

Health AI: Intelligent Healthcare Assistant Using IBM Granite

1. Introduction

Project Title: Health AI: Intelligent Healthcare Assistant using IBM Granite

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2. Project Overview

Purpose:

The purpose of the Health AI Assistant is to provide users with a reliable, AI-powered healthcare companion that can predict possible medical conditions based on symptoms, generate basic treatment suggestions, and provide general health tips. This system aims to make healthcare information more accessible, reduce panic during initial symptoms, and encourage users to consult qualified medical professionals.

Features:

1. Disease Prediction – Suggests possible conditions from entered symptoms.
2. Treatment Plan – Generates personalized remedies and medication guidelines.
3. User-Friendly UI – Simple tab-based design using Gradio.
4. AI-Powered – Uses IBM Granite model for natural medical responses.
5. Safety Disclaimer – Reminds users to consult doctors.

6. Shareable App – Can be accessed online via generated link.

3. Architecture

Frontend (Gradio): Built using Gradio Blocks for a web-based interface with tabbed navigation, symptom inputs, and real-time AI responses.

Backend (Transformers + PyTorch): Uses IBM Granite 3.2-2B Instruct model for natural language understanding and generatio.

1. User Interface (Frontend)

- Built with Gradio.
- Provides input fields (symptoms, condition, age, gender, history).
- output (predictions, treatment plans).

2. Application Layer (Backend Logic)

- Handles user requests from the UI.
- Prepares prompts for the AI model.
- Sends results back to the interface.

3. AI Model Layer

- Uses IBM Granite instruct model.
- Tokenizer processes input into machine-readable form.
- Model generates natural language medical responses.

4. Device Management

- Automatically detects GPU/CPU for processing.
- Ensures smooth inference.

5. Output Layer

- Provides structured responses (disease prediction / treatment plan).
- Includes disclaimers for safe usage.

4. Set-up Instructions

1. Install required libraries (Gradio, PyTorch, Transformers).
2. Check GPU (faster) or CPU (slower).
3. Model auto-downloads from Hugging Face.
4. Save the script in one file.
5. Run it → app opens in browser.
6. Use tabs to enter symptoms or details and get results.

5. Folder Structure

Since the project is run entirely in google colab, there is only one main file used that is, Healthai.ipynb.

Structure:

project/=>HealthAi.pynb

6. Running the Application

Launch the script, open Gradio URL, enter symptoms or conditions, and receive AI-generated results instantly.

7. API / Function Documentation

- `generate_response(prompt)`: Generates text output from model.
- `disease_prediction(symptoms)`: Returns possible conditions.
- `treatment_plan(condition, age, gender, medical_history)`: Returns home remedies and general guidelines.

8. Authentication

Runs in open environment. Future plans: JWT tokens, role-based access, encrypted history.

9. User Interface

Tabbed Gradio UI for Disease Prediction and Treatment Plan with text fields, dropdowns, and disclaimers.

1. Clean design with two main tabs.
2. Textbox inputs for symptoms and patient details.
3. Buttons to generate predictions or treatment plans.
4. Results displayed clearly in large textboxes.
5. Disclaimer shown at the top for safety.
6. Easy navigation between Disease Prediction and Treatment Plan.

10. Testing

- Function Testing – Verified that the Disease Prediction tab correctly analyzes the entered symptoms and provides possible medical conditions with general health recommendations.
- Plan Testing – Checked that the Treatment Plan tab generates personalized suggestions based on condition, age, gender, and medical history.
- Model Response Check – Ensured that the AI model provides meaningful, relevant, and readable outputs without crashes.
- Interface Testing – Confirmed that all buttons (“Analyze Symptoms” and “Generate Treatment Plan”) work properly and display results in the output textboxes.
- Cross-Device Access – Tested the public Gradio link on mobile and desktop browsers to confirm smooth operation.

11.Screenshots

OUTPUT:

A screenshot of a web browser displaying the 'Medical AI Assistant' application. The browser's address bar shows the URL '10cb8648f0c30c13ee.gradio.live'. The page title is 'Medical AI Assistant'. Below the title is a disclaimer: 'Disclaimer: This is for informational purposes only. Always consult healthcare professionals for medical advice.' There are two tabs: 'Disease Prediction' (active) and 'Treatment Plans'. The main content area is divided into two columns. The left column has a text input field labeled 'Enter Symptoms' containing the placeholder text 'e.g., fever, headache, cough, fatigue...'. Below the input field is a grey button labeled 'Analyze Symptoms'. The right column is a large, empty rectangular box labeled 'Possible Conditions & Recommendations'. At the bottom of the page, there is a footer with the text 'Use via API', a logo, 'Built with Gradio', and a 'Settings' link.

