HealthAI: Intelligent Healthcare Assistant

Subtitle: Integrating AI for Smart, Personalized Health Solutions

Presented by the team LTVIP2025TMID31352:
Muppala Vinisree
Kollo Nani
Dammu Hari Venkata Vinay
Pujari Pavani
Avvari Hemasundar

Healthai chatbot

Project Overview

- A Streamlit-based intelligent healthcare web app
- Combines ML + LLM + Analytics
- Solves real-world health support needs
- Four core functionalities:
    - AI Chatbot
    - Disease Predictor
    - Treatment Plan Generator
    - Health Analytics Dashboard

Purpose of the Project :

The primary purpose of the HealthAI project is to build an intelligent, user-friendly healthcare assistant that:

- Empowers users to better understand their health with AI support
- Leverages machine learning to detect early signs of health risks
- Provides empathetic guidance through an LLM-powered chatbot
- Enables informed decisions via real-time health data analytics
- Generates personalized treatment plans tailored to individual profiles

In essence, HealthAI bridges the gap between raw health data and meaningful, actionable insight—accessible to both individuals and healthcare professionals.

IDEATION PHASE

1)Problem Statement:

Patients often lack access to immediate, personalized, and comprehensible healthcare support tools.

Traditional systems don’t integrate AI efficiently to provide real-time diagnosis guidance or visual health monitoring.

2)Empathy Map Canvas :

Think & Feel: “I need help understanding my symptoms.”

See: Confusing online info, no medical background

Hear: “Talk to a doctor later,” “Use Google”

Say & Do: Search symptoms, worry, avoid hospital

Pain: Unclear info, delay in care

Gain: Quick, accurate, empathetic support

3)Brainstorming:

Conversational chatbot

Risk prediction from vitals

Real-time dashboard

LLM-generated treatment PDF

REQUIREMENT ANALYSIS

1) Customer Journey Map

User enters symptoms or vitals
Chatbot or predictor responds
Treatment generated
User tracks via dashboard

2)Solution Requirement

Chatbot for general guidance
ML model for disease risk prediction
LLM for treatment planning
Dashboard for trend visualization

3) Data Flow Diagram

[User Input] --> [Frontend (Streamlit)] --> [Model Inference + LLM] --> [Response/Prediction] --> [Display + Storage]

Tools & Tech Used

Frontend: Streamlit
Backend: Python
ML: scikit-learn (Random Forest)
LLM: IBM Granite (watsonx.ai)
PDF: FPDF
Storage: CSV (Scalable to MongoDB)

PROJECT DESIGN

1)Problem Solution :

Fit Patients need quick, personalized, and explainable support without replacing medical professionals.

2) Proposed Solution A 4-in-1 assistant providing:

Health chatbot
Disease prediction
PDF-based treatment plan
Health analytics dashboard

3) Solution Architecture:

[Streamlit UI] --> [Input Layer] --> [Disease Predictor] (ML Model) --> [LLM Chatbot + Treatment Generator] (watsonx.ai) --> [Data Storage] --> [Analytics Visualizer]

PROJECT PLANNING & SCHEDULING

Project Planning:

Week 1: Requirements gathering + UI

Week 2: Chatbot + Disease Predictor

Week 3: Treatment Generator + PDF

Week 4: Dashboard + Testing + Report

FUNCTIONAL AND PERFORMANCE TESTING

Performance Testing:

Response time of chatbot: < 3s

Disease prediction: ~92% accuracy

LLM output: Generated treatment within 10s

Data handling: Smooth for 100+ records

Architecture Diagram (Visual Slide)

- **UI:** Streamlit
- **Backend:** IBM Granite LLM (watsonx.ai)
- **ML models:** Random Forest
- **Storage:** CSV (can scale to MongoDB)
- **Modules:** Each functionality runs independently

Folder Structure

HealthAI_Chatbot

- venv
- .env
- Healthai.py

Plangenerator

- requirement.txt
- .env
- PlanGenerator.py
- treatment_plan_card_style.pdf

DiseasePredictor

- venv
- .env
- disease_symptoms_binary.csv
- Train_disease_model.py
- Disease_model.pkl,label_encoder.pkl
- diseasepredictor.py

