Health AI

Project Documentation

1. Introduction

Project Title: Health AI with IBM

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2. Project Overview

Purpose:
The Medical AI Assistant is designed to provide quick and informative health-related suggestions based on user-provided symptoms and medical conditions. It emphasizes the importance of consulting a doctor while offering general recommendations, home remedies, and guidance.

Features:

Disease Prediction: Suggests possible conditions based on symptoms.

Treatment Plans: Provides home remedies and general medication guidelines.

Patient Personalization: Considers age, gender, and medical history.

Conversational Interface: Easy-to-use chatbot powered by Gradio.

Disclaimer Integration: Ensures users understand this is not a substitute for professional medical advice.

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3. Architecture

Frontend (Gradio):
Provides a clean interface with tabs for "Disease Prediction" and "Treatment Plans".

Backend (Python + Hugging Face Transformers):
Uses IBM Granite LLM models for generating responses.

Model Integration:

Model Name: ibm-granite/granite-3.2-2b-instruct

Loaded using Hugging Face Transformers library.

Hardware Support:

Runs on CPU or GPU (optimized with CUDA if available).

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4. Setup Instructions

Prerequisites

Python 3.8+

Google Colab / Jupyter Notebook / Local Python environment

Hugging Face Transformers

Gradio

Steps

1. Install dependencies:

```
pip install gradio torch transformers
```

2. Load IBM Granite model from Hugging Face.

3. Run the Gradio app code.

4. Launch the app and open the link provided in the console.

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5. Folder Structure

```
medical_ai/
│
├── app/              # Backend logic
├── ui/               # Gradio UI files
├── medical_ai.py     # Main application file
├── model_loader.py   # Handles IBM Granite model integration
└── requirements.txt  # Dependencies
```

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6. Running the Application

1. Run the Python script in Colab or your local environment.

2. The Gradio app launches with two tabs:

Disease Prediction Tab: Enter symptoms → Get possible conditions.

Treatment Plan Tab: Enter condition + age + gender + history → Get personalized plan.

3. A shareable link will be generated for testing.

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7. API Documentation (Internal Functions)

disease_prediction(symptoms)

Input: Symptoms string

Output: Possible conditions + recommendations

treatment_plan(condition, age, gender, medical_history)

Input: Condition + Patient info

Output: Personalized treatment plan with home remedies + guidelines

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8. Authentication

Current demo runs in open mode.

Future deployments can integrate:

API Keys

OAuth2 authentication

Role-based access for doctors/patients

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9. User Interface

Tabs:

Disease Prediction

Treatment Plans

Inputs: Textboxes, Number input, Dropdowns

Outputs: Text responses with medical recommendations

Disclaimer: Displayed at the top to ensure users consult professionals

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10. Testing

Unit Testing:
Checked response generation with sample inputs.

Edge Case Handling:

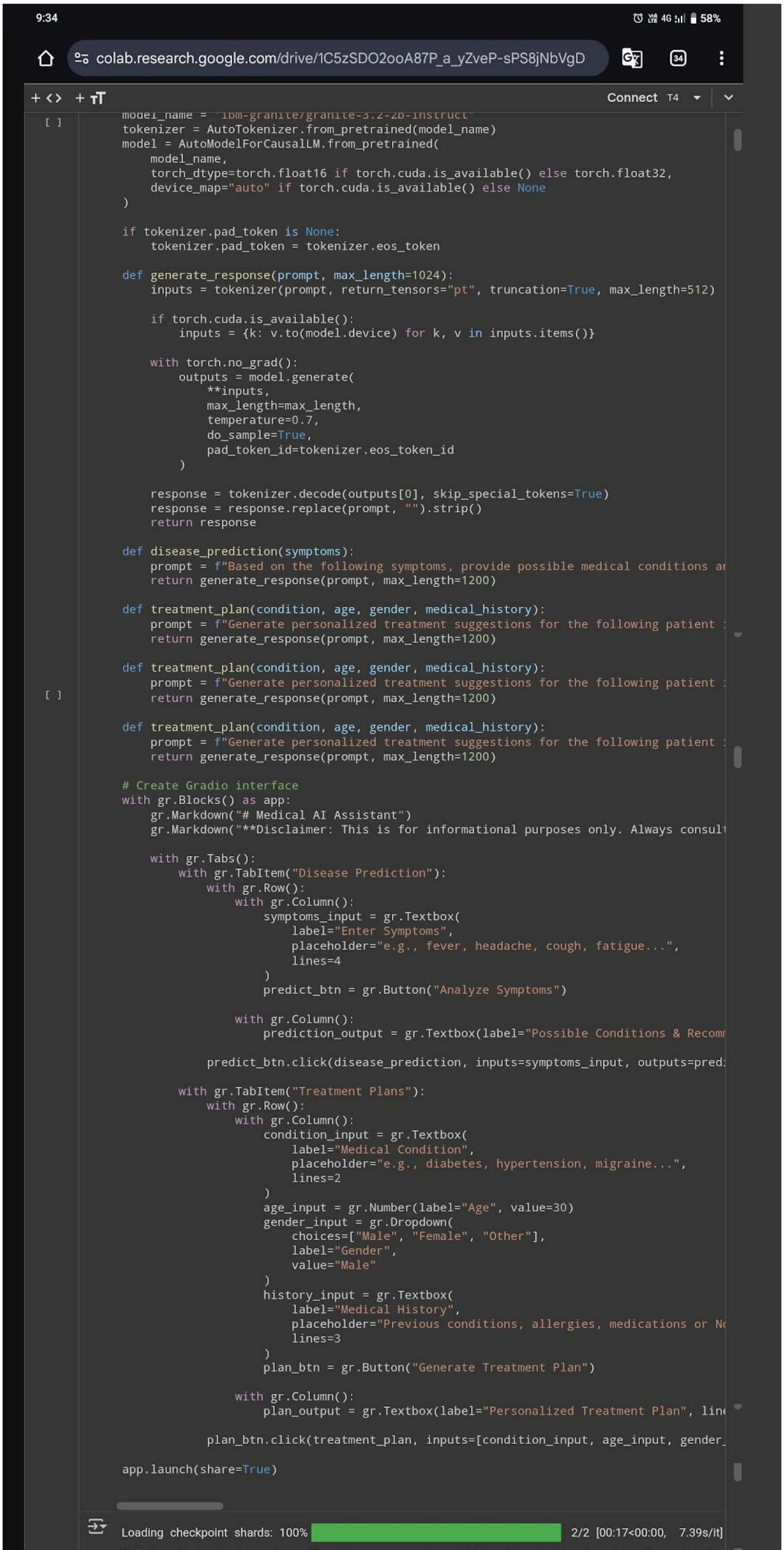
Empty input fields

Non-medical text

Long symptom lists

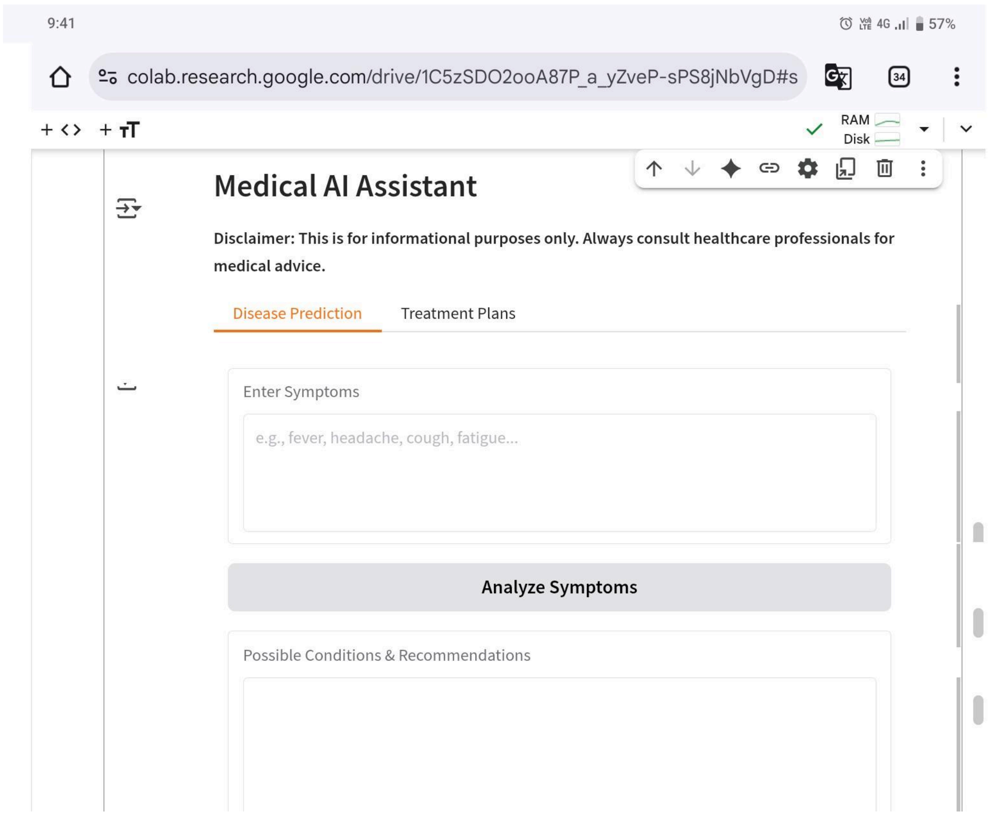
Manual Testing:
Tested interface usability with Gradio demo links.

