Health AI: Intelligent Healthcare Assistant Generative AI with IBM

INTRODUCTION:

In the evolving landscape of healthcare, Artificial Intelligence is playing a transformative role. The **"Health AI: Intelligent Healthcare Assistant"** is a visionary initiative under the **Naan Mudhalvan** project, in collaboration with **IBM**, designed to empower students with cutting-edge skills in **Generative AI** applied to the healthcare domain.

This program introduces learners to how AI can revolutionize patient care, diagnostics, medical data analysis, and personalized medicine by simulating intelligent interactions between patients, doctors, and healthcare systems.

The **Health AI: Intelligent Healthcare Assistant** is an innovative learning initiative under the **Naan Mudhalvan** scheme by the Government of Tamil Nadu, in collaboration with **IBM**. This program introduces students to the transformative power of **Generative AI** in the healthcare sector, equipping them with the skills and tools to build AI-driven solutions for real-world medical challenges.

Generative AI, a rapidly growing field in artificial intelligence, can generate human-like responses, summarize clinical data, and simulate intelligent conversations. Through this program, learners explore how AI can enhance patient care, support medical professionals, and improve access to healthcare—especially in underserved areas.

Students will gain hands-on experience in developing an **AI-powered healthcare assistant** capable of understanding natural language, offering preliminary health guidance, and assisting with tasks like clinical documentation and symptom analysis. The project leverages IBM's cutting-edge tools such as **Watsonx**, **natural language processing (NLP)** services, and cloud platforms to bring ideas to life.

By integrating AI with healthcare, this initiative empowers the next generation of tech talent to drive meaningful change in society. It aligns with the vision of **Naan Mudhalvan**—to build a future-ready workforce skilled in emerging technologies like AI, cloud computing, and data science.

PROJECT DESCRIPTION :

Our project "**SmartSDLC – AI-Enhanced Software Development Lifecycle**" is design and developed by our team under the Naan Mudhalvan program.

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Team Leader : NAVEEN P

Team Member : PALANIYANDI S

Team Member : SANTHOSH S

Team Member : NAVIS M

The **Health AI: Intelligent Healthcare Assistant** project aims to develop a smart, AI-powered virtual assistant capable of interacting with users to provide basic healthcare information, symptom checking, and medical support services. This project integrates **Generative AI technologies** with **IBM's AI and cloud platforms**, enabling students to create solutions that address real-world challenges in the healthcare industry.

What is Generative AI?

Generative AI refers to algorithms (like large language models) that can generate text, images, audio, and synthetic data. In healthcare, it can be used for:

- Creating intelligent medical assistants.
- Generating clinical documentation.
- Automating patient interactions.
- Providing decision support for medical professionals.

Project Objective:

To build a smart, interactive **Healthcare Assistant** that leverages **Generative AI** tools and IBM technologies to:

- Understand natural language queries from patients.
- Provide basic health advice based on symptoms.
- Assist healthcare professionals with summarizing patient records.
- Offer mental health support through empathetic conversation.
- Improve healthcare accessibility in rural or underserved areas.

Learning Outcomes:

- Understand core concepts of Generative AI and healthcare applications.
- Gain hands-on experience using IBM tools to build AI solutions.
- Develop and deploy a conversational AI assistant for health-related use cases.
- Understand the ethical and regulatory considerations in AI for healthcare.

Impact & Vision:

- Bridge the gap between technology and healthcare.
- Create scalable AI solutions for real-world medical challenges.
- Equip students with future-ready skills to thrive in AI-driven industries.
- Support the vision of a healthier, tech-enabled India.

Key Features of the Healthcare Assistant:

- Natural language conversation with users (patients or doctors).
- Basic symptom checking and first-level health advice.
- Health record summarization using AI.
- Integration with IBM Watson or similar AI models.
- Mental health and wellness support via empathetic conversation.
- Multilingual support to enhance accessibility.

Proposed Solution:

The proposed solution is to develop an **AI-powered Intelligent Healthcare Assistant** that uses **Generative AI** and **Natural Language Processing (NLP)** to provide users with basic medical assistance, symptom-based recommendations, and support services. The assistant will simulate human-like conversation, offering a first level of healthcare interaction—particularly useful in areas with limited access to medical professionals.

