

# AI-Driven Health: A Web App for Enhanced Healthcare Queries and Nutrition and Analysis

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**Abstract:** The AI-Driven Health chat assistant is an innovative healthcare solution that seamlessly integrates technology and care, enabling users to have natural language conversations about symptoms, treatments, and general health inquiries. The chatbot functions as a virtual assistant, enabling users to inquire about medical concerns and obtain clear explanations. The nutrition bot utilizes the advanced capabilities of Google Gemini to analyze food images, offering users comprehensive nutritional information. The proposed system undergoes constant refinement through regular testing and user feedback, guaranteeing a smooth and dependable platform for accessible healthcare interactions. The AI-Driven Health chat assistant strives to enhance the accessibility and comprehensibility of healthcare information, ultimately enhancing a healthier and more informed society.

**Keywords:** Chatbot, Explainable AI, Healthcare, Nutritionbot, Virtual Assistant.

## I. INTRODUCTION

Health is the state of well-being, encompassing physical, mental, and social dimensions. Maintaining it requires a disciplined lifestyle with preventive measures and healthy habits. In today's fast-paced world, technology plays a pivotal role in promoting and sustaining health by offering tools like fitness trackers, heart rate monitors, nutrition apps, and telehealth services. Explainable AI enhances these tools by making them more

transparent and trustworthy, enabling personalized insights and regulatory compliance. While consulting medical professionals is ideal, frequent visits may not be feasible due to various constraints. Traditional methods—like internet searches or medical hotlines—often lack 24/7 availability, consistency, and privacy, and rarely offer nutritional predictions. This work proposes a web application that allows users to chat with a healthbot for detailed medical information and use a nutritionbot to analyze food images for instant dietary insights. By leveraging a robust medical knowledge base and Explainable AI, the system aims to bridge gaps in healthcare accessibility and comprehension. Natural Language Processing (NLP) powers the chatbot's ability to parse queries and deliver accurate, context-aware responses, while image recognition enables the nutrition bot to assess food content. Together, these AI-driven components create a seamless, user-centered experience for health management.

It is always the best option to seek assistance from a medical practitioner for health-related advice. However, it is not always feasible to visit the medical practitioner very often because of various constraints. Looking for the best and fastest advice is the next possible option for anyone. The traditional methods for seeking healthcare information involve obtaining advice through internet search engines, healthcare websites, medical hotlines, or self-diagnosis. Traditional methods often lack 24/7 availability, making it challenging for users to obtain timely information. The quality of information obtained through internet searches or forums can vary, and users may struggle to distinguish between reliable and unreliable sources. Waiting for appointments or spending time researching information on-line can be time-consuming, especially when users need quick answers or guidance. Sharing personal health information over the internet may raise privacy concerns for some users. Most of these methods typically lack options for predicting nutrient Information

## II. RELATED WORK

Recent advancements in Artificial Intelligence (AI) and Machine Learning (ML) have significantly improved healthcare systems by enabling intelligent health monitoring and personalized medical assistance. Several studies have focused on developing AI-based healthcare applications that provide symptom analysis, disease prediction, and health recommendations. These systems use machine learning algorithms and large healthcare datasets to analyze patient information and generate useful insights. Web-based healthcare platforms also allow users to easily access medical guidance, improving healthcare accessibility and reducing the burden on medical professionals.

In addition, many researchers have explored nutrition analysis systems that evaluate dietary habits and provide personalized nutritional recommendations. These systems typically use food databases and AI models to analyze nutrient intake and suggest balanced diet plans based on user health conditions.

Some applications integrate chatbots and natural language processing (NLP) to answer health-related queries and provide instant guidance. However, many existing systems focus only on either healthcare queries or nutrition analysis separately. Therefore, integrating both healthcare query assistance and nutrition analysis in a single AI-driven web application can provide a more comprehensive solution for improving user health awareness and lifestyle management.

