

Health AI Project Documentation

1. Introduction

- Project Title: Health AI Intelligent Healthcare Assistant Using IBM Granite
- Team Member: KAMALI S
- Team Member: EZHIL M
- Team Member: ABINAYA M

2. Project Overview

❖ Purpose:

The purpose of Health AI is to harness IBM Watson Machine Learning and Generative AI to provide intelligent healthcare assistance. The system delivers accurate medical insights, predicts diseases, recommends treatment plans, and visualizes patient health analytics. By leveraging IBM Granite-13B Instruct v2, the platform improves healthcare accessibility, empowers users to make informed decisions, and enhances the patient experience

❖ Features:

Patient Chat

- Key Point: Conversational healthcare guidance
- Functionality: Provides natural language interaction for health-related questions with AI generated responses.

Disease Prediction

- Key Point: Symptom-based diagnosis
- Functionality: Analyses user symptoms and health data to suggest possible conditions with likelihoods and next steps.

Treatment Plans

- Key Point: Personalized medical advice
- Functionality: Generates tailored treatment recommendations including medications, lifestyle changes, and follow-up testing.

Health Analytics

- Key Point: Data-driven insights
- Functionality: Visualizes patient health metrics (vital signs, trends) and provides AI-generated insights.

Secure API Management

Key Point: Data safety

Functionality: Ensures responsible handling of healthcare data with API key protection.

3. Architecture

- ❖ Frontend (Streamlit): Provides an interactive interface for chat, prediction, treatment, and analytics with intuitive dashboards and visualizations.
- ❖ Backend (FastAPI): Manages requests, communicates with IBM Granite, and handles core healthcare functionalities.
- ❖ LLM Integration (IBM Watsonx Granite): IBM Granite-13B Instruct v2 model processes natural language queries and generates medical insights.
- ❖ Data Visualization (Plotly, Pandas): Displays patient metrics and trends in interactive graphs.
- ❖ ML Modules: Support disease prediction and health analytics using patient-reported data.

4. Setup Instructions

Prerequisites:

- ❖ Python 3.9+
- ❖ pip & virtual environment
- ❖ IBM Watsonx API key
- ❖ Streamlit, Plotly, Pandas installed

Installation Process:

- ❖ Clone the repository
- ❖ Install dependencies from requirements.txt
- ❖ Configure credentials in .env file
- ❖ Run backend server (FastAPI)
- ❖ Launch frontend via Streamlit
- ❖ Upload health data and interact with modules

5. Folder Structure

- ❖ App/ – FastAPI backend logic including chat, prediction, treatment, and analytics modules.
 - Ui/ – Streamlit frontend components for dashboards and health visualization
- app.py -Entry script to run the main Streamlit interface
- granite_llm.py – Handles IBM Granite Model interactions
- prediction_engine.py – Implements disease prediction logic
- treatment_planner.py – Generates treatment recommendations
- health_dashboard.py – Visualizes health data and insights

6. Running the Application

- ❖ Launch FastAPI server
- ❖ Run Streamlit dashboard
- ❖ Navigate via sidebar
- ❖ Input symptoms, request treatment plans, or view analytics ➤ Receive AI-generated responses in real-time

7. API Documentation

- ❖ POST /chat/ask – Submit health-related queries
- ❖ POST /disease/predict – Submit symptoms for disease prediction
- ❖ POST /treatment/generate – Generate personalized treatment plan
- ❖ GET /analytics/view – Retrieve health metrics and visualizations
- ❖ POST /upload-data – Upload patient health data

8. Authentication

- ❖ Token-based authentication (JWT / API Keys)
- ❖ OAuth2 with IBM Cloud
- ❖ Role-based access (patient, doctor, researcher)
- ❖ Secure API credential handling via .env file

