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AI Health Consultant: A Multi-Agent Framework for Conversational Healthcare Assistance

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Abstract: *This paper presents "AI Health Consultant," a multi-agent–based healthcare assistance system designed to provide structured and safe conversational guidance. The system addresses challenges in understanding symptoms, interpreting medical reports, and accessing reliable preliminary health information. It distributes tasks across specialized agents for symptom analysis, mental health support, lifestyle guidance, medication information, and report interpretation, coordinated by a planner module and unified through a response composition mechanism. The system also incorporates emergency detection to provide immediate first-aid guidance in critical situations. Implemented using Python, Streamlit, and the Google Gemini API, with PDF analysis supported by pdfplumber, the system operates within defined safety boundaries by avoiding diagnosis and prescriptions while encouraging professional medical consultation. The proposed framework demonstrates how multi-agent AI can improve clarity, structure, and reliability in healthcare assistance systems.*

Keywords: Multi-Agent System, Healthcare Chatbot, Conversational AI, Generative AI, Medical Report Analysis, Streamlit, Gemini API

I. INTRODUCTION

The increasing use of digital platforms for health-related information has made basic medical knowledge more accessible, but users often struggle to understand symptoms, interpret medical reports, and identify reliable guidance. Existing systems frequently provide unstructured or generalized responses, which can lead to confusion. This paper proposes "AI Health Consultant," a multi-agent–based healthcare assistance system designed to deliver structured and context-aware conversational guidance. By distributing tasks across specialized agents for symptom analysis, mental health support, lifestyle suggestions, medication information, and report interpretation, the system provides more organized and meaningful responses. The proposed approach improves clarity, accessibility, and reliability of preliminary healthcare assistance while maintaining safety for non-clinical use.

SYSTEM DESIGN

The system design focuses on building a modular and scalable architecture for delivering structured healthcare assistance. The overall system is divided into multiple components, including:

Input Layer: Responsible for receiving user queries in natural language and accepting medical reports in PDF format.

Planner Module: Analyzes user input and determines which specialized agents should be activated based on the context.

Agent Layer: Consists of multiple agents such as Symptom Agent, Mental Health Agent, Diet & Lifestyle Agent, Medication Agent, and Medical Report Agent, each handling specific types of queries.

Emergency Handling Module: Detects critical situations using predefined keywords and provides immediate first-aid guidance.

Response Composition Module: Integrates outputs from multiple agents into a single structured and coherent response.

Output Layer: Displays the final response to the user through a conversational interface.

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This layered architecture ensures organized processing, improved response clarity, and efficient handling of diverse healthcare queries.

METHODOLOGY

Python was used for developing the AI Health Consultant system, including the implementation of multi-agent logic and response handling. Streamlit was used to create an interactive web-based interface that supports conversational input and medical report upload. User queries are processed using the Google Gemini API to generate context-aware responses based on structured prompts assigned to different agents.

Medical reports uploaded in PDF format are processed using the pdfplumber library to extract textual content, which is then analyzed for simplified interpretation. A lightweight memory mechanism is implemented to maintain recent interaction context and improve response relevance. The system integrates outputs from multiple agents and presents them in a structured conversational format, ensuring clarity and usability.

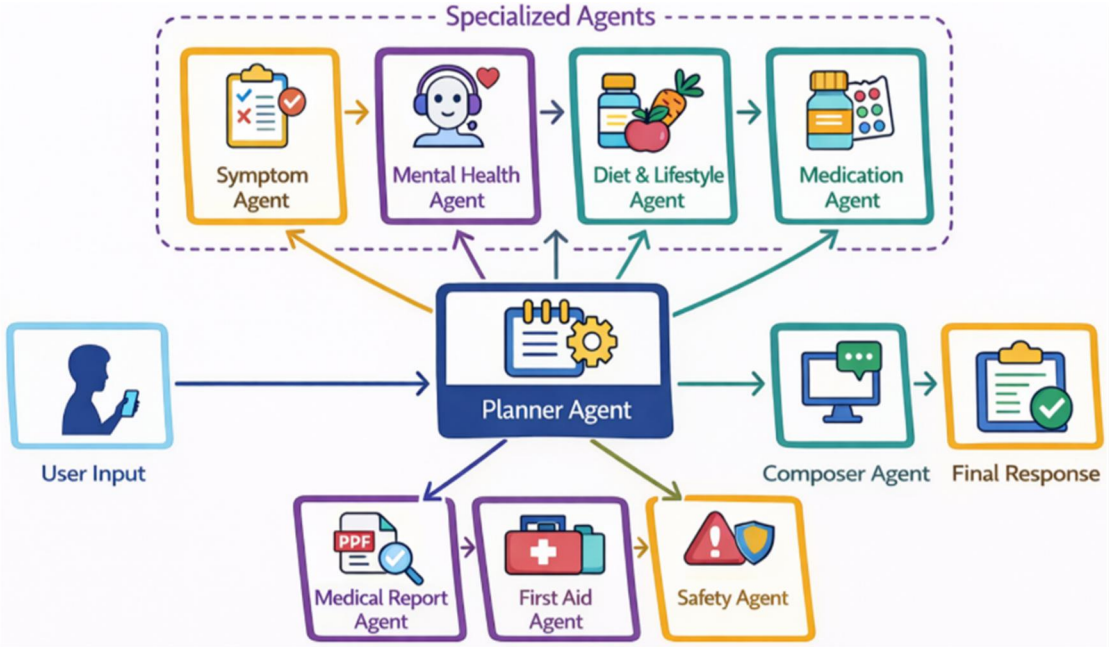

Fig. 1. Multi-Agent System Architecture of AI Health Consultant

RESULT AND DISCUSSION

The AI Health Consultant system provided structured and clear responses to a variety of health-related queries, including symptom understanding, medical report interpretation, and lifestyle guidance. The multi-agent architecture improved response organization by handling different aspects of user input through specialized agents, resulting in more relevant and context-aware outputs.

The system was able to simplify complex medical terminology from uploaded reports, making it easier for users to understand their health information. The conversational interface enhanced user interaction by allowing natural language communication and follow-up queries. Additionally, the emergency detection mechanism ensured that critical situations were addressed promptly with structured first-aid guidance.

Overall, the system demonstrated improved clarity, usability, and reliability compared to traditional single-response systems, making it effective for preliminary healthcare assistance.

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Fig. 2. User Interface of AI Health Consultant System

II. CONCLUSION

This paper presents the design and implementation of the AI Health Consultant, a multi-agent–based healthcare assistance system that provides structured and safe conversational guidance. The proposed architecture improves response clarity and relevance by distributing tasks across specialized agents and integrating their outputs into a unified response. The system effectively supports symptom understanding, medical report interpretation, and lifestyle guidance while maintaining strict safety boundaries by avoiding diagnosis and prescription.

The results demonstrate that a multi-agent approach enhances the usability and reliability of healthcare assistance systems compared to traditional single-model methods. Future work may include integration with real-time healthcare services, multilingual support, and the incorporation of predictive models for advanced health analysis.

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