## III. LITERATURE SURVEY

Christian Nash; Rajesh Nair; Syed Mohsen Naqvi, "Machine Learning in ADHD and Depression Mental Health Diagnosis: A Survey", This paper explores the current machine learning based methods used to identify Attention Deficit Hyperactivity Disorder (ADHD) and depression in humans. Prevalence of mental ADHD and depression is increasing worldwide, partly due to the devastating impact of the COVID-19 pandemic for the latter but also because of the increasing demand placed on the mental health services. It is known that depression is the most common mental health condition, affecting an estimated 19.7% of people aged over 16. ADHD is also a very prevalent mental health condition, affecting approximately 7.2% of all age groups, with this being conceived as a conservative estimate. We explore the use of machine learning to identify ADHD and depression using different wearable and non-wearable sensors/modalities for training and testing. These modalities include functional Magnetic Resonance Imagery (fMRI), Electroencephalography (EEG), Medical Notes, Video and Speech. With mental health awareness on the rise, it is necessary to survey the existing literature on ADHD and depression for a machine learning based reliable Artificial Intelligence (AI). With access to in-person clinics limited and a paradigm shift to remote consultations, there is a need for AI-based technology to support the healthcare bodies, particularly in developed countries.

2. "Ujunwa Madububambachu 1,\*, Augustine Ukpebor 2, Urenna Ihezue 3,"Machine Learning Techniques to Predict Mental Health Diagnoses: A Systematic Literature Review"

This study aims to investigate the potential of machine learning in predicting mental health conditions among college students by analyzing existing literature on mental health diagnoses using various machine learning algorithms. The study highlights Convolution Neural Networks (CNN), Random Forest (RF), Support Vector Machine (SVM), Deep Neural Networks, and Extreme Learning Machine (ELM) as prominent models for predicting mental health conditions. Among these, CNN demonstrated exceptional accuracy compared to other models in diagnosing bipolar disorder. However, challenges persist, including the need for more extensive and diverse datasets, consideration of heterogeneity in mental health condition, and inclusion of longitudinal data to capture temporal dynamics.

3. Xinghan Wu, MSc; Xitong Guo1, PhD; Zhiwei Zhang, PhD,"The Efficacy of Mobile Phone Apps for Lifestyle Modification in Diabetes: Systematic Review and Meta Analysis",

Diabetes and related complications are estimated to cost US \$727 billion worldwide annually. Type 1 diabetes, type 2 diabetes, and gestational diabetes are three subtypes of diabetes that share the same behavioral risk factors. Efforts in lifestyle modification, such as daily physical activity and healthy diets, can reduce the risk of prediabetes, improve the health levels of people with diabetes, and prevent complications. Lifestyle modification is commonly performed in a face-to-face interaction, which can prove costly. Mobile phone apps provide a more accessible platform for lifestyle modification in diabetes.

4. Y. Natarajan, S. P. KR, S. Pandian, S. U. Geetha, and S. Senthilkumar, “Enhancing medical information retrieval with a language model,”

This paper presents the design and development of a multimodal medical chatbot that leverages Gemini- 2.0-Flash Model alongside a novel Retrieval- Augmented Generation (RAG) architecture to support preliminary medical diagnosis and recommendations. The system integrates textual prompt analysis and medical image interpretation, aiming to improve healthcare accessibility, particularly for underserved populations. Focused on data-rich medical conditions, the chatbot generates reliable diagnostic insights based on natural language inputs and/or medical images, requiring minimal user expertise.

The proposed RAG-based architecture incorporates a curated medical knowledge base and structured retrieval mechanisms, significantly reducing hallucinations and enhancing response credibility compared to direct Large Language Model (LLM) querying. By demonstrating the efficacy of multimodal reasoning in conjunction with structured retrieval, this work paves the way for more accessible, accurate, and scalable AI-driven health support systems.

#### IV. METHODOLOGY

The proposed work is to develop a web-based chatbot system. This web interface will serve as a comprehensive solution for addressing health inquiries and dietary needs. The website provides detailed information on the functionality of a chatbot and its application in the field of nutrition.