A second screenshot of the same 'Medical AI Assistant' web application. The browser address bar and page title are identical. The disclaimer and tabs remain the same. In the 'Enter Symptoms' input field, the text 'fever' has been entered. The 'Analyze Symptoms' button is still present. The 'Possible Conditions & Recommendations' box remains empty. The footer is also identical to the first screenshot.



Medical AI Assistant

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Disease Prediction Treatment Plans

Enter Symptoms

fever

Analyze Symptoms

Possible Conditions & Recommendations

1. **Acute Infectious Fever** (e.g., Influenza, Streptococcal Infections, or Bacterial Meningitis):
 - **Medical Conditions:** Influenza (Flu), Streptococcal pharyngitis, Bacterial meningitis, Legionnaire's disease.
 - **Medication Suggestions:** Antiviral medications (e.g., Oseltamivir for influenza), antibiotics (e.g., Penicillin for streptococcal pharyngitis), broad-spectrum antibiotics (for serious infections like meningitis), supportive care with hydration and antipyretics.
2. **Viral Fever** (e.g., Common Cold, COVID-19):
 - **Medical Conditions:** COVID-19, Common cold (caused by various viruses, such as rhinovirus, coronavirus, or adenovirus).
 - **Medication Suggestions:** Antiviral medications may not be effective, but supportive care is crucial, including rest, hydration, and antipyretics. For COVID-19, vaccination, early treatment with antivirals (e.g., Remdesivir), and symptom management are essential.
3. **Fever of Unknown Origin (FUO)**:
 - **Medical Conditions:** Infections, autoimmune disorders, malignancies, or idiopathic causes.
 - **Medication Suggestions:** A thorough investigation to determine the underlying cause. This may involve laboratory tests, imaging studies, and consultation with infectious diseases specialists or other relevant medical specialists.



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Disease Prediction Treatment Plans

Enter Symptoms

fever

Analyze Symptoms

Possible Conditions & Recommendations

4. **Viral Fever** (e.g., Common Cold, COVID-19):
 - **Medical Conditions:** COVID-19, Common cold (caused by various viruses, such as rhinovirus, coronavirus, or adenovirus).
 - **Medication Suggestions:** Antiviral medications may not be effective, but supportive care is crucial, including rest, hydration, and antipyretics. For COVID-19, vaccination, early treatment with antivirals (e.g., Remdesivir), and symptom management are essential.
3. **Fever of Unknown Origin (FUO)**:
 - **Medical Conditions:** Infections, autoimmune disorders, malignancies, or idiopathic causes.
 - **Medication Suggestions:** A thorough investigation to determine the underlying cause. This may involve laboratory tests, imaging studies, and consultation with infectious diseases specialists or other relevant medical specialists.
4. **Fever due to Medication or Allergic Reaction**:
 - **Medical Conditions:** Medication side effects or allergic reactions.
 - **Medication Suggestions:** Discontinue the suspected medication, administer appropriate antihistamines or corticosteroids for allergic reactions, and consider alternative medications if the fever is unrelated to the treatment.

In conclusion, a fever can indicate various medical conditions. The appropriate treatment depends on the underlying cause. Consult a healthcare professional for a proper diagnosis and tailored treatment plan.

12. Known Issues

- May run slowly if the internet connection is weak or the model size is large.

- Sometimes generates incomplete or inaccurate medical suggestions.
- No login or authentication system, so anyone with the link can access the app.
- Limited to the knowledge and capabilities of the underlying AI model.
- Requires Google Colab/Gradio environment to run, so it cannot work fully offline.

13. Future Enhancement

- Add user authentication (login system) for better security.
- Provide a download option to save generated analysis or treatment plans.
- Improve the AI to provide more accurate, reliable, and detailed results.
- Integrate voice-based interaction for better accessibility.
- Add multilingual support so users can interact in regional languages.
- Enable offline functionality by using lightweight on-device models.