This solution will be built using **IBM's AI tools**, such as **Watsonx**, and integrated with cloud services to ensure scalability, accessibility, and real-time performance.

Key Components of the Solution:

1. **Conversational AI Interface**
   - Enables users to interact with the assistant through voice or text in natural language.
   - Understands user inputs using NLP and responds with contextually relevant information.

2. **Symptom Checker**
   - Collects symptom details from users and provides possible causes and next steps.
   - Advises on whether the condition is minor or requires professional consultation.

3. **Medical Knowledge Base Integration**
   - Connects to verified medical databases and guidelines (e.g., WHO, Mayo Clinic) for accurate information.
   - Uses AI to retrieve and summarize relevant data in real time.

4. **Clinical Documentation Support**
    - Assists healthcare professionals by summarizing patient conversations and generating preliminary reports or notes.
    - Automates repetitive documentation tasks.

5. **Mental Health Support**
    - Offers a confidential, AI-based empathetic support system for users facing stress, anxiety, or mental health issues.
    - Uses sentiment analysis to respond with care and appropriate resources.

6. **Deployment on Cloud (IBM Cloud)**

    - Ensures the solution is scalable, secure, and available across platforms (web, mobile apps).

    - Allows remote access for users in rural or remote areas.

Benefits of the Proposed Solution

The development of an **Intelligent Healthcare Assistant** using **Generative AI and IBM technologies** offers significant advantages to both users and the healthcare ecosystem. Below are the key benefits:

Improved Access to Healthcare

- Provides basic medical guidance to users in **remote or underserved regions** where access to doctors is limited.
- Operates 24/7, ensuring **round-the-clock support** without geographical limitations.

Time and Resource Efficiency

- Reduces the burden on healthcare professionals by handling **initial patient interactions**, symptom collection, and documentation.
- Speeds up patient triage and allows doctors to **focus on critical cases**.

Scalable and Cost-Effective

- Built on **IBM Cloud**, making it easy to scale across hospitals, clinics, or public health systems.
- Reduces the need for physical infrastructure for preliminary consultations.

Personalized and Intelligent Responses

- Uses Generative AI to offer **context-aware, empathetic, and personalized** interactions.
- Enhances user trust and engagement, especially for mental health support and follow-up queries.

Multilingual and Inclusive

- Supports **multiple languages**, including regional Indian languages, enabling broader accessibility.

- Inclusive design ensures usability for **diverse age groups and literacy levels**.

Hands-On Learning for Students

- Offers students real-world experience with **AI tools, NLP, and cloud technologies** from IBM.
- Builds in-demand technical and soft skills like problem-solving, ethical AI development, and user-focused design.