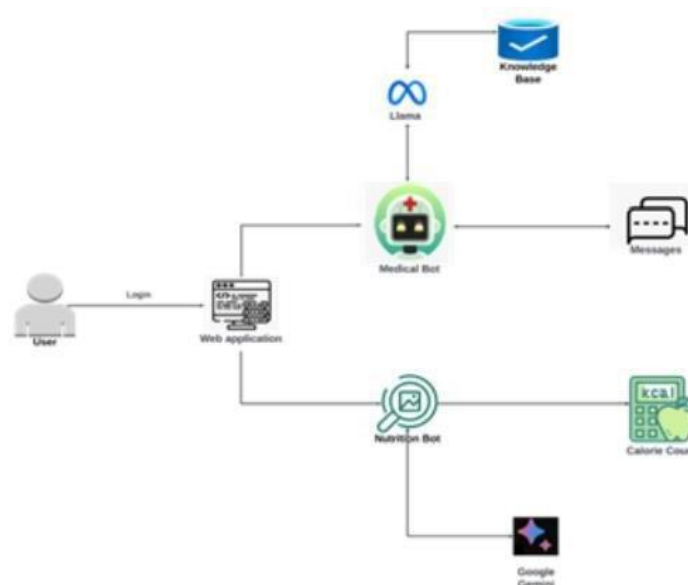
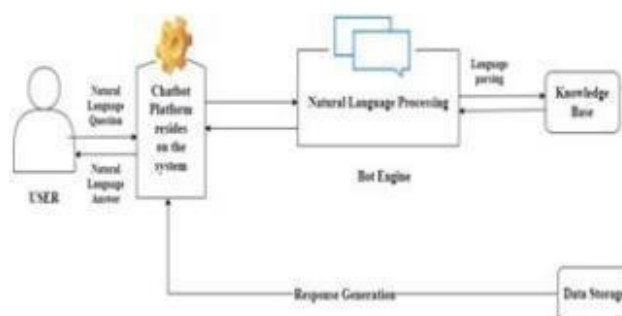


Fig.1.Proposed Architecture

Fig. 1 shows the proposed architecture of the web application. To begin, the user registers and logs in to the platform. They can

then choose to use either the nutrition bot or the chatbot. When the chatbot option is selected, users can ask healthcare-related questions and receive prompt responses. The chatbot utilizes the repository of relevant information in the KB to identify suitable responses. The KB contains structured data that the chatbot retrieves using the parsed input. If the nutritionbot is chosen, the user is prompted to upload an image of the food, after which they receive nutritional information about the food items in the image.

Fig. 2 illustrates the designed workflow of a chatbot system, responsible for processing and responding to user queries using NLP. The user initiates an inquiry by submitting a question in natural, conversational language. The system's objective is to generate a response in a manner that is easily comprehensible and natural for human users. The chatbot platform initially receives the user's query and manages the interaction with both the user and the processing units. Once received, the chatbot platform transmits the query to the NLP module. The NLP module is employed both to build the KB and to process and respond to user queries.



**Fig.2 Working of Chatbot**

The KB is constructed using information from [17], a reputable medical resource. This encyclopedia is well-known for its extensive coverage and accuracy in medical content, ensuring that the KB is founded on credible and trustworthy facts. Consequently, the system can deliver precise and reliable solutions to medical related queries, enhancing its effectiveness and trustworthiness. During the KB construction process, text from the source is systematically divided into segments. These segments are then transformed into embeddings—numeric representations that capture the semantic meaning of the text. The embeddings are organized into a semantic index, facilitating efficient retrieval of relevant information based on the indexed content. When a user submits a query, the NLP module applies a similar process. The query is parsed to analyze its structure, key words are extracted, and the text is transformed into embeddings. These embeddings are then matched against the semantic index in the KB, enabling the system to fetch and deliver accurate, relevant information to the user. The chatbot engine manages the interaction among the data storage, the KB, and the NLP module. It uses the parsed language data to query the KB and retrieve relevant information or responses. The data storage component manages any additional data necessary for processing or storing user interactions. This includes preserving user queries, responses, or other metadata for future reference. Once the bot engine retrieves the necessary information from the KB, it generates a response. This response is then transmitted to the user via the chatbot platform.