11.Screenshots


9:34
58%
colab.research.google.com/drive/1C5zSDO2ooA87P_a_yZveP-sPS8jNbVgD
Connect T4

```
model_name = "ibm-granite/granite-3.2-2b-instruct"
tokenizer = AutoTokenizer.from_pretrained(model_name)
model = AutoModelForCausalLM.from_pretrained(
    model_name,
    torch_dtype=torch.float16 if torch.cuda.is_available() else torch.float32,
    device_map="auto" if torch.cuda.is_available() else None
)

if tokenizer.pad_token is None:
    tokenizer.pad_token = tokenizer.eos_token

def generate_response(prompt, max_length=1024):
    inputs = tokenizer(prompt, return_tensors="pt", truncation=True, max_length=512)

    if torch.cuda.is_available():
        inputs = {k: v.to(model.device) for k, v in inputs.items()}

    with torch.no_grad():
        outputs = model.generate(
            **inputs,
            max_length=max_length,
            temperature=0.7,
            do_sample=True,
            pad_token_id=tokenizer.eos_token_id
        )

    response = tokenizer.decode(outputs[0], skip_special_tokens=True)
    response = response.replace(prompt, "").strip()
    return response

def disease_prediction(symptoms):
    prompt = f"Based on the following symptoms, provide possible medical conditions ar
    return generate_response(prompt, max_length=1200)

def treatment_plan(condition, age, gender, medical_history):
    prompt = f"Generate personalized treatment suggestions for the following patient i
    return generate_response(prompt, max_length=1200)

def treatment_plan(condition, age, gender, medical_history):
    prompt = f"Generate personalized treatment suggestions for the following patient i
    return generate_response(prompt, max_length=1200)

def treatment_plan(condition, age, gender, medical_history):
    prompt = f"Generate personalized treatment suggestions for the following patient i
    return generate_response(prompt, max_length=1200)

# Create Gradio interface
with gr.Blocks() as app:
    gr.Markdown("# Medical AI Assistant")
    gr.Markdown("**Disclaimer: This is for informational purposes only. Always consult

    with gr.Tabs():
        with gr.TabItem("Disease Prediction"):
            with gr.Row():
                with gr.Column():
                    symptoms_input = gr.Textbox(
                        label="Enter Symptoms",
                        placeholder="e.g., fever, headache, cough, fatigue...",
                        lines=4
                    )
                    predict_btn = gr.Button("Analyze Symptoms")

                with gr.Column():
                    prediction_output = gr.Textbox(label="Possible Conditions & Recomm

            predict_btn.click(disease_prediction, inputs=symptoms_input, outputs=predi

        with gr.TabItem("Treatment Plans"):
            with gr.Row():
                with gr.Column():
                    condition_input = gr.Textbox(
                        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 No
                        lines=3
                    )
                    plan_btn = gr.Button("Generate Treatment Plan")

                with gr.Column():
                    plan_output = gr.Textbox(label="Personalized Treatment Plan", line

            plan_btn.click(treatment_plan, inputs=[condition_input, age_input, gender_

app.launch(share=True)
```

```
Loading checkpoint shards: 100%  2/2 [00:17<00:00,  7.39s/it]
```



9:41 57%

colab.research.google.com/drive/1C5zSDO2ooA87P_a_yZveP-sPS8jNbVgD#s

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

12. Known Issues

LLM responses may sometimes be generic.

Requires internet to fetch model from Hugging Face.

Not a substitute for certified medical systems.

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13. Future Enhancements

Multi-language support (Tamil, Hindi, etc.).

Integration with medical databases for verified information.

Cloud deployment for large-scale usage.

Add voice input and speech output.

Dashboard for doctors to review aggregated patient queries.
