HealthAI: Intelligent Healthcare Assistant

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Team Size : 4

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1. Introduction

HealthAI is an intelligent healthcare assistant designed to provide accurate and personalized medical insights. It integrates IBM Watson Machine Learning with the Granite•13B•Instruct•v2 model, delivering AI•powered healthcare support such as patient chat, disease prediction, treatment plan generation, and health analytics. Built with Streamlit, HealthAI offers an intuitive, responsive interface that empowers users to make informed health decisions confidently.

2. Project Overview

Purpose:

The primary purpose of HealthAI is to:

- Empower users with data•driven healthcare guidance.
- Provide responsible, evidence•based insights to health•related queries.
- Help predict potential medical conditions from symptoms.
- Deliver personalized treatment recommendations.
- Visualize and monitor health data trends effectively.

Features:

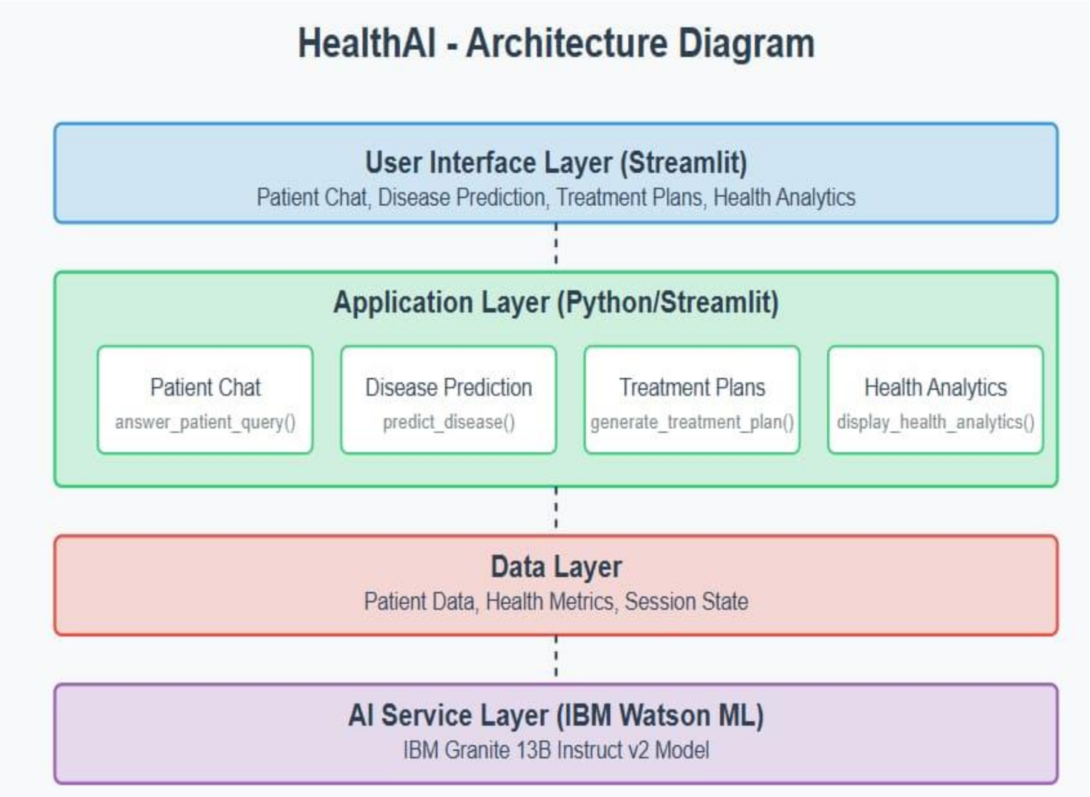
- Patient Chat: Conversational system to answer health•related questions.
- Disease Prediction: Analyzes symptoms and suggests potential conditions with likelihood

scores.

• Treatment Plans: Generates customized medical recommendations including medications, lifestyle changes, and follow•ups.