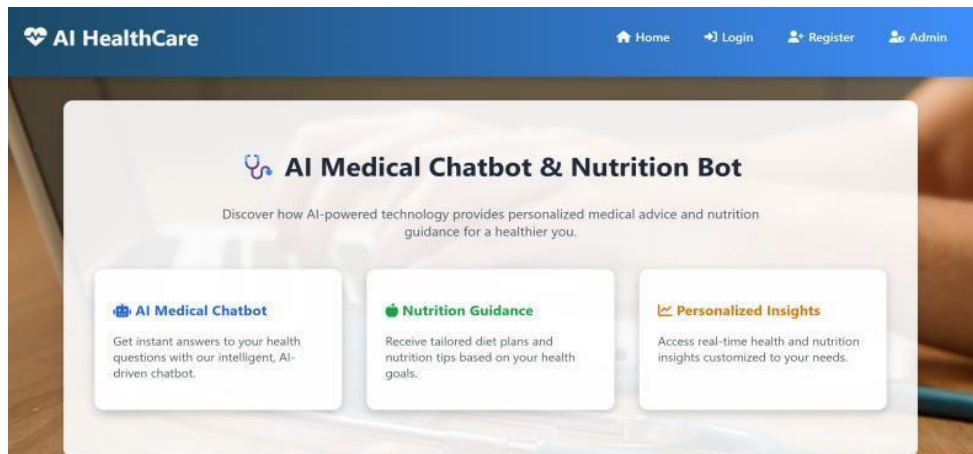
## V. IMPLEMENTATION

A function is defined to establish a retrieval-based question answering chain. This function utilizes a LLM and Facebook AI Similarity Search (FAISS) vector store to efficiently retrieve pertinent information. A separate function, load llm, is implemented to load a conversational LLM using Transformers'. This model is designed to produce responses to user queries. A function is defined to coordinate the configuration of the QA system. The system loads sentence embeddings for representing sentences, loads the FAISS vector store, initializes the LLM, creates a retrieval Question-Answer (QA) chain, and returns it. The Final Result Function acts as the primary access point for user queries. The QA bot function is used to retrieve a response to the user's query. The code employs a function to handle the Chatbot's interactions. This code defines event handlers that are responsible for initiating the bot and handling user messages. Upon receiving a message, the QA chain is activated to produce a response, which is subsequently sent back to the

user. This implementation establishes a conversational AI chatbot that is specifically designed to offer medical aid. The system utilizes retrieval-based question-answering techniques in conjunction with a conversational LLM to comprehensively comprehend and provide effective responses to user queries. Structured or unstructured data that can be employed to address inquiries is contained in the external knowledge base. Text snippets are used to deconstruct information from the external KB into smaller, more manageable components. These excerpts are likely pertinent pieces of information that can be employed to address particular inquiries. Next, the text snippets are transformed into vector embeddings, which are numerical representations of the text. These embeddings are maintained in a vector database. This enables the efficient search and retrieval of pertinent information by leveraging the similarity of the embeddings. An embedding is also generated when a question is posed. The question is represented in the same vector space as the text snippets by this embedding, which enables the comparison and retrieval of pertinent snippets. The text snippets that are retrieved are subsequently incorporated into a LLM. The LLM generates a coherent and precise response by analyzing the snippets and the question. The LLM generates the final output of the process, which is then presented to the user.

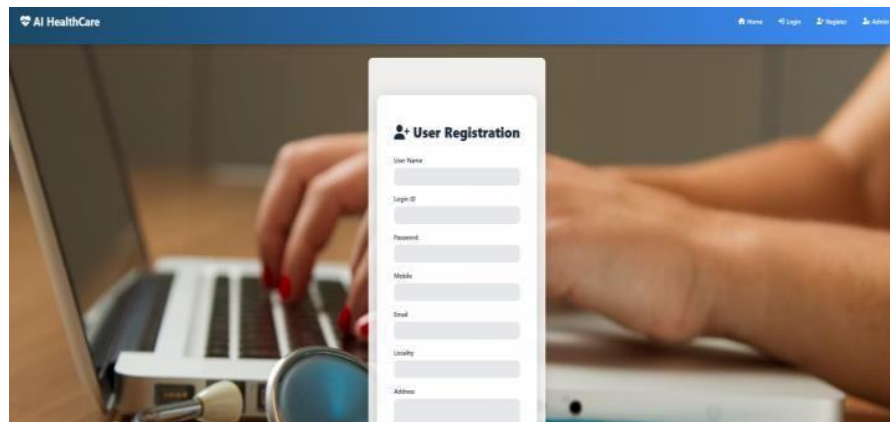
## VI. RESULT AND DISCUSSION

The user must first log in to the web application. After that, he will be taken to the first page, as seen in Figure 3, where he can select between the NutritionBot and the chatbot. In addition, the user will have access to a help option that will provide instructions on how to use the web application. The home page is the main interface of the application where users first interact with the system. It provides a simple and user-friendly layout that introduces the purpose of the AI-driven health assistant. From this page, users can easily navigate to different sections such as registration, login, and system information. The design of the home page ensures that users can quickly understand the features of the system and access the services provided by the application. It acts as the starting point for both new and existing users.



