Project Documentation

1. Introduction

Project title: Healthai – Intelligent Healthcare Assistant using IBM Granite

Team Leader: S. Swetha

Team Member: B. Shiyamala Devi

Team Member: S. Subhashri

2. Project Overview

Purpose:
The purpose of Healthai is to empower patients, doctors, and healthcare administrators by providing a smart healthcare assistant that improves healthcare delivery. Leveraging AI and real-time data, Healthai assists users by providing medical information, health recommendations, scheduling support, and patient monitoring, while guiding better healthcare practices. For medical staff, it acts as a decision-support tool by summarizing patient data, providing actionable insights, and assisting in resource management. The project bridges healthcare, technology, and patient engagement for efficient and proactive care.

Features:

Conversational Interface
Key Point: Natural language interaction
Functionality: Enables patients and doctors to ask health-related questions and receive understandable guidance.

Medical Record Summarization
Key Point: Simplified patient data understanding
Functionality: Converts long medical records into concise summaries for doctors.

Appointment Scheduling
Key Point: Automated scheduling assistance
Functionality: Manages patient appointments, reminders, and doctor availability in real time.

Health Tips Generator
Key Point: Personalized health advice
Functionality: Provides daily health tips based on user profile and behavior patterns.

Patient Feedback Loop
Key Point: Community engagement

Functionality: Collects patient feedback to improve service delivery and patient care quality.

Predictive Health Monitoring
Key Point: Proactive health management
Functionality: Uses data from wearables and patient inputs to predict potential health issues.

Multimodal Input Support
Key Point: Flexible data handling
Functionality: Accepts input from text, medical PDFs, and CSV files for analysis.

Streamlit or Gradio UI
Key Point: User-friendly interface
Functionality: Provides an intuitive web dashboard for interaction.

---

3. Architecture

Frontend (Streamlit):
Interactive web UI featuring dashboards, file uploads, chat interface, feedback forms, and report viewers, organized via a sidebar for ease of navigation.

Backend (FastAPI):
Provides API endpoints for document processing, chat interactions, health tips generation, and vector embedding. Optimized for asynchronous handling and Swagger integration.

LLM Integration (IBM Watsonx Granite):
Utilizes IBM Watsonx Granite for natural language understanding and generation. Responsible for summarization, health tip generation, and conversational responses.

Vector Search (Pinecone):
Embeds medical documents using Sentence Transformers, stores them in Pinecone, and performs semantic search using cosine similarity.

ML Modules (Health Monitoring and Predictive Analysis):
Uses lightweight ML models for forecasting health risks and anomaly detection using Scikit-learn. Time-series data is processed and visualized with pandas and matplotlib.

---

4. Setup Instructions

Prerequisites:
• Python 3.9 or later
• pip and virtual environment tools
• API keys for IBM Watsonx and Pinecone
• Internet access for cloud services

Installation Process:
• Clone repository
• Install dependencies from requirements.txt
• Configure .env file with credentials
• Run FastAPI backend server
• Launch frontend with Streamlit
• Upload data and interact with modules

---

5. Folder Structure

app/ – Backend logic, including API routers, models, and integration modules

ui/ – Frontend components for Streamlit pages

smart_dashboard.py – Entry point for the Streamlit dashboard

granite_llm.py – IBM Granite model integration for health-related tasks

document_embedder.py – Converts medical documents to embeddings

health_predictor.py – Forecasts patient health trends

anomaly_checker.py – Detects abnormal health metrics

report_generator.py – Generates AI-powered medical summaries and reports

---

6. Running the Application

1. Launch FastAPI backend server

2. Start Streamlit dashboard for web UI

3. Navigate through sidebar

4. Upload medical records or CSVs

5. Interact with the chat assistant

6. Generate summaries, health tips, and predictions in real time

---

7. API Documentation

POST /chat/ask – Receives health-related query, returns AI-generated response

POST /upload-doc – Uploads and embeds medical documents into Pinecone

GET /search-docs – Returns similar medical policies or documents

GET /get-health-tips – Provides personalized health tips

POST /submit-feedback – Collects patient feedback

---

8. Authentication

Currently open for demonstration

Planned security features:
• JWT tokens

• OAuth2 with IBM Cloud credentials
• Role-based access (Admin, Doctor, Patient)

