

Research Article

Innovative Healthcare Solutions with Suhita: Chatbots, Voice Commands, and Seamless Health Tracking

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Abstract

Over the last several years, technology has transformed what is possible in healthcare, allowing for the efficient management of medications and personalized health assistance. Suhita: A Health App with a Powerful Medicine Reminder, Chatbot, and Hospital Finder It uses MERN (MongoDB, Express.js, React.js, Node.js) stack along with Twilio API, which provides the user with a fast and smooth interface. The chatbot is the system's buzz that provides a diagnosis through symptoms, seems on images for nutrition insights, and uses voice commands with the aim of making healthcare a more user engagement and fun exercise. Suhita focuses on using modern-day technologies to target the health management challenges of our time to drive better health outcomes.

Keywords: Health application, Medicine reminder, Multilingual chatbot, Nutrition analysis, Hospital finder, MERN stack, Context-aware chatbot, In-memory vector storage, Web scraping, Serper API, Semantic search

Introduction

The world today is slowly emerging on the virtual assistant, one of the most common technologies that we have had in recent history has become hot is chatbots. Chatbots had initially performed a few rudimentary customer service functions, but they have very quickly moved into big areas like health care, legal assistance, education and e-commerce. Still, traditional chatbots struggle for performant context-sensitive information retrieval on large-scale dialogs, particularly for multi-turn conversations. That barrier presents an acute challenge, especially when the chatbot employs effective but limited forms of simple keyword-based searching methods or a pool of static pre-programmed responses.

Traditional methods of training, which would produce irrelevant or inaccurate responses, allow chatbots to even recognize complex or nuanced queries. These issues are only exacerbated when the system must deal with big data. To tackle these, the authors describe Suhita; a health application powered by an advanced chatbot and enhanced by modern technologies to facilitate its dialogic strategies.

A chatbot handles the basics of Suhita, providing such functions as symptom-based advice, medication reminders, and nutrition analysis. Their differentiation is in the form of multiturn dynamic discussions that support voice/image-based input.

With AI models involved, the responses generated by the chatbot are coherent, context-aware, and need-specific. Machine learning training on the data up to October 2023, which captures complexity and nuance to help the system understand and respond to more sophisticated queries and provide personalized help within the context of a broad health data landscape. Needless to say, Suhita with such functionalities is a valuable deviation from traditional, static chatbots. The single most powerful thing about this whole system, then, is that it can keep users engaged in sustainable humanlike and responsive conversations that well exceed the interactivity that would ever be introduced through simple scripted answers and create real value to the user experience. This path would

Problem Statement

Rule-based response mechanism or at best keyword-matching, traditional built classic chatbots still work on template-based rules. Although such techniques are capable of addressing the ground-based queries, these methods tend to corrupt the integrity of the response generation actively in complex interactions which requires them to be thick on retrieval conjecture. As in the health sector, the user might need tailored advice based on his/her symptoms, medications, diet recommendations etc., which cannot be adequately handled by a simple keyword search that will give often either incomplete or irrelevant answers.

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There is even a broad spectrum of GPT-based generator models that manage to create small rubber stamps of syntactically and grammatically correct wording yet fail miserably actually pulling domain-specific medical info from the vagueness. These models literally work by generating their best response based on learned statistical patterns, not by retrieving anything from structured information models, and they are thus invariably more misleading than accurate. This limitation accurately flags a demand for a most sophisticated approach that fuses AI-mediated conversation fluency with genuinely dependable health data retrieval.

To solve this problem, Suhita creates a distinct architecture using the MERN Stack integrated with Twilio API and AI-based chatbot technologies. Suhita provides real-time things like diagnosis on symptoms, multi-language support, Nutrition Analysis for images, Hospital search with pin code search unlike the traditional systems. Another accessibility feature is accentuating the input process using text or voice conversation mode with ease and intuitively.

An equilibrium is thus set with AI-based dialogue systems generating casual conversation while retrieving information from more structured facts.

What is SUHITA?

To tackle these severe problems in personal health management such as missed medication doses, non-availability of actionable and reliable health information, difficulty in finding nearby healthcare, Suhita- a smart healthcare app, was developed. Suhita is a state-of-the-art AI with modern web technologies, and provides a one-stop solution for various healthcare services seamlessly integrated into a user-friendly interface.

Essentially, Suhita acts as a medicine reminder system, intelligent chatbot and hospital finder, all updated with notifications for medication reminders, health guidance and when, where and how to avail medical facilities. MERN Stack (MongoDB, Express. js, React. js, Node. js for the system and Twilio API for SMS notification as a scalable and super-efficient solution.

