Health AI Assistant - Project Documentation

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# 1. Introduction & Project Overview

The Health AI Assistant is an intelligent healthcare support system built using Python, Gradio, Transformers, and Plotly. Its primary goal is to provide users with preliminary medical insights, symptom analysis, treatment plan suggestions, hospital directories, and health analytics. It uses IBM Granite models for natural language understanding and response generation.

Key Technologies:  
- Gradio for User Interface  
- Hugging Face Transformers & IBM Granite Model  
- PyTorch for Model Execution  
- Pandas & Plotly for Data Analytics and Visualization

# 2. System Architecture

The system follows a modular architecture with multiple components:  
  
1. Disease Prediction: Uses user-entered symptoms to predict possible conditions.  
2. Treatment Plan: Provides personalized treatment suggestions based on condition, age, gender, and history.  
3. Patient Chat: Interactive chatbot for general health queries.  
4. Health Analytics: Generates plots and AI-driven health insights.  
5. Tablet Info: Displays information on common medications.  
6. Hospital Search: Finds nearby hospitals from a predefined dataset.

The architecture ensures modularity, making it easier to extend the project with new features like BMI calculators, lab report analysis, and voice support.

# 3. Implementation Details

The implementation is divided into several Python modules integrated using Gradio:  
  
- Model Loading: The IBM Granite model is loaded via Hugging Face transformers.  
- Disease Prediction: A prompt-based query is sent to the model, which analyzes symptoms.  
- Treatment Plan: Generates suggestions by combining user profile inputs with model responses.  
- Chatbot: Stores and maintains chat history for user interaction.  
- Analytics: Uses sample datasets with Pandas and generates plots with Plotly.  
- Hospital Search: Uses a dictionary dataset mapped to cities for quick lookup.

# 4. Features

The Health AI Assistant offers multiple features:  
  
1. Patient Profile Management: Stores details like name, age, gender, medical history, and allergies.  
2. Disease Prediction: Suggests possible conditions and lifestyle recommendations.  
3. Treatment Plans: Provides general treatment guidance with emphasis on consulting a doctor.  
4. Health Analytics: Visualizes heart rate, blood pressure, glucose levels, and symptom frequency.  
5. Tablet Info: Displays 15 common medications with their purpose.  
6. Hospital Directory: Provides contact details of hospitals in multiple cities.  
7. Patient Chat: Conversational AI assistant for medical queries.

# 5. User Interface (Gradio Design)

The Gradio Blocks interface is designed for usability:  
  
- Left Sidebar: Patient profile input fields and profile save option.  
- Tabs:  
 • Disease Prediction: Symptom input and analysis results.  
 • Treatment Plans: Generate personalized treatment suggestions.  
 • Health Analytics: Interactive charts and AI-generated insights.  
 • Tablet Info: Displays medicines and their usage.  
 • Nearby Hospitals: Search for hospitals by location.  
 • Patient Chat: Conversational interface with clear chat option.

This modular design makes the system intuitive and user-friendly, allowing patients to quickly access multiple healthcare-related features in one place.

# 6. Conclusion & Future Enhancements

The Health AI Assistant is a powerful proof-of-concept demonstrating how AI can assist in preliminary healthcare support. While it provides valuable insights, it is not a replacement for medical professionals. All suggestions emphasize consulting doctors for serious conditions.  
  
Future Enhancements:  
- BMI Calculator using height and weight.  
- Lab Report Upload and Automated Analysis.  
- Voice Support for patient interactions.  
- Authentication for secure patient data management.  
- Expansion of hospital directory with real-time integration.

This project demonstrates the integration of AI with healthcare data visualization and information retrieval, paving the way for more advanced healthcare solutions in the future.