---

9. User Interface

Simple and clear design focusing on usability

Sidebar navigation

Health data visualizations

Real-time form handling

PDF report download support

---

10. Testing

Unit Testing: For utility functions and prompt engineering

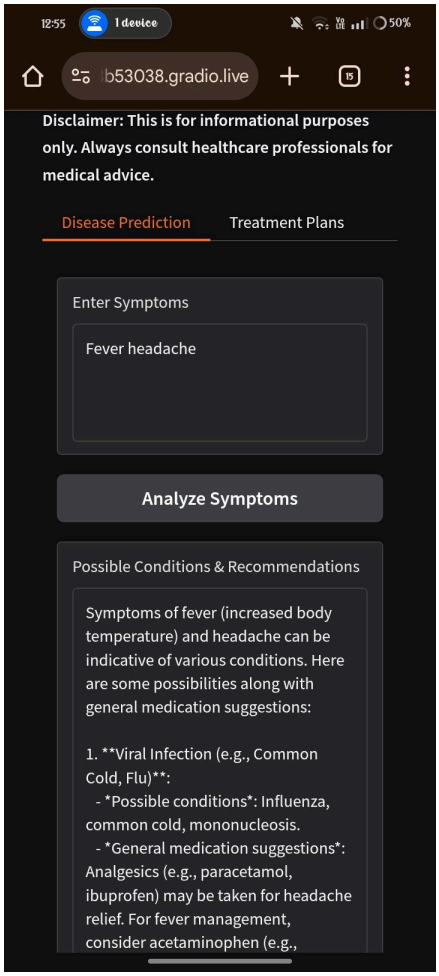
API Testing: Via Postman and Swagger UI

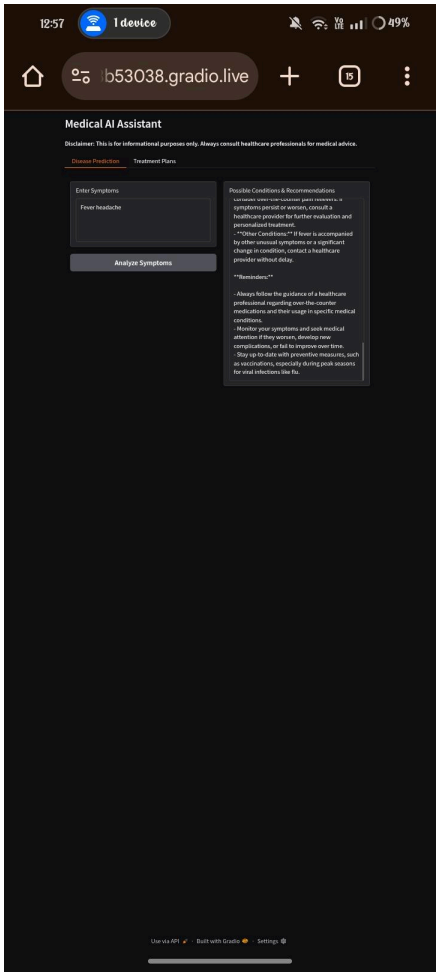
Manual Testing: For file uploads and chat consistency

Edge Case Handling: Malformed inputs and large files

---

11. Screenshots


12:55
1 device
50%
b53038.gradio.live
Disclaimer: This is for informational purposes only. Always consult healthcare professionals for medical advice.
Disease Prediction
Treatment Plans
Enter Symptoms
Fever headache
Analyze Symptoms
Possible Conditions & Recommendations
Symptoms of fever (increased body temperature) and headache can be indicative of various conditions. Here are some possibilities along with general medication suggestions:
1. **Viral Infection (e.g., Common Cold, Flu)**:
- *Possible conditions*: Influenza, common cold, mononucleosis.
- *General medication suggestions*: Analgesics (e.g., paracetamol, ibuprofen) may be taken for headache relief. For fever management, consider acetaminophen (e.g.,


12:57
1 device
49%
b53038.gradio.live
15
Medical AI Assistant
Disclaimer: This is for informational purposes only. Always consult healthcare professionals for medical advice.
Disease Prediction
Treatment Plans
Enter Symptoms
Fever headache
Analyze Symptoms
Possible Conditions & Recommendations
symptoms persist or worsen, consult a healthcare provider for further evaluation and personalized treatment.
- **Other Conditions:** If fever is accompanied by other unusual symptoms or a significant change in condition, contact a healthcare provider without delay.
Reminders:
- Always follow the guidance of a healthcare professional regarding over-the-counter medications and their usage in specific medical conditions.
- Monitor your symptoms and seek medical attention if they worsen, develop new complications, or fail to improve over time.
- Stay up-to-date with preventive measures, such as vaccinations, especially during peak seasons for viral infections like flu.
Use via API
Built with Gradio
Settings