Heath Analytics

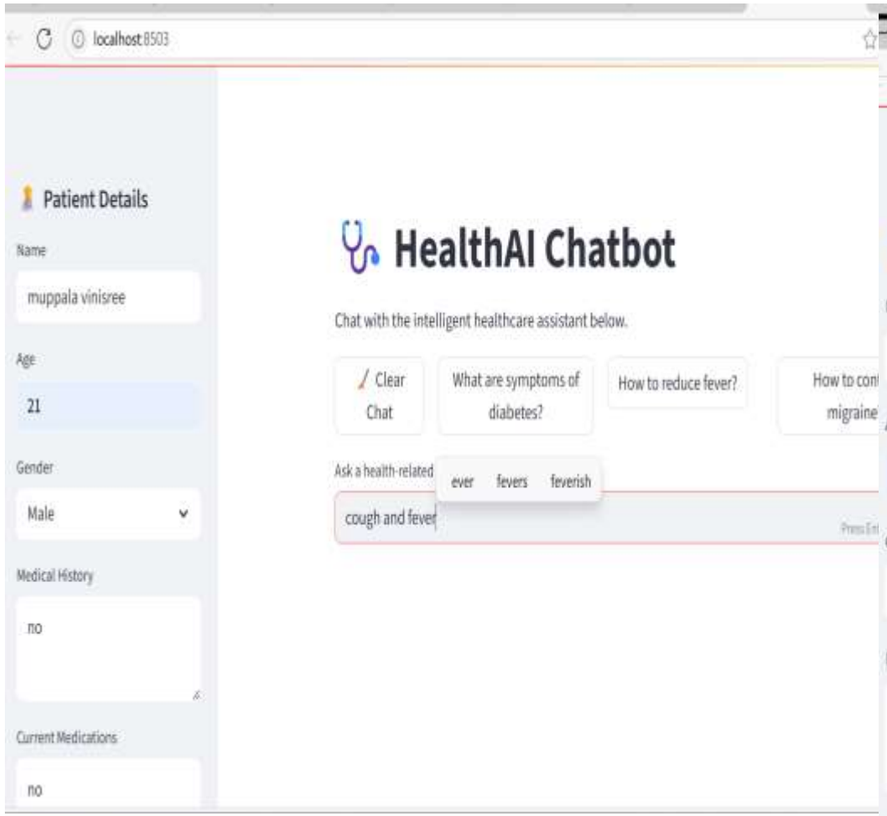
- nenv
- .env
- health_risk_data.csv
- patient_health_data.csv
- train_model.py
- risk_model.joblib,label_map.joblib
- HealthAnalytics.py