Suhita stands out in that it replaces static notifications of regular reminder apps with an AI-powered chat bot that interfaces with the user and provides value through symptom-based therapy, multilingualism, voice input, and nutrition analysis through image processing. Patients can input their symptoms and the chatbot will return answers based on what is currently known about medicine. The food analysis feature allows users to upload images of their food to receive detailed nutrition information and help them make healthier choices.

The hospital finder module takes Suhita's practical aspect a step further with the option to look up hospitals around you through a simple pin code lookup. This becomes even more important in emergency cases so that users can quickly locate the closest hospital.

Suhita's user-first approach tries to make its interaction as seamless as possible: reminding patients for medication, answering health-related questions, helping them locate a nearby hospital, etc. In every sense, it is a digital health assistant. The vocal language breaking all communication barriers and making interaction accessible for all is the other end of converse interaction feature for the multilingual and voice-enabled interaction.

This game-changing combination of AI-powered chatbot intelligence, 24x7 health alarms and intelligent data mining rebot Suhita's digital health management paradigm. These synergies and their resultant abilities make it a powerful, adaptable, and scalable tool for improving healthcare accessibility and archiving knowledge in the hands of the people with healthcare information pertinent to them.

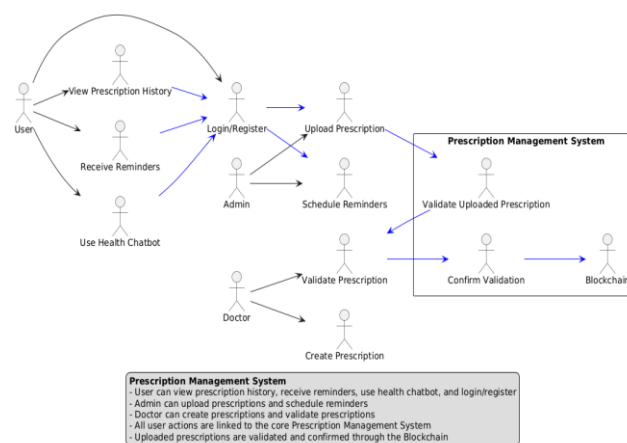


Fig. 1. Block Diagram

The brain behind SUHITA

Suhita, is-you guessed right- based on powerful technology to deliver smart, real-time health support through an integrated medicine reminder system, an AI chatbot, and a hospital finder. 5}The fundamental architecture of Suhita is a combination of artificial intelligence technologies and current generation cloud solutions to provide users with relevant, contextual and interactive health care assistance.

Its centerpiece is the AI chatbot from Suhita, which integrates natural language processing (NLP) with multilingual voice-input technology and image recognition to provide contextual health-related information. Therefore, after the user inputs his/her symptoms, the chatbot parses this input via dynamic data fetching utilities so that it can generate answers not from static responses pre-written in the templates however from the real world, medical knowledge bases and reliable online outlets. This allows Suhita to provide personalized and contextual responses unlike traditional symptom checkers.

A Suhita comes with an important innovation where it is able to analyze food and enables users to quickly upload the pictures of their meals and get a

nutritional breakdown of the meal. Similarly, this feature utilizes food-database-trained image processing models to analyze the nutritional value of a meal, so that the user can make tips based on healthier dietary options. Suhita is a unique health entity AI assistant that will help users combine machine learning with hosted food recognition APIs.

The Twilio API powered medicine reminder system keeps users on target for doses. It is customizable in terms of when to take their medicines, and Suhita is sending SMS alerts stating the medicine name, dosage and time. This system goes beyond your typical reminder service providing real-time notifications of and intelligence on users' medication usage and adherence to ensure they stay on the pill with their prescriptions.

Suhita promotes accessibility via multi-lingual and voice-enabled interaction, which allows users to use voice or type queries in multiple languages. It also ensures that users from all linguistic backgrounds will be included, so that healthcare assistance can be implemented to a much larger group.

The hospital finder engine is engineered with algorithms for the location-based search and guides the users to the hospitals situated in the nearby where the user can enter a pincode. So, in emergency this facility is important, so that the user can emanate quickly.

SUHITA smart health assistant in your application

Suhita is built for integration into Web, and Mobile Platforms which discharges a seamless, convenient, and engaging healthcare experience. Its modular nature allows for real-time interactions, smart data retrieval, and AI-enabled responses, making it a formidable health assistant for users across spectrum. This application is made of three main components, a medicine reminder, an AI chatbot, and a hospital finder, and every one of them has been considered individually for the performance and access options.