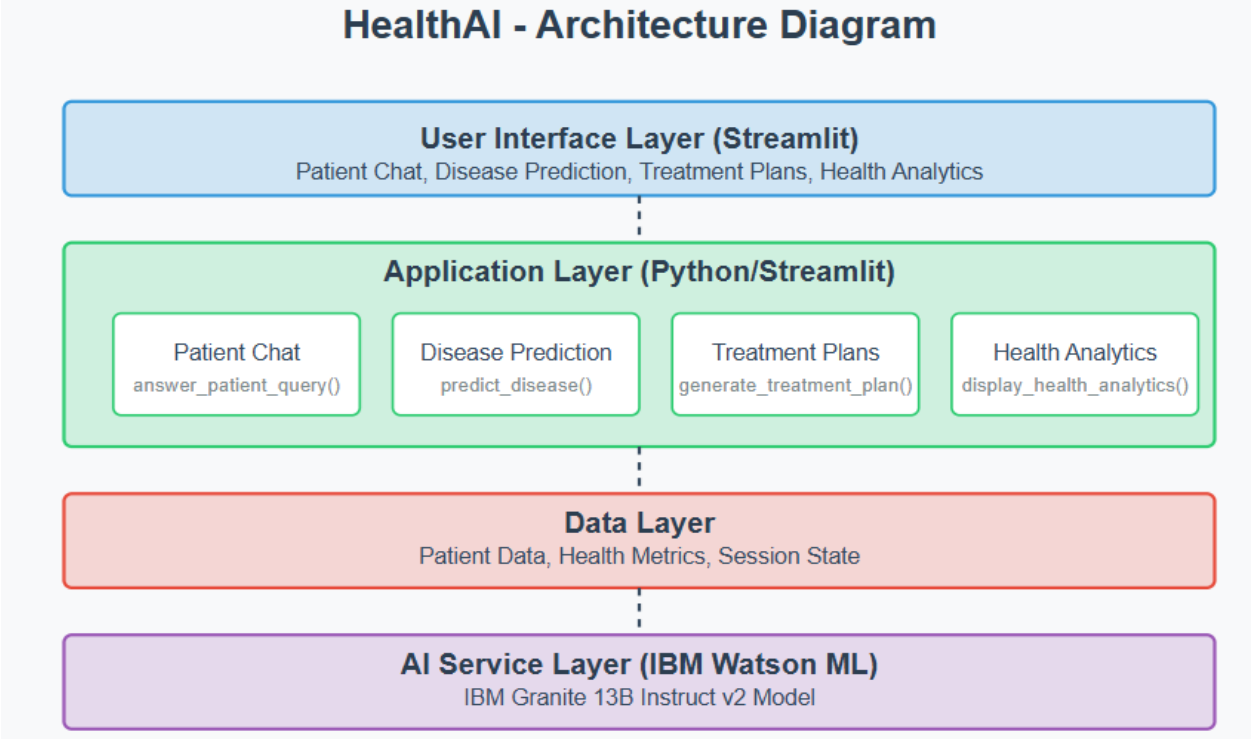
Promotes Preventive Healthcare

- Encourages users to monitor their health regularly and seek early medical advice.
- Supports awareness campaigns and **proactive health behavior**.

Aligned with National Goals

- Supports the **Digital India** and **Ayushman Bharat** missions by promoting tech-enabled, affordable healthcare.
- Enhances the vision of **Naan Mudhalvan** to create a skilled, future-ready workforce.

PROJECT ARCHITECTURE:



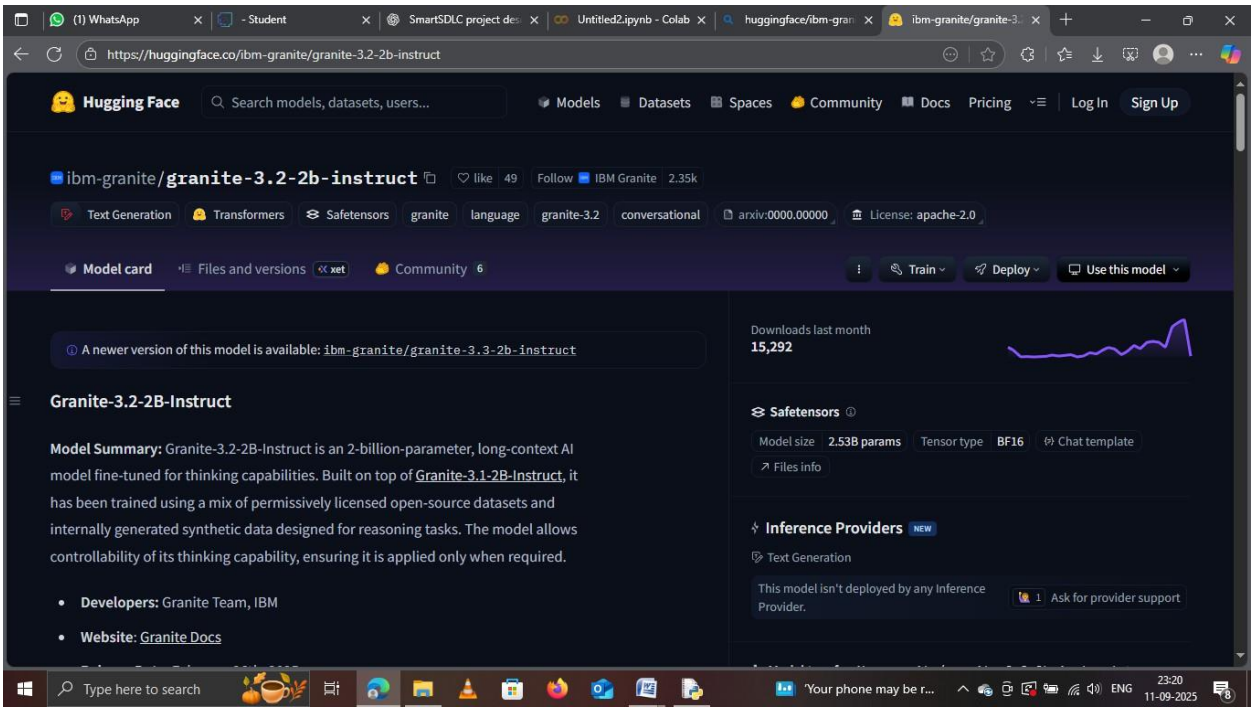
Technologies Used:

- **Languages:** Python
- **AI/ML Frameworks: I**BM Watsonx AI & Granite Models, Streamlit.
- **DevOps Tools:** Git & GitHub.
- **Cloud:** Google Drive / Colab storage.

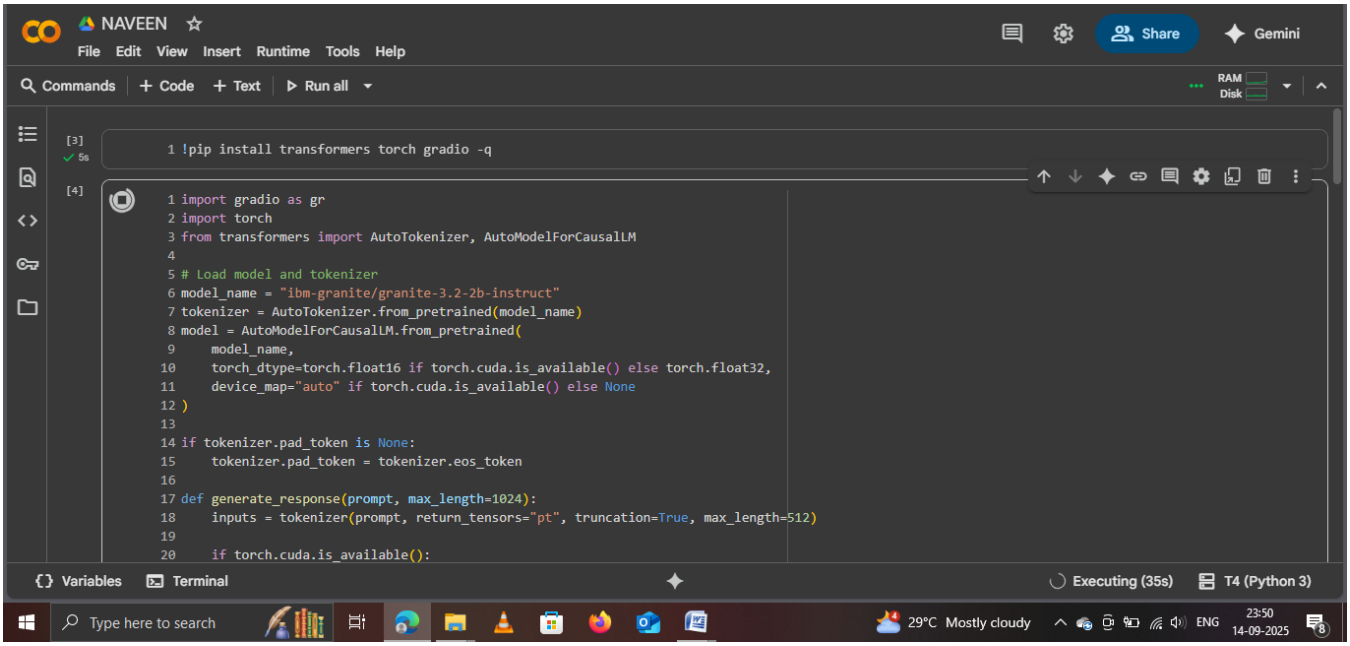
- **Library:** Transformers, torch, gradio.