• Health Analytics: Dashboards for visualizing health metrics (heart rate, blood pressure, glucose, symptoms).

3. Architecture


HealthAI - Architecture Diagram
User Interface Layer (Streamlit)
Patient Chat, Disease Prediction, Treatment Plans, Health Analytics
Application Layer (Python/Streamlit)
Patient Chat
answer_patient_query()
Disease Prediction
predict_disease()
Treatment Plans
generate_treatment_plan()
Health Analytics
display_health_analytics()
Data Layer
Patient Data, Health Metrics, Session State
AI Service Layer (IBM Watson ML)
IBM Granite 13B Instruct v2 Model

• Frontend Layer: Built using Streamlit for user interaction.

• Application Layer: Python functions managing patient chat, disease prediction, treatment plans, and analytics.

• AI Service Layer: IBM Watson ML hosting Granite•13B•Instruct•v2 for natural language processing and prediction.

• Data Layer: Handles patient data, health metrics, and session state.

Deployment can be done via Google Colab (T4 GPU) or cloud hosting (Streamlit Cloud).

4. Setup Instructions

1. Open Google Colab or local environment.
2. Change runtime (in Colab) → set hardware accelerator to T4 GPU.
3. Install dependencies:

```
pip install streamlit pandas numpy plotly transformers torch gradio
```

ibm•watson•machine•learning python•dotenv

4. Load the Granite model from Hugging Face on IBM Watson ML.

5. Create a .env file for API credentials:

```
WATSONX_API_KEY=your_api_key
WATSONX_PROJECT_ID=your_project_id
```

5. Folder Structure

```
/project_directory
├── app.py            # Main application logic
├── requirements.txt    # Dependencies
├── .env             # API credentials
└── data/            # Patient data & health metrics
```

6. Running the Applications

- Local:

```
streamlit run app.py
```

- Colab: Execute notebook cells → Streamlit app launches with Gradio public link.

7. API Documentation

- Uses IBM Watson ML APIs for:
  - Disease prediction
  - Treatment plan generation
  - Patient chat query handling
- All API requests are secured via keys stored in .env.

8. Authentication

- Application•level authentication via IBM API keys.
- No user•level login system implemented yet (future enhancement).

9. User Interface

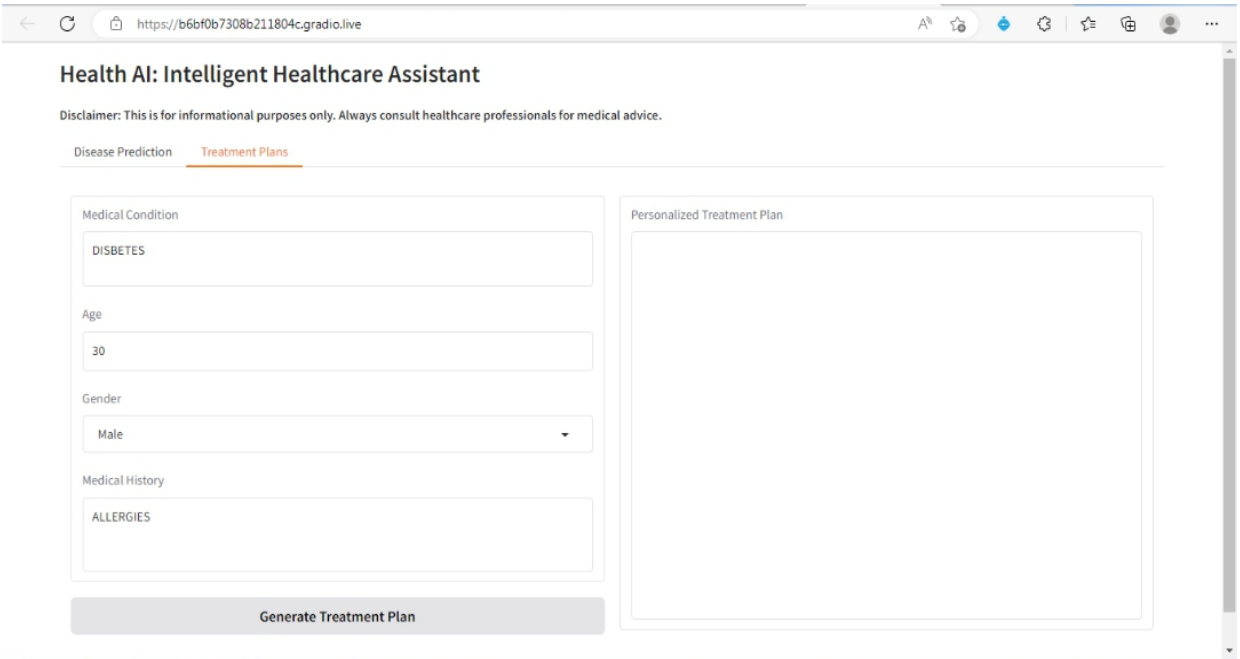
- Streamlit + Gradio for responsive UI.
- Features:
  - Sidebar with patient profile.
  - Chat interface with session history.
  - Symptom•based prediction form.
  - Health analytics dashboard with charts and metrics summary.