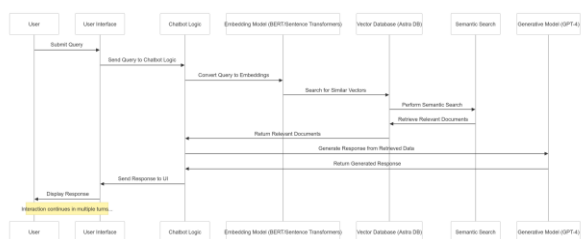


Fig. 2 Working Principal of Application

The frontend of Suhita is in React in order for it to be very much compatible with devices, and the backend is Node based. js – it deals with secure data exchanges, real-time interactions. Efficient storage of user data is done with the key data store MongoDB. The SMS notifications for medication reminders are delivered using the Twilio API so that the user will never forget to take the medicine.

At the root of Suhita, is possibly the world's most intelligent chatbot capable of taking inputs via voice and text in multiple languages. With help from its chatbot, Suhita reviews users' reported symptoms to extract relevant health information from trusted sources online. Suhita, unlike traditional chatbots that respond to specific queries with pre-programmed answers, intelligently extracts and processes relevant medical information, enabling accurate, timely and contextual health information. Additionally, image recognition technology enables users to scan food items to receive an overall nutritional summary to help them make informed decisions about what they eat.

Beside chatbot there exist hospital finder module, so the users will find the closest possible hospitals just entering the valid pin code. Such search options based on the location of the user can come in handy in case of a medical emergency when one may need to quickly find and access health facilities.

SUHITA in advanced environment

Voice interactions and external device compatibility will enhance the Suhita health assistant further to create an immersive experience that offers easy access. Such improvements will allow users to interact with Suhita

A. Voice Interaction and Display Integration

Available in several foreign languages, Suhita works on voice input and output. Suhita lets users interact through spoken commands. It might also be connected to voice assistants like Google Assistant or Amazon Alexa, enabling hands-free operation for reminding about medicines, checking for symptoms and providing nutritional advice. To enable smooth and instant voice conversation, through speech-to-text and text-to-speech technologies.

Suhita can also be extended to support external screens and is highly effective in public health kiosks, hospitals, and educational context. In this way, the health experience would not be dry and text-based; the large-screen would be used both for bringing up health insights and medicine schedules, as well as the chatbot responses, all using the big screen, or projectors connected to Suhita. Which works great for multi-user situations, where you reassure with audio and visual feedback

The multi-channel operation makes it work across mobile, web, and third-party screens, providing users with a consistent, warm, and accessible health experience, which is a sign of a good digital health buddy.

Modules

1) The Medicine Reminder and SMS Notifications: The medicine reminder can be created by the user by entering the name of the medicine, the dosage, and

time. At the defined time frame, Suhita will remind the user via SMS with the medicine information from Twilio and the users will never forget their medicines.

2) Intelligent Symptom-Based Chatbot: The chatbot facilitates interactive communication such that symptoms can be entered in a free-text by the users. An AI-based analysis of authenticated medical sources retrieves information on most common queries and probable reasons, helping the chatbot offer relevant health information.

3) Multilingual Voice-Based Chatbot The Suhita also offers voice input/output, appealing to users who find interaction easier via voice. This way a large number of users can get unique replies tailored to their common language of conversation.

4) Food Nutrition Analysis: Users upload images of food items, which Suhita processes to give a detailed breakdown of the nutritional value of food The chatbot can analyze calorie content, macronutrients, and health impacts overall, helping users make educated diet choices.

5) Hospital Finder: Users give pincode or location and Suhita provides the list of hospitals and clinics nearby. That allows for quick access to health care facilities in emergencies.

6) Voice and Display Integration Suhita can interact with voice assistants and allow users to speak to the system or send commands through voice. It also enables integration with external displays, to show things like health insights to healthcare kiosk or hospital systems.

Visualizing SUHITA in Action

A. Interaction with Suhita

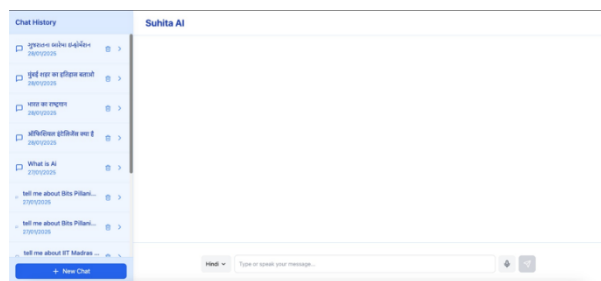


Fig. 4. Semantic Search with Response Generation in Suhita

Fig. demonstrates the complete paradigm of Suhita doing semantic search and response generation with RAG along with in-memory vector logic for improved performance. It all starts with a user querying from a mobile or web UI. Then it goes a step further and rephrases the input text to provide better context and clarity. Then ensure the real-time data collection and

scrapping the relevant data from the web using the Serper API. Cheerio retrieves and parses the HTML from web pages, removing extra HTML tags and keeping only the relevant textual content, as soon as the data is retrieved.