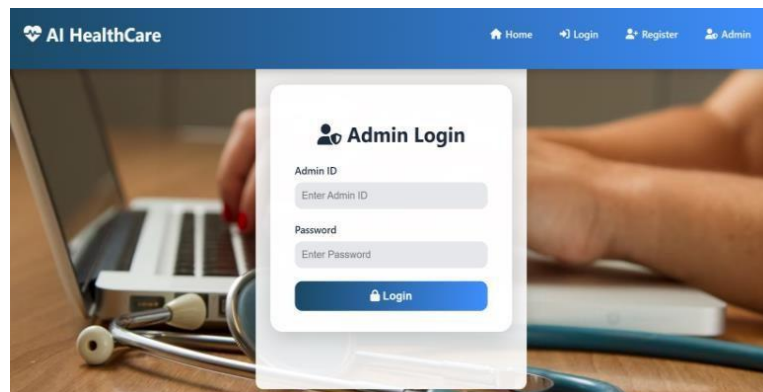
**Fig.3.Home Page of AI-Driven Health Chat Assistant**

User-friendly medical chatbot is shown in Fig. 4, shows the registration page allows new users to create an account in the system. Users are required to enter their basic information such as name, email, username, and password. This process ensures that each user has a unique account in the system. Once the registration is completed successfully, the user details are stored in the database and the user can later log in to access the services of the application.



**Fig.4.User Registration Page**

Fig.5 shows the admin login interface of the system. This page allows the administrator to enter valid credentials to access the admin dashboard. It ensures that only authorized personnel can manage and control the system functionalities.



**Fig.5.Admin Login Page**

Fig.6 shows the admin home page which acts as the dashboard for the administrator. From this page, the admin can monitor system activities and manage registered users. It provides different options that help the admin control and maintain the overall system effectively.

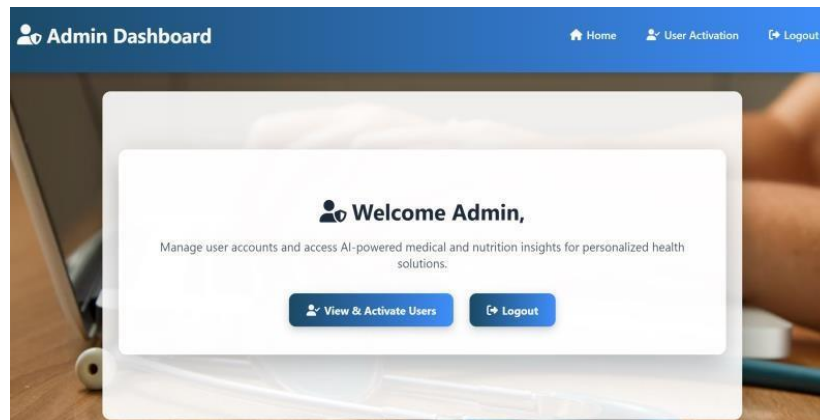


Fig.6.Admin Home Page

Fig.7 shows the user activation module available to the administrator. In this page, the admin can approve or activate newly registered users. This feature enhances system security by ensuring that only authorized and verified users can access the platforms.