10. Testing

- Scenario 1: Input symptoms → get condition predictions (e.g., headache, fatigue → COVID•19, Flu).
- Scenario 2: Input condition → generate treatment plan with lifestyle + medication suggestions.
- Scenario 3: Upload health metrics → analytics dashboard visualizes trends.

11. Output Screenshot

- Patient Chat: Conversational medical Q&A.


https://b6bf0b7308b211804c.gradio.live
Disease Prediction
Treatment Plans
Generate Treatment Plan
Personalized Treatment Plan

Health AI: Intelligent Healthcare Assistant

Disclaimer: This is for informational purposes only. Always consult healthcare professionals for medical advice.

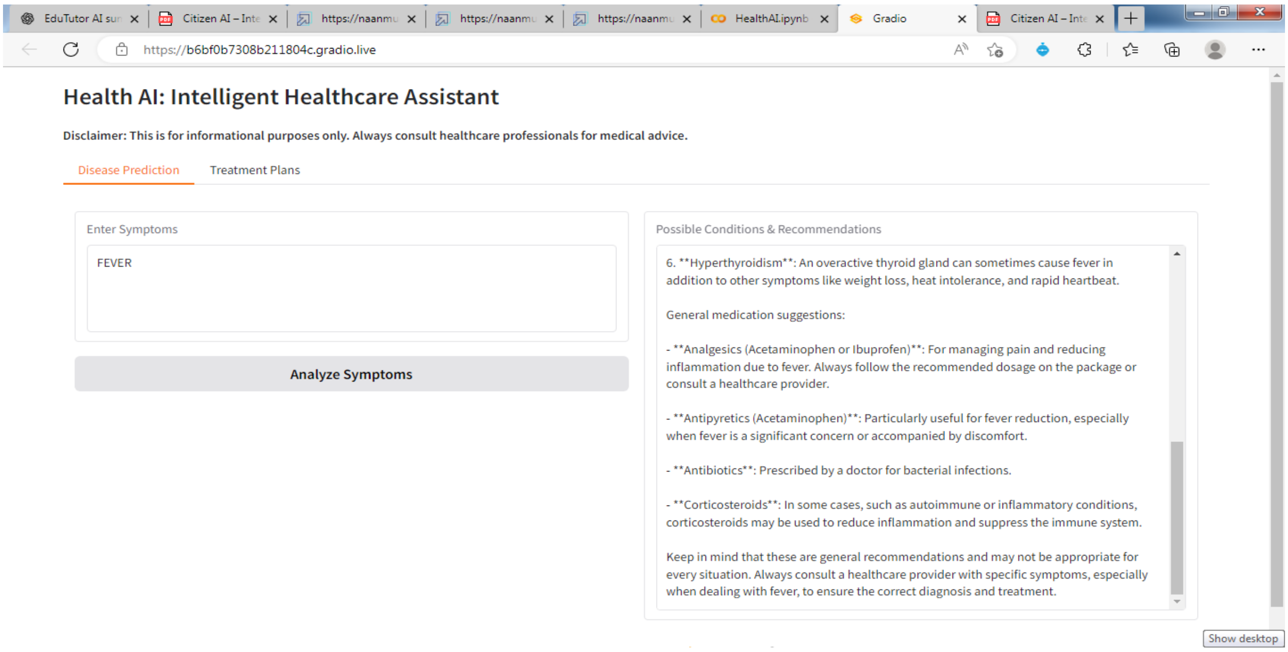
Medical Condition: DISBETES

Age: 30

Gender: Male

Medical History: ALLERGIES

- Disease Prediction: Condition likelihood list.



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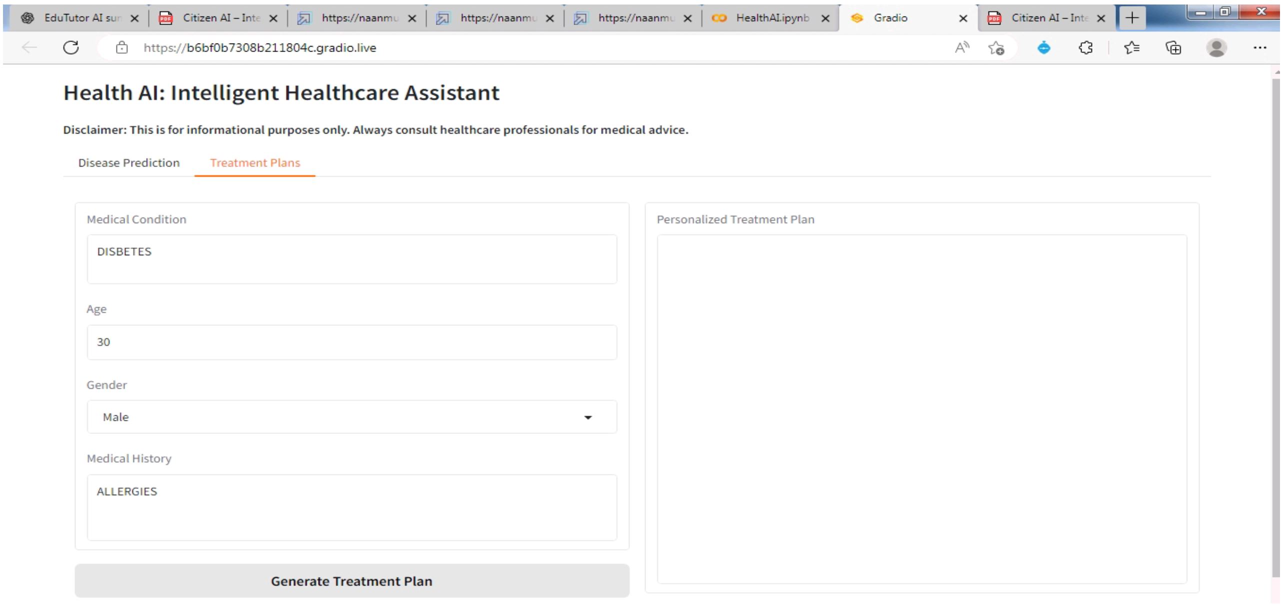
Enter Symptoms: FEVER

Possible Conditions & Recommendations

```
6. **Hyperthyroidism**: An overactive thyroid gland can sometimes cause fever in addition to other symptoms like weight loss, heat intolerance, and rapid heartbeat.

General medication suggestions:

- **Analgesics (Acetaminophen or Ibuprofen)**: For managing pain and reducing inflammation due to fever. Always follow the recommended dosage on the package or consult a healthcare provider.

- **Antipyretics (Acetaminophen)**: Particularly useful for fever reduction, especially when fever is a significant concern or accompanied by discomfort.

- **Antibiotics**: Prescribed by a doctor for bacterial infections.

- **Corticosteroids**: In some cases, such as autoimmune or inflammatory conditions, corticosteroids may be used to reduce inflammation and suppress the immune system.

Keep in mind that these are general recommendations and may not be appropriate for every situation. Always consult a healthcare provider with specific symptoms, especially when dealing with fever, to ensure the correct diagnosis and treatment.
```