This extracted content is then embedded into vectors using deep text embedding models BERT or Sentence Transformers which converts the text content to high dimensional vector space for semantic searches. In parallel, the modified user input gets converted into vectors also. This vector of data that was pasted is then fed into the main model, which can cross-reference the retrieved knowledge with the generative AI (llama model) to build a coherent, fact-checked, and context-aware response to the user.

The sources section shows the scraped web page data that was shown on the user side in the generation process, giving transparency of where the information is coming from. And, for follow-up questions, the system requires a context of relevant next-step queries to be generated on output to ensure a more interactive, multi-turn conversation.

B. Medicine Reminder System

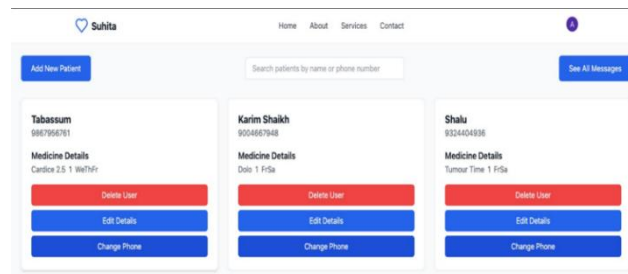


Fig. 5. The Demonstration of Suhita’s Medicine Reminder

Fig. 5 demonstrates the dynamic conversational abilities of Suhita. The flow goes like this: When a user types in a natural language health query, Suhita fetches relevant medical documents from its vector database and generates a response with the help of GPT-4.

It illustrates how suitably Suhita can handle multi-turn dialogues, maintaining context across multiple utterances. The chatbot strikes a balance in answering based on facts while eases to secure transitions from retrieval-based searches to generative replies.

Future Scope

1) Improved Real-Time Performance: Suhita will focus on optimization of semantic look up and response generations in future iterations of Suhita resulting in instantaneous interactions even with large traffic flows.

2) Advanced Multimodal Interactions: Suhita can not only recognize voice but pictures as well with gesture-based inputs, so users can interact beyond just a piece of text which only serves to augment more simulation interaction.

3) Personalized User Experience: Advanced profiling and machine learning will empower Suhita to provide highly personalized responses relevant to user behavior, preferences, and past interactions to increase user engagement and satisfaction.

4) Domain-Specific Application: Future Suhita versions will now also be highly tuned to cater to specific domains like healthcare, law, or finance while ensuring acute relevance and providing model fine-tuning where we can have more fine point possibility by optic data into dedicated datasets in vector DB and RAG model.

5) Global Accessibility: With further multilingual extension, Suhita will also include a broader assortment of dialects and languages for users worldwide, making it more global and accommodating for various user groups.

Practical applications of SUHITA

1) Real-Time Support in Legal and Healthcare: Suhita can query for real time outputs for both these domains. Based on the query raised by the user, it can retrieve case details, law or regulation from a vectorized database. So in case of healthcare, Suhita can share personalized information such as how long before medicines expire or how to administer them so it could respond to the user on time and accurately

2) Enhanced Educational Interactions: The technology that we are experiencing can provide text-to-speech and multi-language support; this results on the revolution on education, providing options to create interesting presentations that is adaptable to o several groups of students. The ability to deliver up-to-date, contextual information as Suhita excels at question and answer sessions or interactive learning experiences.

3) Interactive Collaborative Workspaces: Suhita builds Interactive Collaborative Workspaces, whereby users project relevant information documents or presentations onto shared surfaces, allowing for employee or student engagement, leading group discussions and brainstorming sessions or conducting live problem solving. This allows for a very well-balanced collaborative structure and easy information flow

4) Immersive Personalized Customer Service: Suhita will transform customer service into a stage for immersive, highly personalized experiences. It extracts relevant information from querying the business database, generating context-aware responses from customer inquiries for order tracking, problem resolution, or product inquiries, literally paving the path for a speedy and personalized experience.

Conclusion

This intelligent chatbot system is a remarkable advancement of conversational AI, and more importantly, of human-computer interaction, which emerged from the origin of the vector database and the RAG model. The chatbot combines semantic search with dynamic answer generation, integrating information retrieval into a conversation that sounds more organic. The hybrid nature of it enables the application over a wide range of fields, such as knowledge-oriented context-based response generation services in law, medicine, customer services, and even education industries.

Intelligent technologies enabled this: vector databases for semantic search, GPT-based well-formed responses in conversation, multilingualism for the global audience. The other thing about that system is that it allows users to maintain a very good conversational context over multiple interactions with the users interact, so they have a seamless experience.

Clearly, it has scalable and adaptable solutions across several areas and with more advancement, it could become the intelligent chatbot. This will truly change the way humans or business communicate with each other, making it signifying the future of tech-driven communications with proper implementation of retrieval-augmented generation along with data management and ending with a user-friendly interface.

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