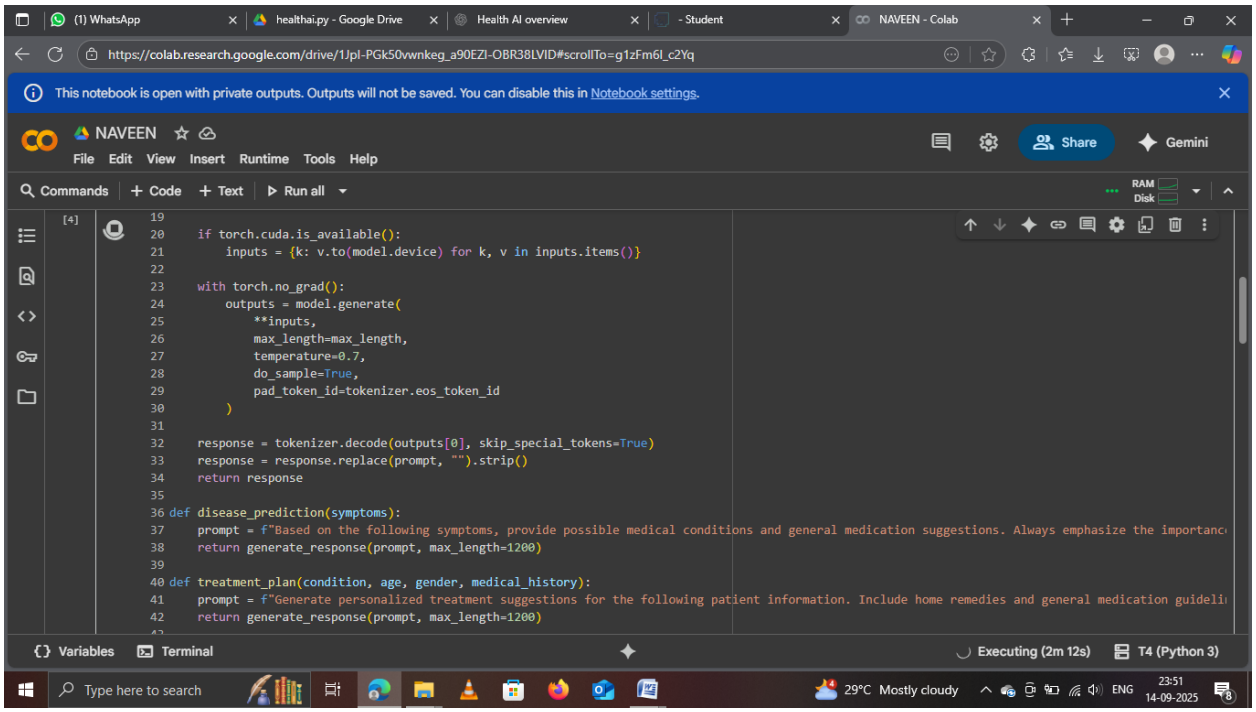
IMPLEMENTATION :

Using Hugging Face for AI Models :