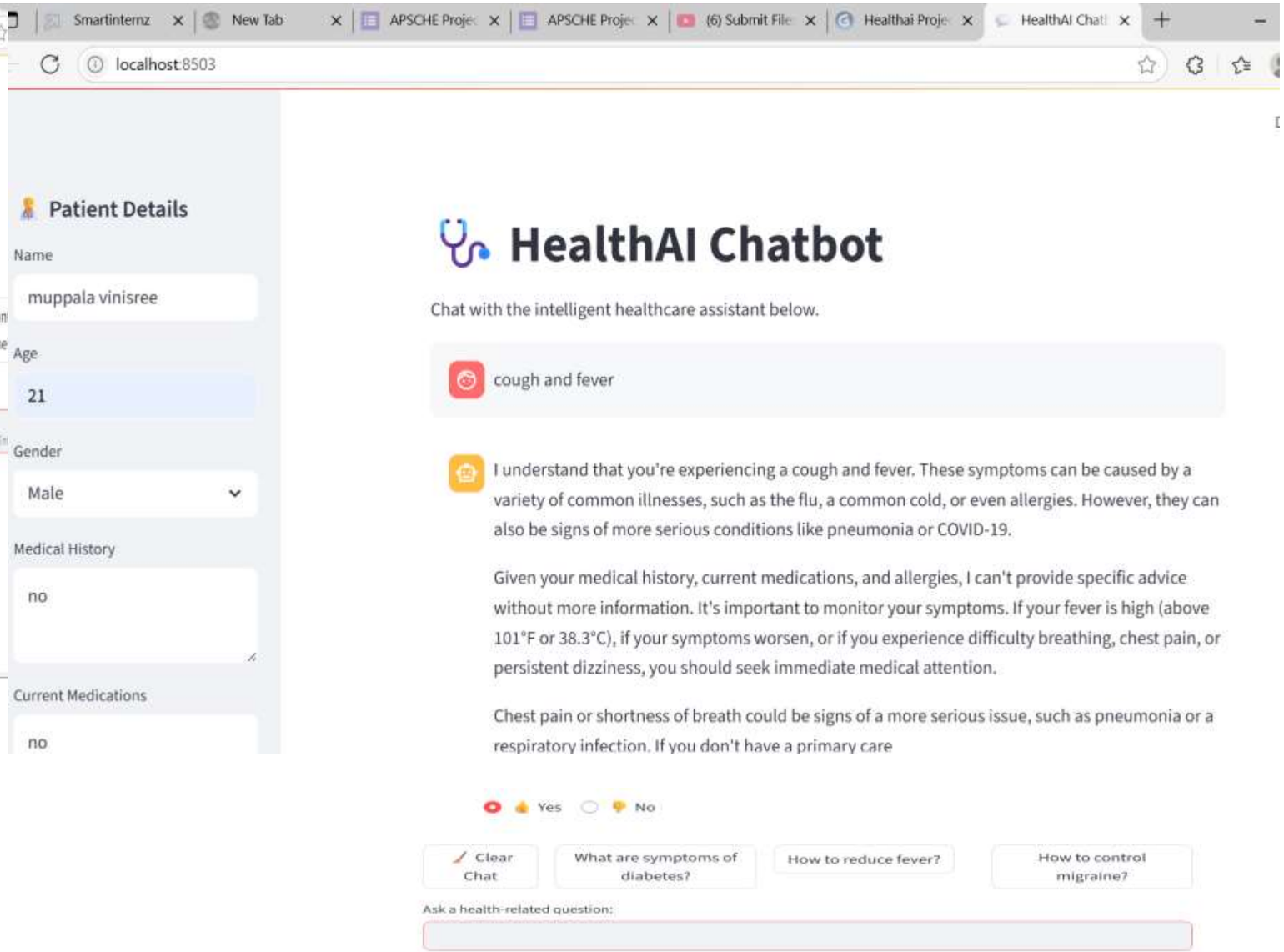
Below are the Results of all four functionalities we implemented

HealthAI Chatbot

- **Goal:** Provide empathetic, AI-driven health guidance
- **Tech**: IBM Granite 13B Instruct (via watsonx.ai)
- **Features:**
  - Natural conversation
  - No diagnosis, only guidance
  - Explains symptoms, lifestyle tips

HealthAI Chatbot Result:

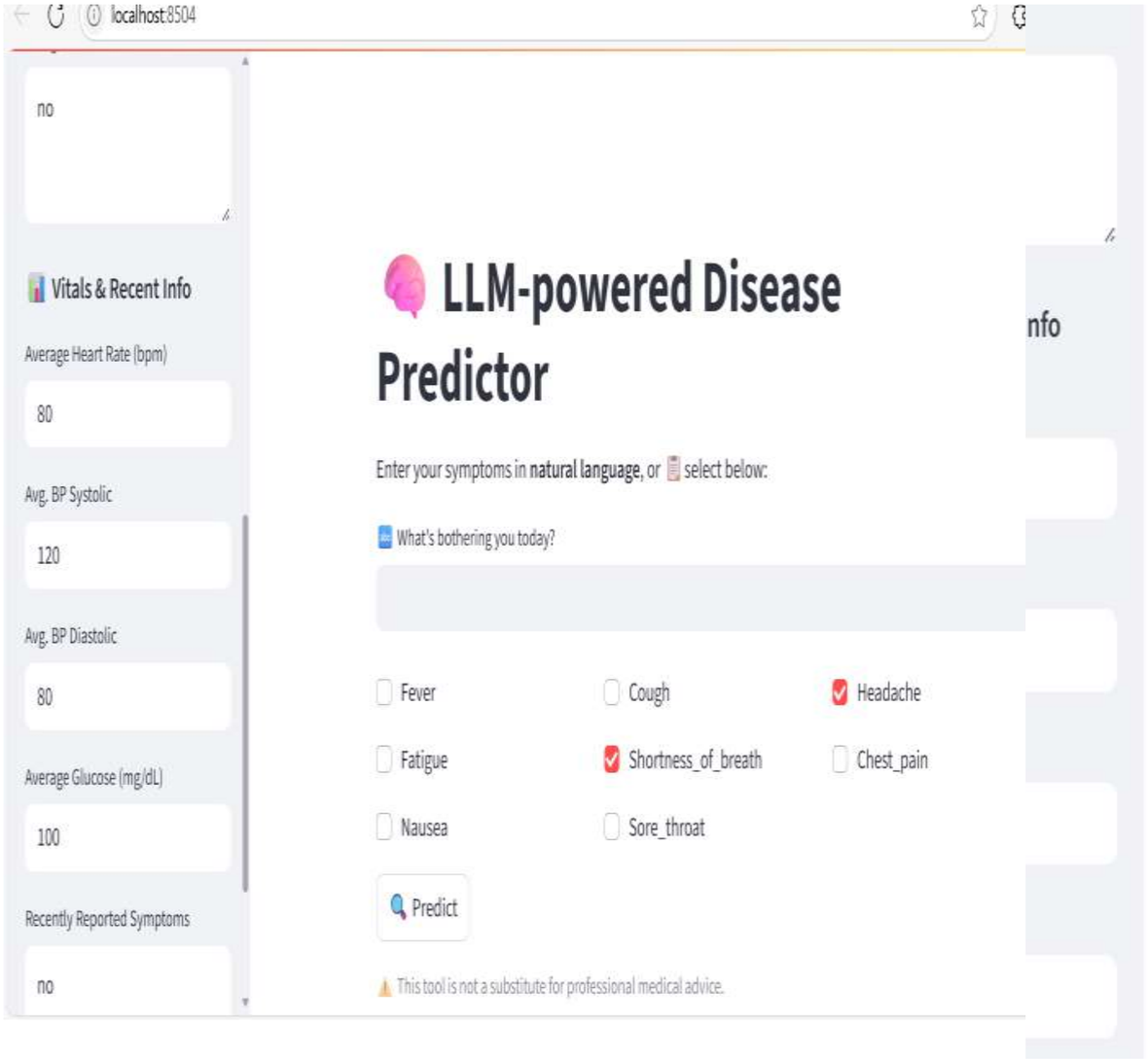




Disease Predictor

- **Goal**: Predict disease risk from vital stats + symptoms
- **Inputs**:
  - Heart rate, BP, glucose, sleep, symptoms
- **Model**: Random Forest Classifier
- **Output**: Risk prediction + label
- **Accuracy**: ~92%

Disease Predictor Result:



Predict

vinisree, based on your symptoms, the predicted disease (ML) is: **Migraine**

- Age:
- Gender: Female
- Symptoms: `headache, shortness_of_breath`

LLM-Based Prediction

1. Potential Condition: Migraine Likelihood: High Explanation: The patient is experiencing a headache, which is a common symptom of a migraine. The absence of other symptoms and normal health metrics make a migraine a likely possibility. Recommended next steps: The patient should consider keeping a headache diary to track triggers, duration, and intensity. Over-the-counter pain relievers may provide relief. If headaches are severe, frequent, or worsening, consult a healthcare professional.

2. Potential Condition: Anxiety Likelihood: Medium Explanation: Shortness of breath can be a symptom of anxiety, and the patient's age and gender are also factors that may increase the likelihood of anxiety disorders. However, without further information, it is difficult to make a definitive diagnosis.