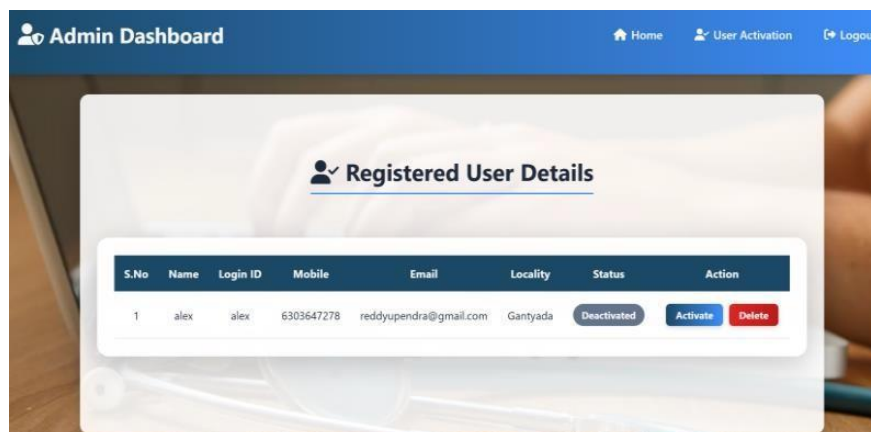
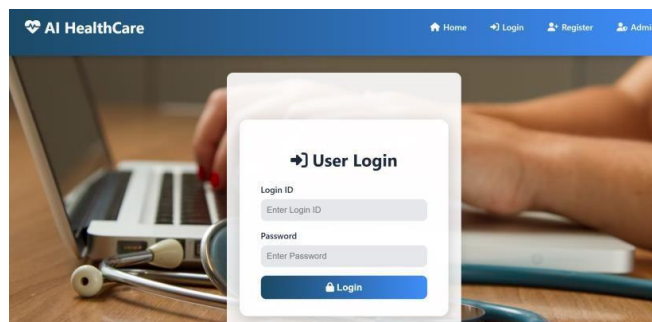


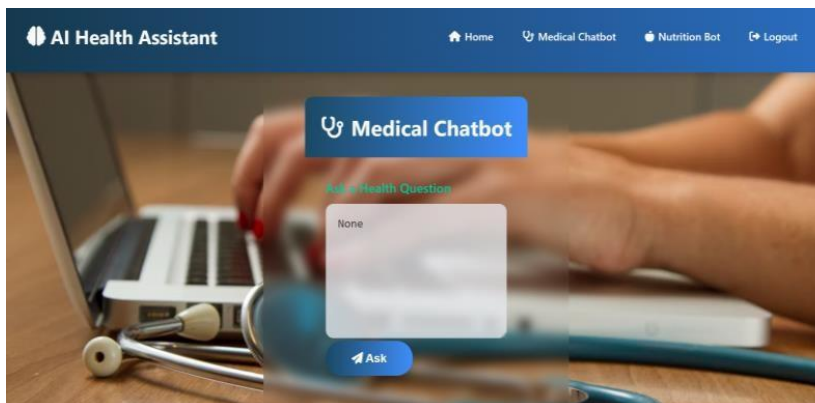
Fig.7.Admin User Activation Page

Fig.8 shows the user login page where registered users enter their username and password to access the system. The login authentication verifies the user credentials before granting access to the application.



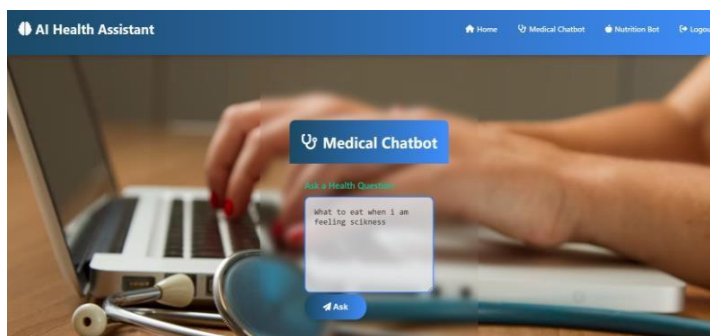
**Fig.8.User Login Page**

Fig.9 shows the user home page which acts as the main dashboard for the user after successful login. From this page, users can access different features such as the chatbot and nutrition bot. The interface is designed to make navigation simple and convenient. Each user has a unique account in the system. Once the registration is completed successfully, the user details are stored in the database and the user can later log in to access the services of the application.