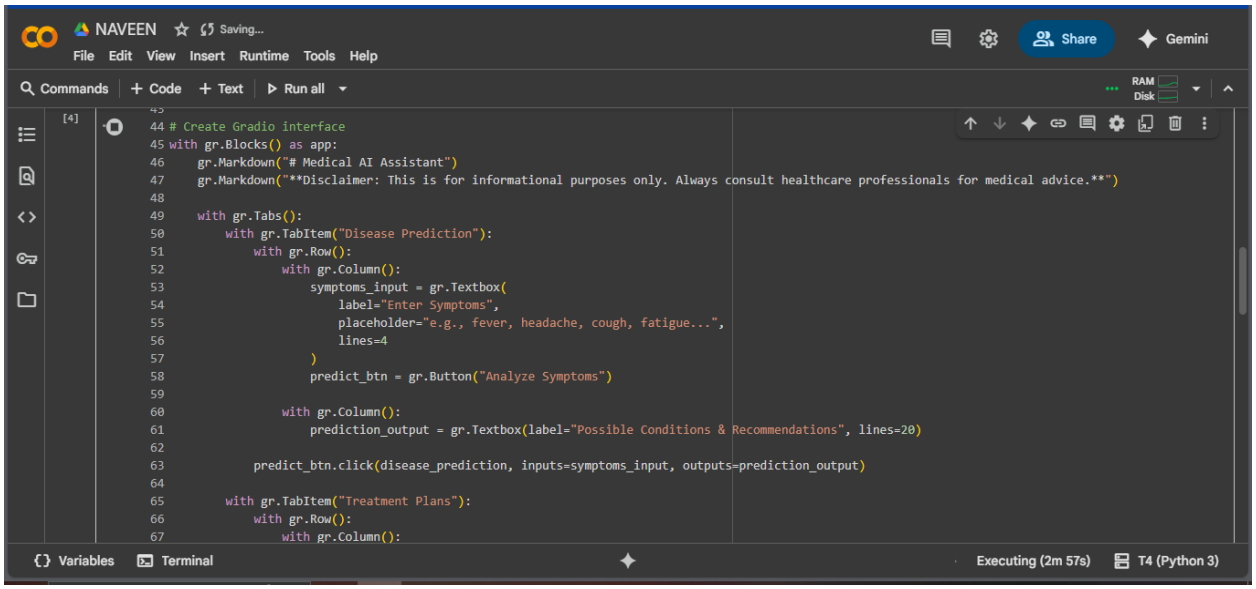


- Here for this project (Hugging Face), we are using “ibm-granite/granite-3.2-2b-instruct” which is compatible fast and light weight.

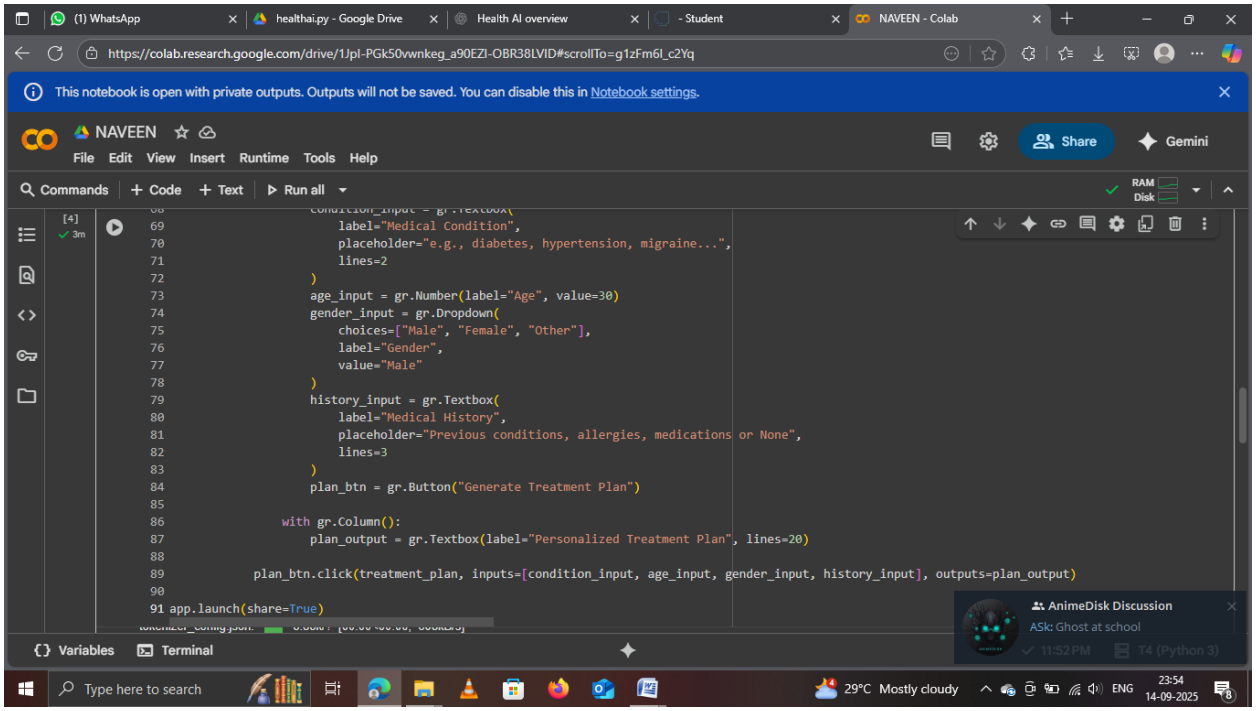




```
[4]
19
20  if torch.cuda.is_available():
21      inputs = {k: v.to(model.device) for k, v in inputs.items()}
22
23  with torch.no_grad():
24      outputs = model.generate(
25          **inputs,
26          max_length=max_length,
27          temperature=0.7,
28          do_sample=True,
29          pad_token_id=tokenizer.eos_token_id
30      )
31
32  response = tokenizer.decode(outputs[0], skip_special_tokens=True)
33  response = response.replace(prompt, "").strip()
34  return response
35
36 def disease_prediction(symptoms):
37  prompt = f"Based on the following symptoms, provide possible medical conditions and general medication suggestions. Always emphasize the importanc
38  return generate_response(prompt, max_length=1200)
39
40 def treatment_plan(condition, age, gender, medical_history):
41  prompt = f"Generate personalized treatment suggestions for the following patient information. Include home remedies and general medication guideli
42  return generate_response(prompt, max_length=1200)
```



```
[4]
44 # Create Gradio interface
45 with gr.Blocks() as app:
46     gr.Markdown("# Medical AI Assistant")
47     gr.Markdown("**Disclaimer: This is for informational purposes only. Always consult healthcare professionals for medical advice.**")
48
49     with gr.Tabs():
50         with gr.TabItem("Disease Prediction"):
51             with gr.Row():
52                 with gr.Column():
53                     symptoms_input = gr.Textbox(
54                         label="Enter Symptoms",
55                         placeholder="e.g., fever, headache, cough, fatigue...",
56                         lines=4
57                     )
58                     predict_btn = gr.Button("Analyze Symptoms")
59
60                 with gr.Column():
61                     prediction_output = gr.Textbox(label="Possible Conditions & Recommendations", lines=20)
62
63             predict_btn.click(disease_prediction, inputs=symptoms_input, outputs=prediction_output)
64
65         with gr.TabItem("Treatment Plans"):
66             with gr.Row():
67                 with gr.Column():
```