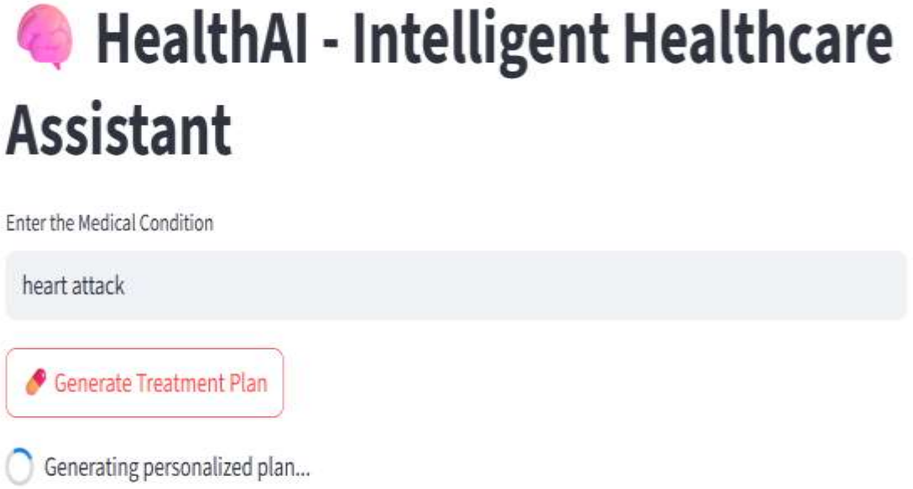
Healthai chatbot

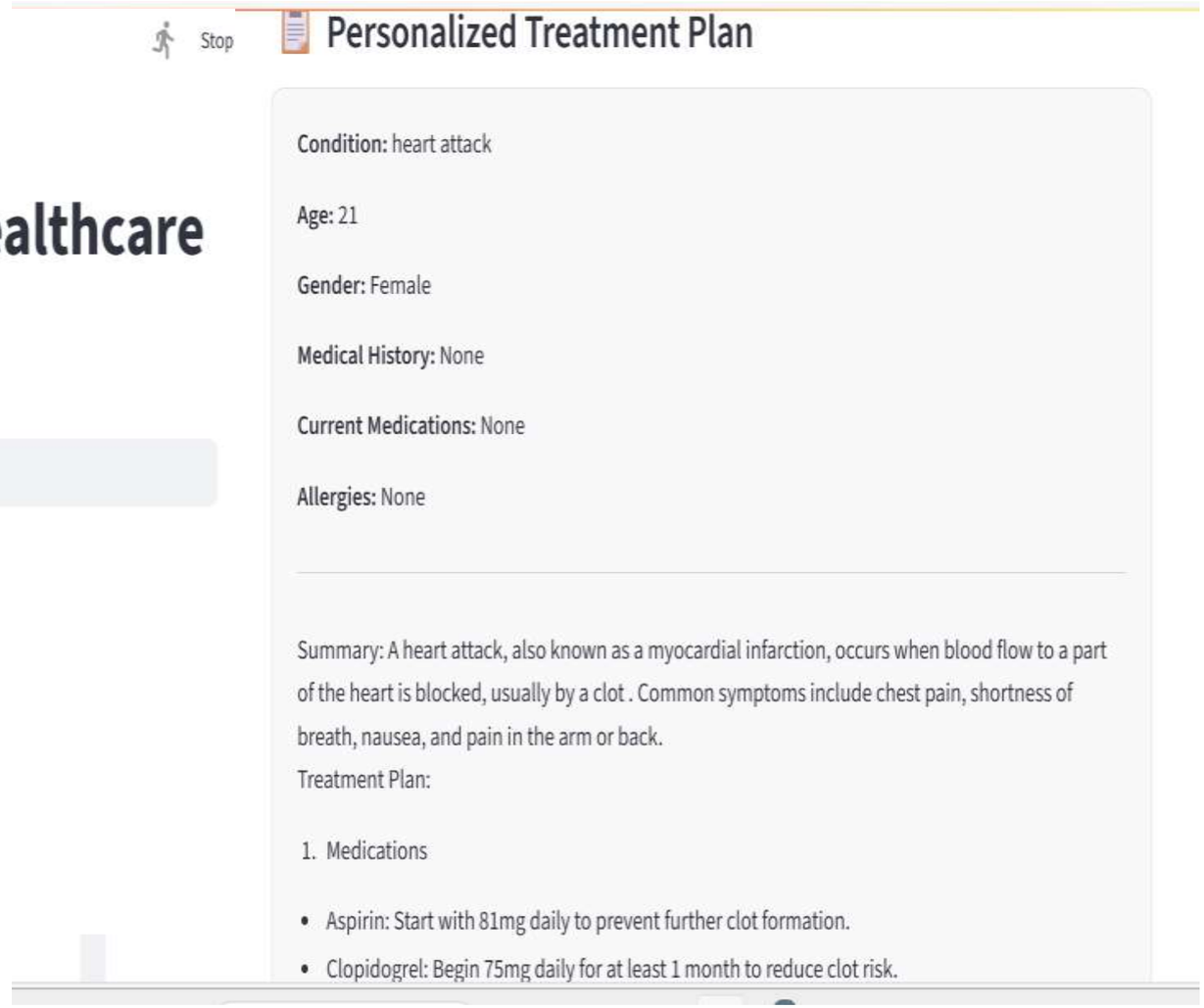
Treatment Plan Generator

- Goal: Generate personalized treatment plans
- Inputs:
  - Age, Gender, Condition, Medical History, Medications, Allergies
- Model: IBM Granite LLM
- Output:
  - PDF with 5-section treatment strategy using FPDF