9. User Interface

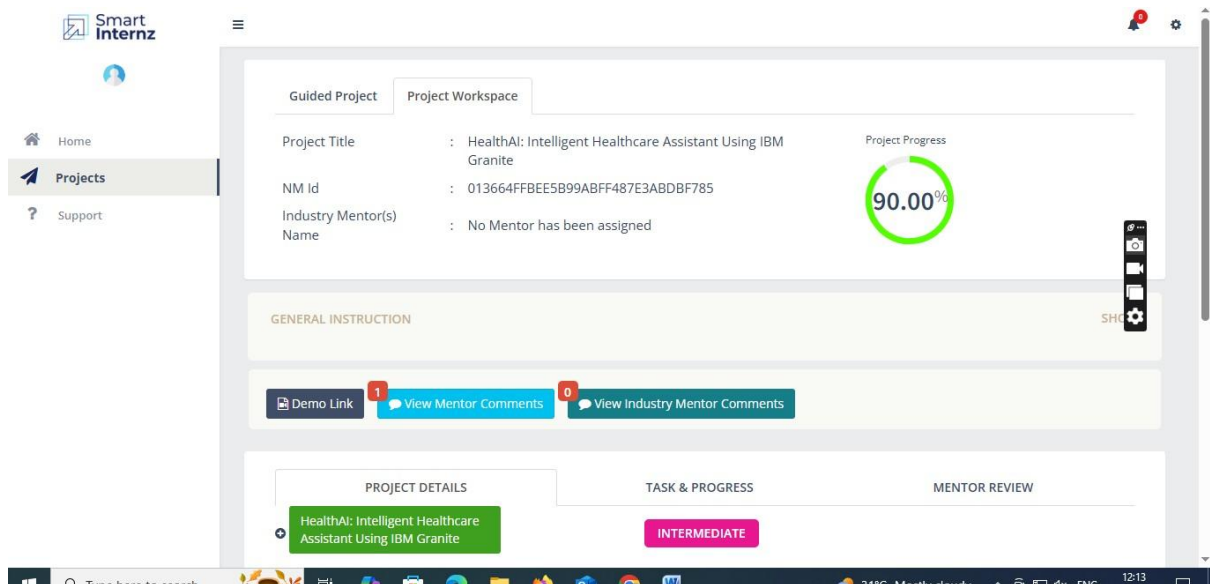
- ❖ Sidebar navigation
- ❖ Chat interface for Patient Chat
- ❖ Symptom input and prediction display
- ❖ Treatment recommendation output
- ❖ Interactive health dashboard with visualizations

10. Testing

- ❖ Unit Testing: For AI prompting and data utilities
- ❖ API Testing: Swagger UI and Postman
- ❖ Manual Testing: For chat, prediction, and visualization consistency
- ❖ Edge Case Handling: Invalid inputs, missing symptoms, large datasets

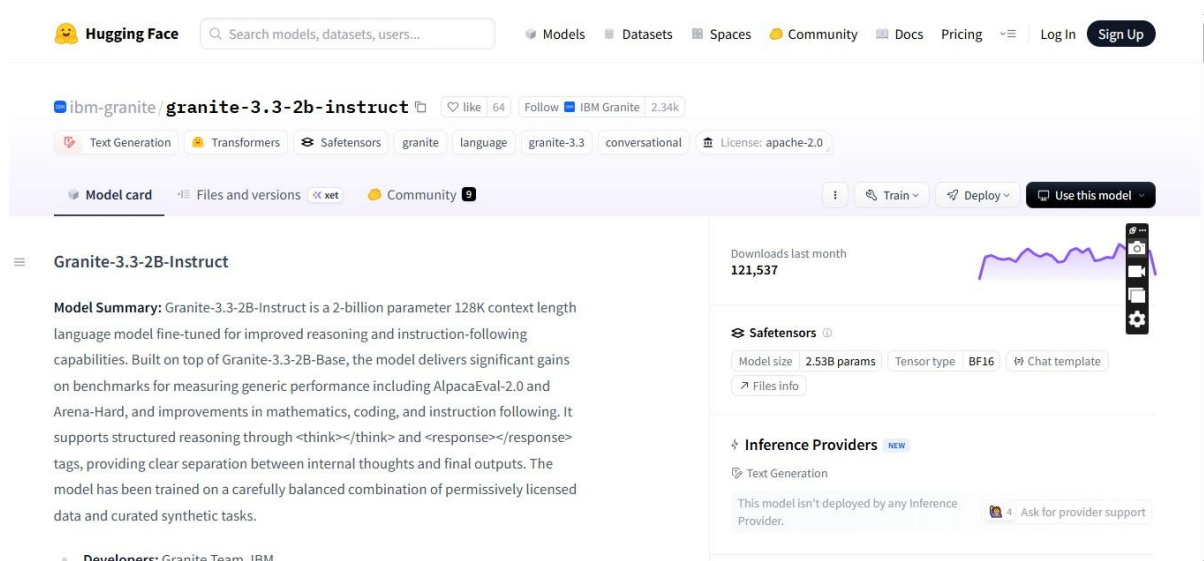
11. Screenshot

- ❖ Then Click (**Naanmudhalvan Smartinternz**) Then login with your details.
- ❖ Then you will be redirected to your account then click on “Projects” Section. There you can see which project you have enrolled in here it is “Health AI”.