(1) WhatsApp
healthai.py - Google Drive
Health AI overview
- Student
NAVEEN - Colab
https://colab.research.google.com/drive/1JpI-PGk50vwnkeg_a90EZI-OBR38LVID#scrollTo=g1zFm6l_c2Yq
This notebook is open with private outputs. Outputs will not be saved. You can disable this in Notebook settings.
NAVEEN
File Edit View Insert Runtime Tools Help
Share
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Commands + Code + Text Run all
RAM
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[4]
3m
label="Medical Condition",
placeholder="e.g., diabetes, hypertension, migraine...",
lines=2
age_input = gr.Number(label="Age", value=30)
gender_input = gr.Dropdown(
choices=["Male", "Female", "Other"],
label="Gender",
value="Male"
history_input = gr.Textbox(
label="Medical History",
placeholder="Previous conditions, allergies, medications or None",
lines=3
plan_btn = gr.Button("Generate Treatment Plan")
with gr.Column():
plan_output = gr.Textbox(label="Personalized Treatment Plan", lines=20)
plan_btn.click(treatment_plan, inputs=[condition_input, age_input, gender_input, history_input], outputs=plan_output)
app.launch(share=True)
AnimeDisk Discussion
ASk: Ghost at school
11:52 PM
T4 (Python 3)
Variables
Terminal
Type here to search
29°C Mostly cloudy
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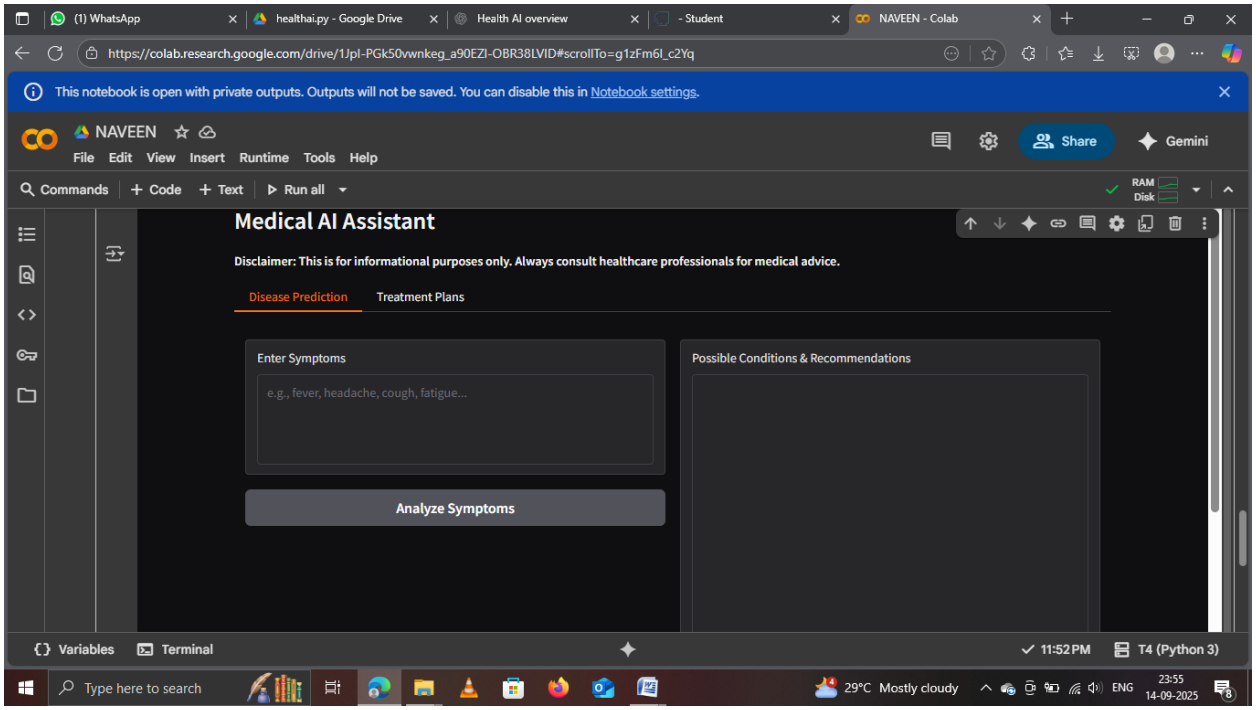
23:54
14-09-2025


