

# HealthAI — Intelligent Healthcare Assistant

## Project Documentation

### 1.Introduction

- Project tile: HealthAI - Intelligent Healthcare Assistant
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### 2.project overview

#### Propose:

The purpose of HealthAI is to provide a safe and intelligent healthcare assistant that helps users with:

- Disease Prediction
- Treatment Plans
- Patient Support Chat
- Health Analytics Dashboard

HealthAI leverages Hugging Face Transformers and PyTorch inside Google Colab to give safe, general healthcare insights.

#### Future :

Disease Prediction:

Key Point: Early awareness of possible conditions

Functionality:

Accepts patient details (name, age, gender, history, allergies, medications) and current symptoms

Uses an LLM to predict common conditions

Returns structured JSON with:

- Possible conditions
- Red flag symptoms
- General recommendations

Treatment Plan:

Key Point: General care suggestions for common conditions

Functionality:

User enters a medical condition (e.g., Diabetes, Migraine)

AI generates:

- Treatment overview
- Self-care tips
- Lifestyle recommendations
- Signs when to seek urgent care

24/7 Patient Chat Support:

Key Point: Conversational assistance

Functionality:

- Chatbot answers health-related queries in 3–6 short bullet points
- Friendly and safe responses
- Guardrails block unsafe advice (e.g., overdose, unprescribed medicine)
- Always ends with a medical disclaimer

Analytics Dashboard:

Key Point: Health monitoring through data

Functionality:

- Users can upload CSV/Excel files with health metrics (Heart Rate, Blood Pressure, Glucose, etc.)
- Data is visualized using Plotly interactive charts
- Default dataset available for demo
- Helps track weekly health trends

Safety Guardrails:

Key Point: Responsible AI usage

Functionality:

- Detects unsafe or harmful requests
- Blocks responses containing dangerous advice
- Adds disclaimers reminding users to consult healthcare professionals

### **3. Architecture**

Frontend (Gradio UI):

- Interactive web interface built with Gradio
- Tabs for prediction, treatment, chat, and analytics

Backend (Python in Google Colab):

- Hugging Face Transformers for LLM responses
- PyTorch for model inference
- Pandas & Plotly for health data visualization

Model Integration:

- Default Model: ibm-granite/granite-3.2-2b-instruct
- Fallbacks: zephyr-7b-beta, Mistral-7B-Instruct

Guardrails:

- Detects unsafe prompts (e.g., overdose, self-surgery)
- Automatically adds disclaimers

## 4. Setup Instructions

Prerequisites:

- Python 3.9+
- Google Colab account
- Hugging Face access

Installation (in Colab):

**!pip install transformers torch gradio pandas plotly -q**

Run the app:

**Demo.queue()**

**Demo.launch(share=True)**

## 5. Folder / Notebook Structure

Healthai.ipynb

```
|
|
|— Model Loader (with fallback)
|
|— Guardrails
|
|— Disease Prediction
|
|— Treatment Plan
|
|— Chatbot
|
|— Analytics Dashboard
└— Gradio UI
```

## 6. Running the Application

1. Open Google Colab.
2. Upload and run healthai.ipynb.
3. Install dependencies.
4. Launch the Gradio interface.
5. Use tabs to test disease prediction, treatment plans, chatbot, and analytics.

## 7.API Documentation

Backend APIs available include:

POST /prediction/analyze

- Accepts patient profile and symptoms
- Returns possible conditions, red flags, and general recommendations in JSON

POST /treatment/plan

- Accepts patient profile and a medical condition
- Responds with a general treatment overview, lifestyle tips, and when to seek care

POST /chat/ask

- Accepts a user health-related query
- Responds with an AI-generated safe and friendly answer in bullet points

POST /analytics/upload

- Accepts CSV or Excel files containing health vitals (Heart Rate, BP, Glucose, etc.)
- Returns an interactive Plotly chart showing weekly health trends

GET /disclaimer

- Returns the medical disclaimer used in all responses

## 8. Authentication

Currently, the HealthAI project runs in open mode in Google Colab (any user with the shared Gradio link can access it).

For secure deployments, the following authentication methods can be added:

Token-based Authentication (JWT / API Keys)

- Assigns each user an access token.
- Ensures only authorized users can run predictions or access the chatbot.

OAuth2 / Hugging Face Login

- Uses Hugging Face or Google login for authentication.
- Ideal for cloud deployments (Hugging Face Spaces, Streamlit Cloud, etc.).

Role-Based Access Control (RBAC)

- Different permissions for Patients, Doctors, and Researchers.
- Example: Only doctors can access advanced treatment recommendations.

Session Management

- Tracks user sessions for better monitoring.
- Maintains patient profile data during the session.

Planned Enhancements

- Encrypted storage of uploaded health files.