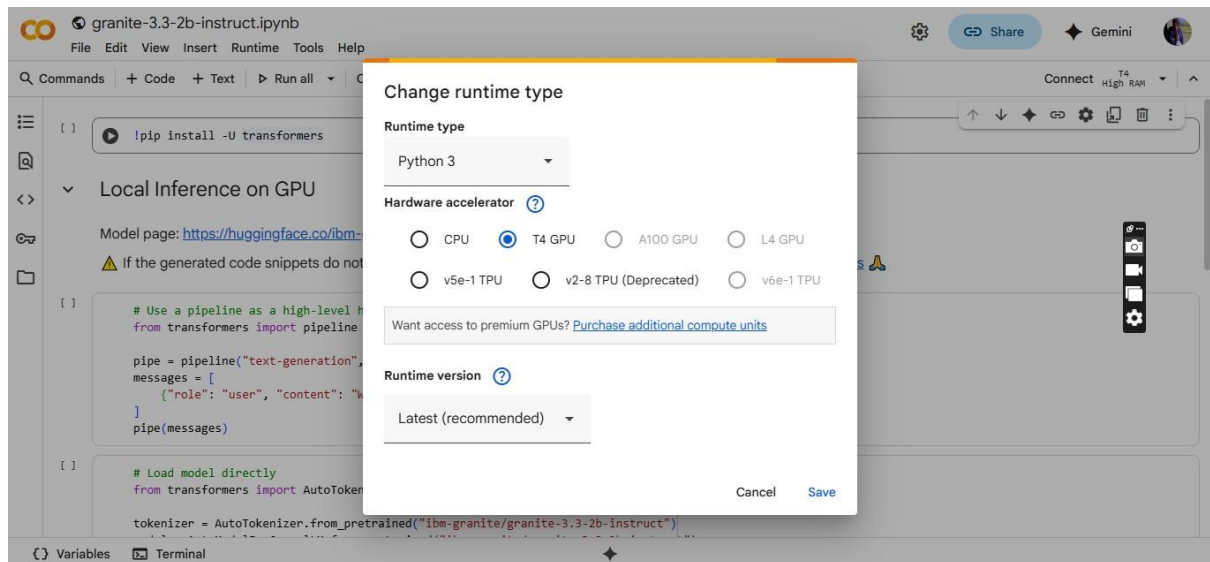
- ❖ Click on “Project Workspace”, there you can find your project progress and Place to upload “Demo link”.

IBM Granite model From Hugging Face.