Healthai chatbot

Treatment Plan Generator Results:



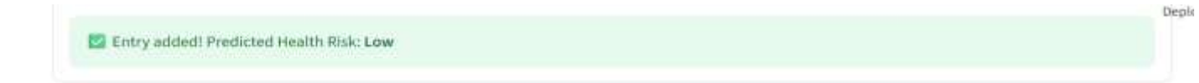


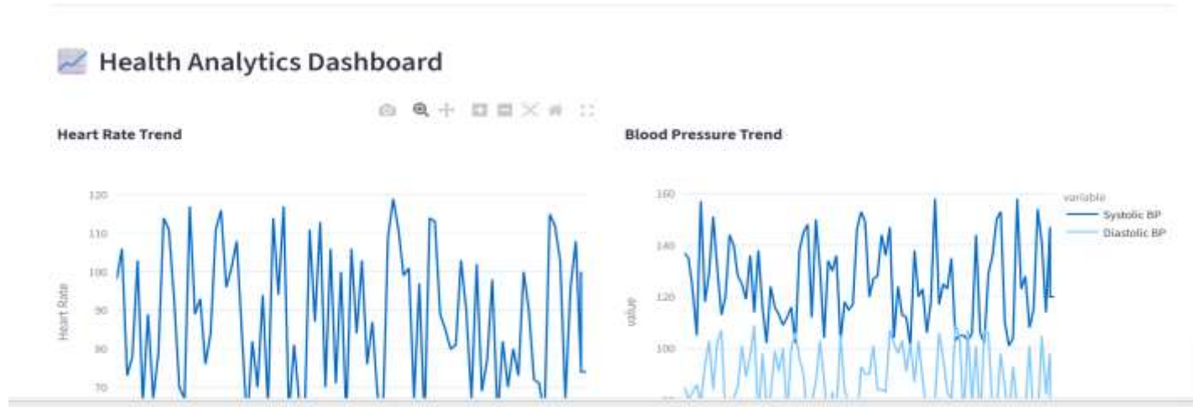
Healthai chatbot

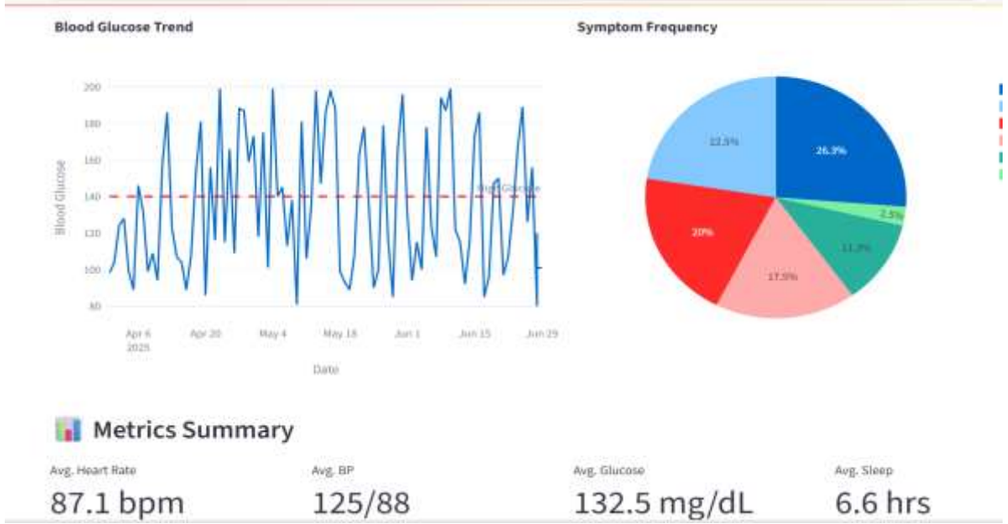
Health Analytics Dashboard

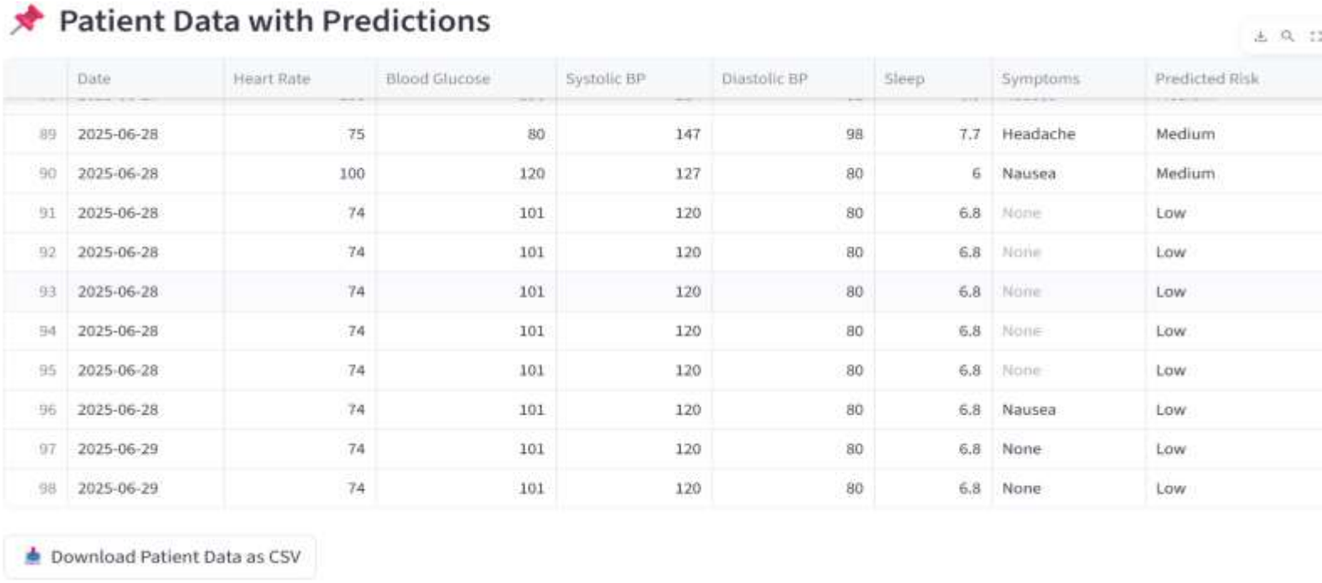
- Goal: Visualize health trends & patterns
- Charts:
  - Heart rate, Blood pressure, Glucose, Sleep
  - Symptom frequency pie chart
- Features:
  - Avg. metrics
  - CSV export
  - Dynamic date-wise analysis

Health Analytics Dashboard Results:









	Date	Heart Rate	Blood Glucose	Systolic BP	Diastolic BP	Sleep	Symptoms	Predicted Risk
89	2025-06-28	75	80	147	98	7.7	Headache	Medium
90	2025-06-28	100	120	127	80	6	Nausea	Medium
91	2025-06-28	74	101	120	80	6.8	None	Low
92	2025-06-28	74	101	120	80	6.8	None	Low
93	2025-06-28	74	101	120	80	6.8	None	Low
94	2025-06-28	74	101	120	80	6.8	None	Low
95	2025-06-28	74	101	120	80	6.8	None	Low
96	2025-06-28	74	101	120	80	6.8	Nausea	Low
97	2025-06-29	74	101	120	80	6.8	None	Low
98	2025-06-29	74	101	120	80	6.8	None	Low

ADVANTAGES & DISADVANTAGES

Advantages

Simple UI with powerful AI backend
Multimodal health insights
Portable and modular
Personalized PDF generation

Disadvantages

No real-time wearable integration (yet)
Dependent on API key for LLM
No user login/session management
As worked with free plan of ibm cloud cannot generate more prompts.

CONCLUSION

HealthAI offers a comprehensive AI-powered platform that provides empathetic interaction, smart diagnosis prediction, treatment generation, and health trend analytics—all accessible via a unified and user-friendly web application.

FUTURE SCOPE

Add user authentication

Real-time wearable integration (e.g., smartwatches)

Scale backend using MongoDB/Firebase

Enable multi-language chatbot support

Real-time doctor notifications for high-risk predictions

APPENDIX

Source Code: Available in project repository go to github.

Dataset Link: Custom synthetic + sample vitals dataset

GitHub Link: Muppalavinisree/Intelligent-health-care-assistance-using-ibm-granite

Project Demo: click to see video demo

THANK YOU

Muppala Vinisree
Kollo Nani
Dammu Hari Venkata Vinay
Pujari Pavani
Avvari Hemasundar