- Audit logs for chatbot interactions.
- Integration with IBM Cloud Identity for enterprise deployment.

## 9. User Interface

Sidebar with patient details & model settings

Tabs for:

-  Disease Prediction
-  Treatment Plan
-  Patient Chat
-  Analytics Dashboard

## 10. Testing

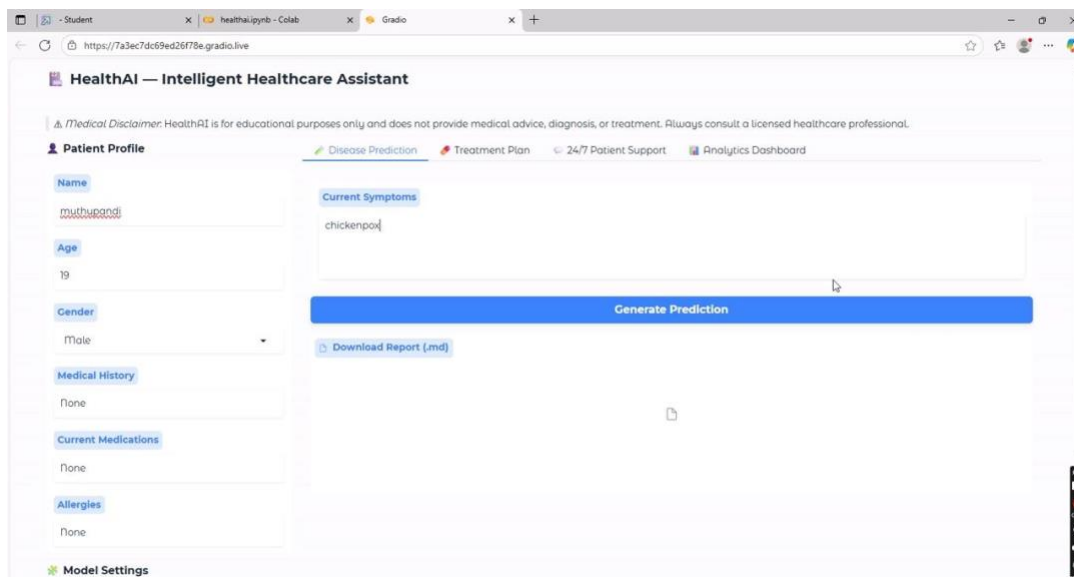
Unit Testing → Prompt builders, JSON parsing

Manual Testing → Chatbot answers, prediction/treatment accuracy

Edge Cases → Empty inputs, invalid CSV files

## 11. Screenshots

Disease Prediction:



The screenshot shows a web browser window with the URL <https://7a3ec7dc69ed26f78e.gradio.live>. The application is titled "HealthAI — Intelligent Healthcare Assistant". A medical disclaimer is displayed at the top: "Medical Disclaimer: HealthAI is for educational purposes only and does not provide medical advice, diagnosis, or treatment. Always consult a licensed healthcare professional." Below the disclaimer, there are four tabs: "Disease Prediction" (active), "Treatment Plan", "24/7 Patient Support", and "Analytics Dashboard". On the left, a "Patient Profile" sidebar contains fields for Name (muthupandi), Age (19), Gender (Male), Medical History (None), Current Medications (None), and Allergies (None). The main area of the "Disease Prediction" tab has a "Current Symptoms" input field containing the text "chickenpox". Below this input field is a large blue "Generate Prediction" button and a smaller "Download Report (.md)" button. At the bottom left, there is a "Model Settings" link.

Output :

The screenshot shows a web application interface for HealthAI. On the left, there are input fields for patient information: Name (muthupandi), Age (19), Gender (Male), Medical History (None), Current Medications (None), and Allergies (None). Below these is a 'Model Settings' section with a 'Model Name' field set to 'ibm-granite/granite-3.2-2b-instruct'. A tip states: 'Tip: If the default model fails, the app will try a fallback.' On the right, the 'chickenpox' input is visible. A blue 'Generate Prediction' button is present. Below it, a 'Download Report (.md)' button is shown next to the file 'prediction\_0lwufuhml.md' (1.3 KB). The main content area displays the following:

**Potential Conditions**

- Chickenpox

**Red Flags**

- Severe pain
- Fever over 102°F
- Difficulty breathing
- Persistent vomiting
- Swollen face or neck
- Persistent headache
- New stiff neck
- Confusion
- High fever with rash
- Increasing rash confusion
- Rash worsening with time
- Blisters rupturing or not forming
- Rash spreading outside known area
- Infection at the site of chickenpox

This screenshot shows the full generated report from the HealthAI application. The 'Model Settings' section on the left remains the same. The main content area displays the following:

- Persistent headache
- New stiff neck
- Confusion
- High fever with rash
- Increasing rash confusion
- Rash worsening with time
- Blisters rupturing or not forming
- Rash spreading outside known area
- Infection at the site of chickenpox
- Chickenpox in people who have received the varicella vaccine and are not immune
- Chickenpox in immunocompromised individuals
- Chickenpox in pregnant women

**Recommendations**

- Rest and avoid physical exertion
- Stay hydrated
- Take Acetaminophen or ibuprofen for discomfort (see package instructions)
- Use cool compresses on the rash to help soothe it
- Wash hands frequently to prevent spreading to others
- Keep the living environment clean to prevent spread
- Avoid contact with those at higher risk if possible
- Seek medical attention if rash worsens, if signs of infection appear (redness, pus, warmth), or if high fever is prolonged
- Do not scratch the rash to prevent blister rupture or infection
- Cover the rash with loose, breathable clothing
- Avoid contact sports until the rash has completely healed

⚠️ HealthAI provides general information only and is not a substitute for professional medical advice. Always consult a licensed clinician for diagnosis and treatment.

Use via API • Built with Gradio • Settings

## Treatment Plan:

The screenshot shows the HealthAI web application interface. The top navigation bar includes links for Disease Prediction, Treatment Plan (active), 24/7 Patient Support, and Analytics Dashboard. The Patient Profile section on the left contains input fields for Name (muthupandi), Age (19), Gender (Male), Medical History (None), Current Medications (None), and Allergies (None). The Medical Condition field on the right contains 'chickenpox'. A large blue button labeled 'Generate Treatment Plan' is prominently displayed. Below it is a 'Download Plan (.md)' button. A 'Model Settings' section at the bottom left shows the model name 'ibm-granite/granite-3.2-2b-instruct'. A 'screenrec' watermark and a 'WARNING! Microphone recording is disabled' message are visible in the bottom right corner.

## Output:

The screenshot shows the output of the treatment plan generation. The left sidebar remains the same. The main content area displays a message: 'Could not parse structured output. You are HealthAI, a careful, concise medical information assistant. Keep advice general and safe. Avoid making diagnoses. Use simple language and short paragraphs.' Below this, the 'Patient Details' are listed: Name: muthupandi, Age: 19, Gender: Male, Medical History: None. The 'Condition' is listed as 'chickenpox'. The 'Task' is: 'Provide a general treatment overview. Return ONLY valid JSON with keys: overview (string), self\_care (list of strings), when\_to\_seek\_care (list of strings), lifestyle (list of strings). Do not include any other commentary outside JSON.' The output is a JSON object:

```
{
  "overview": "Chickenpox, caused by the varicella-zoster virus, is a common illness characterized by an itchy, fluid-filled rash. Most people rec",
  "self_care": [
    "Stay hydrated by drinking plenty of fluids.",
    "Take over-the-counter pain relievers like acetaminophen or ibuprofen to manage discomfort.",
    "Use calamine lotion or oatmeal baths to soothe the rash.",
    "Avoid picking or scratching the blisters to prevent infection and scarring.",
    "Get plenty of rest to aid recovery."
  ],
  "when_to_seek_care": [
    "If you develop a high fever (>102°F) or it persists for more than 5 days.",
    "Seek immediate care if you have difficulty breathing, chest pain, or a rash spreading to the eyes, mouth, or genitals, as these may indicate",
    "Contact your healthcare provider if you have a weakened immune system or a chronic medical condition."
  ],
  "lifestyle": [
    "Wash your hands frequently to prevent spreading the virus.",
    "Avoid close contact with others, especially those who are pregnant or have weakened immune systems, until the blisters have crusted over.",
    "Clean and disinfect shared surfaces in your home to minimize transmission.",
    "Consider wearing a hat or sunglasses to protect the rash from direct sunlight."
  ]
}
```

## Patient Chat:

The screenshot shows the HealthAI web application interface. The top navigation bar includes the title "HealthAI — Intelligent Healthcare Assistant" and a medical disclaimer. Below this, the "Patient Profile" section is visible, containing fields for Name (muthupandi), Age (19), Gender (Male), Medical History (None), Current Medications (None), and Allergies (None). The "Chatbot" section is active, displaying the input "i have chickenpox what i eat" and a blue "Ask" button. The "Model Settings" section is also visible at the bottom left.

HealthAI — Intelligent Healthcare Assistant

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**Patient Profile**

**Name**  
muthupandi

**Age**  
19

**Gender**  
Male

**Medical History**  
None

**Current Medications**  
None

**Allergies**  
None

**Model Settings**

**Chatbot**

Ask your health question

i have chickenpox what i eat

Ask

Clear Chat

## Output:

The screenshot shows the HealthAI web application interface with the Chatbot output displayed. The output is titled "Chickenpox and Diet:" and lists four recommendations: Stay Hydrated, Eat Nutritious Foods, Avoid Spicy and Fatty Foods, and Easy-to-Chew Foods. The input "i have chickenpox what i eat" is still visible in the chat area.