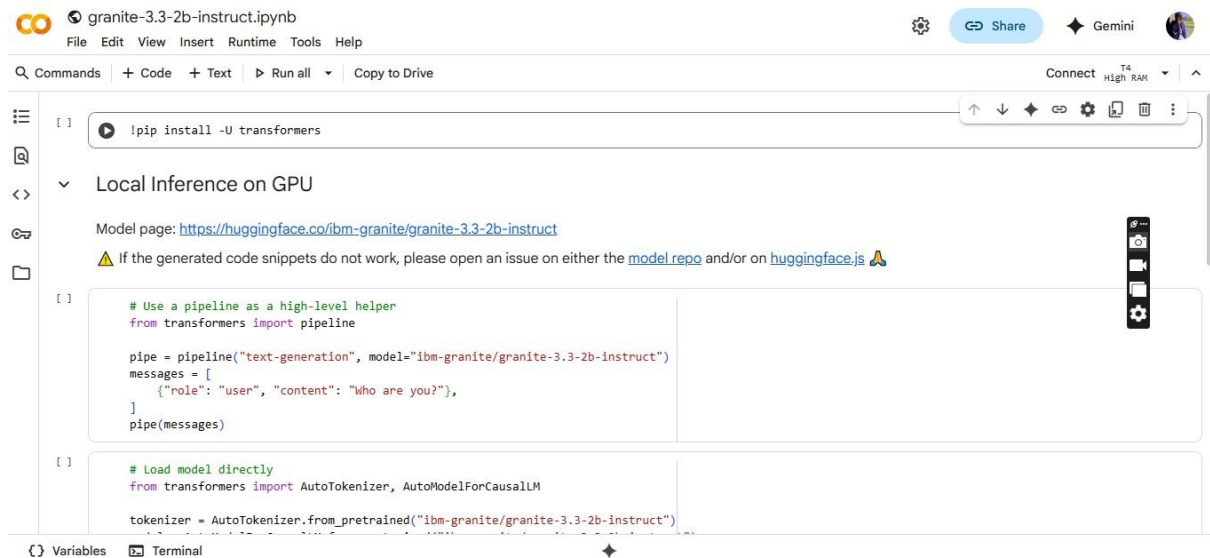


- ❖ Then click (Hugging Face), then click on signup and create your own account in Hugging Face. Then search for “IBM-Granite models” and choose any model

- ❖ Here for this project we are using “granite-3.2-2b-instruct” which is compatible fast and light weight.



- ❖
- ❖ Choose “T4 GPU” and click on “Save”



- ❖ Then run the code in the next cell.
- ❖ You can View the Application is running in the other tab.

Medical AI Assistant

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

Disease Prediction

Treatment Plans

Enter Symptoms

heart pain, breast cancer,

Analyze Symptoms

Possible Conditions & Recommendations

1. Heart pain: This could indicate an acute coronary syndrome (ACS), such as unstable angina or acute myocardial infarction (heart attack). ACS requires immediate medical attention and treatment, which may include:

- Aspirin (75-162 mg daily) for antiplatelet effects
- Clopidogrel (75 mg daily) or a P2Y12 inhibitor for added platelet inhibition
- Nitrites (sublingual, IV, or oral) for vasodilation and pain relief
- Beta-blockers (e.g., metoprolol) for heart rate and blood pressure control
- Statins (e.g., atorvastatin) to lower cholesterol levels and reduce plaque formation
- Potential emergency procedures like percutaneous coronary intervention (PCI) or coronary artery bypass graft (CABG) surgery

2. Breast cancer: This symptom is concerning as it's not typically associated with general heart pain. Breast cancer may present with:

- Lump or mass in the breast
- Changes in breast shape, size, or texture
- Nipple discharge or retraction
- Skin irritation or dimpling (tender "peau d'orange")
- Swollen or tender axillary lymph nodes

If breast cancer is suspected, further diagnostic steps like mammography, ultrasound, MRI, or biopsy are necessary. Treatment may include surgery, radiation therapy, hormone

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

Disease Prediction

Treatment Plans

Medical Condition

heart pain

Age

20

Gender

Female

Medical History

Previous conditions, allergies, medications or None

Generate Treatment Plan

Personalized Treatment Plan

5. Regular Monitoring and Follow-up:

- Schedule regular check-ups with your cardiologist to monitor heart health and adjust treatments as needed.
- Track your symptoms and monitor any changes in your daily activities or overall well-being to share with your healthcare provider during appointments.

6. Lifestyle Changes:

- Quit smoking, if applicable, as it can cause and worsen heart conditions.
- Limit alcohol consumption to no more than one drink per day for women.
- Engage in regular physical activity, under the guidance of a fitness professional or your cardiologist, to improve cardiovascular fitness and overall health.

7. Stress Management:

- Incorporate stress-reducing practices such as yoga, meditation, or mindfulness techniques into your daily routine.
- Ensure adequate sleep and maintain a healthy stress balance.

Remember, this treatment plan is a general guideline, and individual responses may vary. Always consult a healthcare professional before making any changes to your treatment regimen.

Use via API • Built with Gradio • Settings

12. Known Issues

- ❖ Limited coverage of rare medical conditions
- ❖ Requires stable internet for real-time AI queries
- ❖ Dependent on IBM Watson API quota

13. Future Enhancements

- ❖ Integration with wearable health devices
- ❖ Expanded medical condition coverage
- ❖ Doctor-verified treatment plans
- ❖ Multi-language support
- ❖ Advanced anomaly detection in patient data