- Treatment Plan: Personalized recommendatione



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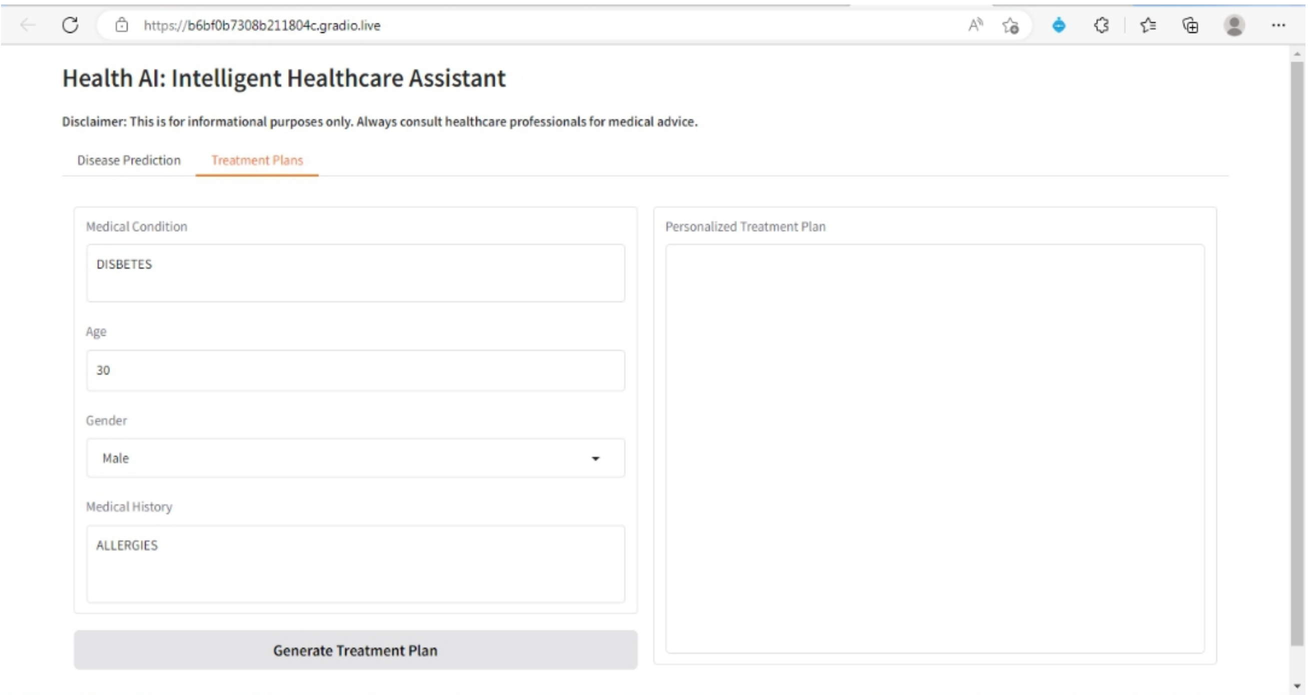
- Analytics Dashboard: Charts for vitals & symptom frequencies.



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Treatment Plans

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Generate Treatment Plan
Personalized Treatment Plan

12. Known Issues

- Limited diagnostic accuracy due to model constraints.
- Relies on internet connectivity for API calls.
- Lacks user•level authentication and persistent storage.

13. Future Enhancements

- Add user accounts for personalized data storage.
- Expand dataset & diagnostic range.
- Introduce multi-user support.
- Enhance accuracy with advanced medical models.
- Deploy on robust cloud platforms with monitoring.