HealthAI — Intelligent Healthcare Assistant

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**Patient Profile**

**Name**  
muthupandi

**Age**  
19

**Gender**  
Male

**Medical History**  
None

**Current Medications**  
None

**Allergies**  
None

**Model Settings**

**Chatbot**

short, friendly, safe answer in 3-6 bullet points.

**Chickenpox and Diet:**

- **Stay Hydrated:** Drink plenty of fluids, such as water, herbal teas, or electrolyte drinks, to help your body fight the virus.
- **Eat Nutritious Foods:** Consume a balanced diet rich in fruits, vegetables, lean proteins, and whole grains. This aids in your overall recovery.
- **Avoid Spicy and Fatty Foods:** These can irritate the roof of your mouth and make you uncomfortable.
- **Easy-to-Chew Foods:** Opt for soft, easy-to-eat foods to prevent mouth sores from worsening.
- **Avoid Dairy:** While not harmful, dairy can sometimes exacerbate mouth sores in some people, so consider limiting it if you're experiencing

Ask your health question

i have chickenpox what i eat

Ask

Clear Chat



## Analytics Dashboard:

HealthAI — Intelligent Healthcare Assistant

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**Patient Profile**

**Name**  
Rithvik

**Age**  
22

**Gender**  
Male

**Medical History**  
None

**Current Medications**  
None

**Allergies**  
None

**Model Settings**

**Health Vitals Overview**

Upload CSV/Excel (columns: Day, ...)

Drop File Here  
- or -  
Click to Upload

**Generate Health Report**

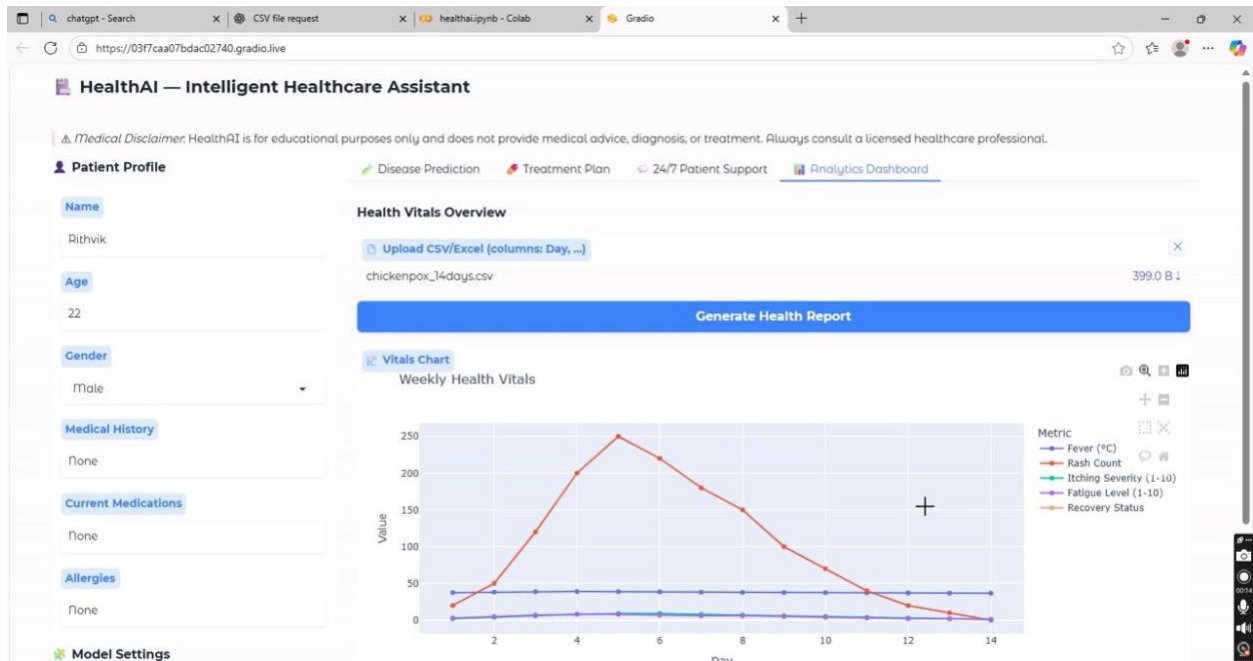
**Vitals Chart**

screenrec

WARNING! Microphone recording is disabled.

To enable it go to Settings and click on the input icon.

Output:



## **12. Known Issues**

- Model loading may fail if internet is unstable
- Heavy models may cause memory errors on small GPUs
- JSON parsing may fail if LLM outputs malformed text

## **13. Future Enhancements**

- Multi-language support (Tamil, Hindi, etc.)
- Integration with wearable health device data
- Secure login & user history tracking
- Mobile app deployment