(1) WhatsApp
healthai.py - Google Drive
Health AI overview
- Student
NAVEEN - Colab
https://colab.research.google.com/drive/1JpI-PGk50vwnkeg_a90EZI-OBR38LVID#scrollTo=g1zFm6l_c2Yq
This notebook is open with private outputs. Outputs will not be saved. You can disable this in Notebook settings.
NAVEEN
File Edit View Insert Runtime Tools Help
Share
Gemini
Commands + Code + Text Run all
RAM
Disk
Medical AI Assistant
Disclaimer: This is for informational purposes only. Always consult healthcare professionals for medical advice.
Disease Prediction
Treatment Plans
Enter Symptoms
e.g., fever, headache, cough, fatigue...
Analyze Symptoms
Possible Conditions & Recommendations
Variables
Terminal
11:52 PM
T4 (Python 3)
Type here to search
29°C Mostly cloudy
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- Now you can see our project output.
- Click on the URl to open the **Project Application** link.

Conclusion:

The **Health AI: Intelligent Healthcare Assistant** project represents a significant step toward integrating advanced technologies like **Generative AI** into the healthcare sector. By leveraging IBM's AI and cloud platforms, this initiative empowers students to design intelligent solutions that improve healthcare accessibility, efficiency, and quality.

Through this project, learners gain not only technical expertise but also a deep understanding of how AI can solve real-world problems with social impact. The virtual assistant developed through this initiative has the potential to transform how people interact with healthcare services—especially in rural and underserved areas—by offering timely, reliable, and personalized support.

Aligned with the goals of the **Naan Mudhalvan** program, this project not only builds future-ready talent but also contributes to the vision of a digitally empowered and healthier India.