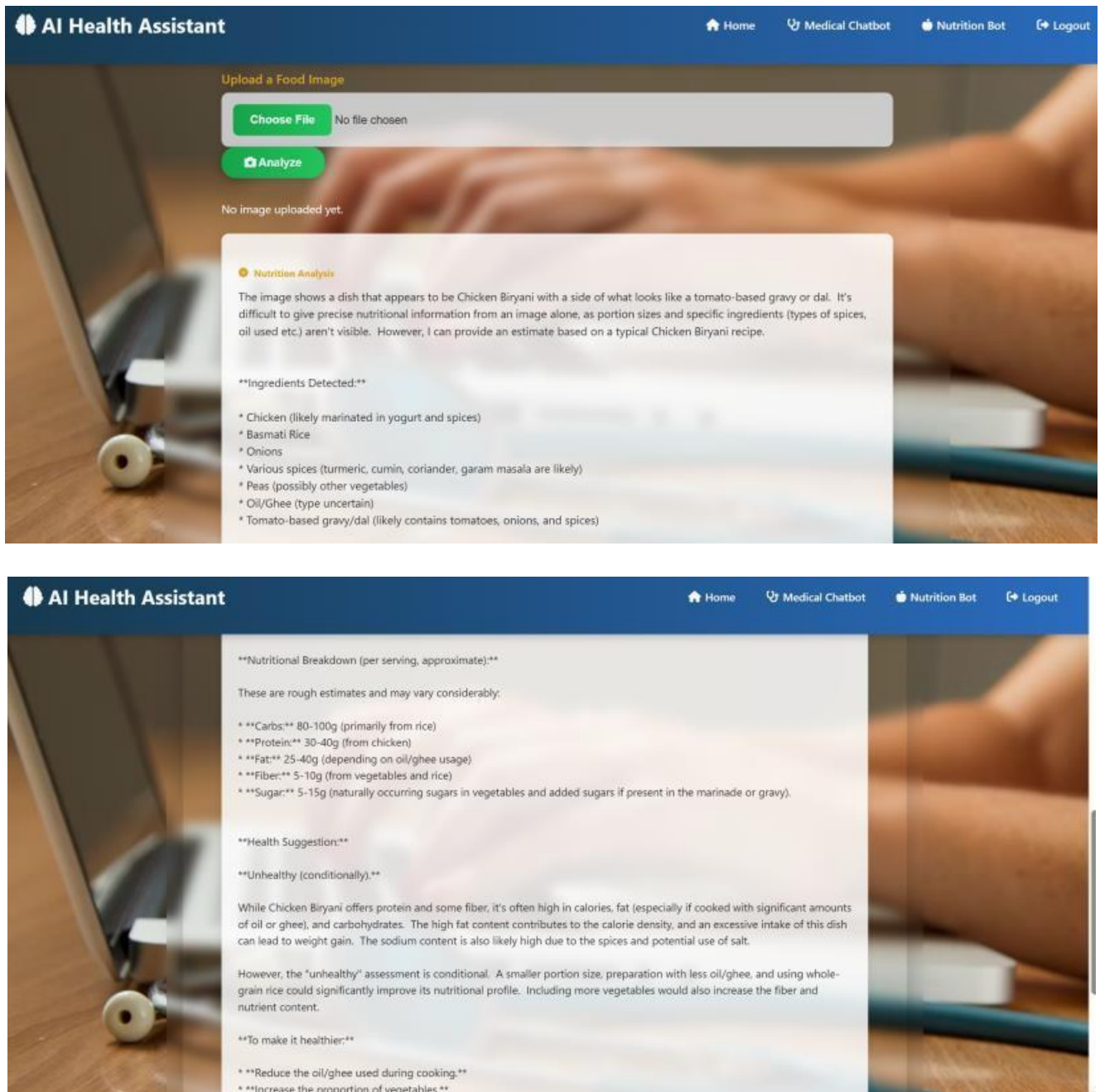
**Fig.9.User Login Page**

Fig's.10 shows the chatbot interface where users can interact with the AI system by asking health-related questions. The chatbot processes the user queries and provides responses related to symptoms, treatments, and general healthcare information.



**Fig's.10.Health Chatbot Interface**

Fig's.11 shows the output generated by the nutrition bot after analyzing a food image uploaded by the user. The system identifies the food item and provides nutritional information such as calories, proteins, fats, and carbohydrates. This helps users understand the nutritional value of their food.



Fig's.11.Nutrition Bot Output

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