Foundation for Autonomous Agents and Multiagent Systems, 2011., pp. 1135-1136
- [7]. Agarwal, R., Gao, G., DesRoches, C., et al.: The Digital Transformation of Healthcare: Current Status and the Road Ahead. Information Systems Research 21, 796-809 (2010).
- [8]. Aron, A., Aron, E.N., Smollan, D.: Inclusion of Others in the Self Scale and the structure of interpersonal closeness. Journal of Personality and Social Psychology 63, 596-612 (1992).

- [9]. Bickmore, T., Cassell, J.: Social Dialogue with Embodied Conversational Agents. In: Kuppevelt, J.C.J., Bernsen, N.O., Dybkjær, L. (eds.) *Advances in Natural Multimodal Dialogue Systems*, vol. 30, pp. 23–54. Springer, Dordrecht (2005).
- [10]. Bickmore, T., Gruber, A., Picard, R.: Establishing the computer–patient working alliance in automated health behavior change interventions. *Patient Education and Counseling* 59, 21-30 (2005).
- [11] Kalyan, Katikapalli Subramanyam. “A Survey of GPT-3 Family Large Language Models Including ChatGPT and GPT-4.” *Social Science Research Network*, Jan. 2023, <https://doi.org/10.2139/ssrn.4593895>.
- [12] Jiao, Wenxiang, et al. “Is ChatGPT a Good Translator? Yes With GPT-4 as the Engine.” *arXiv (Cornell University)*, Jan. 2023, <https://doi.org/10.48550/arxiv.2301.08745>.
- [13] Mehrotra, Anay, et al. “Tree of Attacks: Jailbreaking Black-Box LLMs Automatically.” *arXiv (Cornell University)*, Dec. 2023, <https://doi.org/10.48550/arxiv.2312.02119>.
- [14] Chen, Weixin, and Bo Li. “GRATH: Gradual Self-Truthifying for Large Language Models.” *arXiv (Cornell University)*, Jan. 2024, <https://doi.org/10.48550/arxiv.2401.12292>.
- [15] Zhang, Xuanming, et al. “ProLex: A Benchmark for Language Proficiency-oriented Lexical Substitution.” *arXiv (Cornell University)*, Jan. 2024, <https://doi.org/10.48550/arxiv.2401.11356>.
- [16] Liu, Alisa, et al. “Tuning Language Models by Proxy.” *arXiv (Cornell University)*, Jan. 2024, <https://doi.org/10.48550/arxiv.2401.08565>.
- [17] “Generative Artificial Intelligence: Trends and Prospects.” *IEEE Journals & Magazine | IEEE Xplore*, 1 Oct. 2022, ieeexplore.ieee.org/document/9903869.
- [18] Ahuja, Kabir, et al. “MEGA: Multilingual Evaluation of Generative AI.” *arXiv.org*, 22 Mar. 2023, arxiv.org/abs/2303.12528.
- [19] Brooks, Chay, et al. “Artificial Intelligence in the Legal Sector: Pressures and Challenges of Transformation.” *Cambridge Journal of Regions, Economy and Society*, vol. 13, no. 1, Jan. 2020, pp. 135–52. <https://doi.org/10.1093/cjres/rsz026>.