Citizen AI: Intelligent Citizen Engagement Platform Using IBM Granite

Project Documentation

Introduction

Project title: Citizen AI: Intelligent Citizen Engagement Platform Using IBM Granite

Team members:

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Project Overview

Purpose:

The purpose of Citizen AI is to provide users with an intelligent, AI-powered assistant capable of answering queries related to government services, civic issues, and public engagement. By leveraging IBM's Granite LLM and real-time AI processing, the platform aims to deliver accurate, accessible, and user-friendly guidance while supporting authorities in improving transparency and citizen satisfaction.

Features:

1.Conversational Interface:

Key Point: Natural language interaction
Functionality: Users can ask questions about government services, policies, or civic issues and receive AI-generated responses.

2.Service Guidance:

Key Point: Citizen-focused information
Functionality: Provides step-by-step guidance for services like Aadhaar application, Voter ID registration, RTI queries, and transportation-related information.

3.Quick Question Buttons:

Key Point: Easy access to common queries
Functionality: Pre-set buttons for frequently asked topics such as Aadhaar, RTI Act, Voter ID, and Railway ticket booking.

4.Chat Management

Key Point: Enhanced user control
Functionality: Options to send queries, clear chat history, and download conversations as a text file.

5.Gradio UI

Key Point: User-friendly interface
Functionality: Gradient-based chatbot design with text input, quick action buttons, and real-time responses.

Architecture:

Frontend (Gradio):

Chat-based web interface with input textbox and functional buttons (Send, Clear, Download, Quick Questions).

Inputs: User queries in natural language.

Outputs: AI-generated responses displayed in the chat, with option to download as text.

Backend (Python + Transformers):

1.Processes user queries and generates AI responses using IBM Granite LLM.

2.Handles model loading and GPU optimization if available.

LLM Integration (IBM Granite – Hugging Face Model):

Model: ibm-granite/granite-1b-code-instruct (lightweight and efficient for Colab).

1.Performs natural language understanding and response generation. Deployment (Google Colab):

2.Runs in Google Colab with T4 GPU for smooth AI processing.

3. Application can be shared publicly using launch(share=True).

Setup Instructions Prerequisites:

1.Python 3.9 or later

2.pip for package installation

3.Internet connection (for downloading model)

4.GPU recommended for faster response (T4 GPU in Colab)

Installation Process:

1. Clone the repository.

2. Install dependencies: pip install transformers torch gradio

3. Run the Gradio app: python citizen_ai.py

4. Open the provided local URL or use the public share link

Folder Structure:

citizen_ai.py – Main Gradio app and UI layout

requirements.txt – Python dependencies

Running the Application:

1. Launch the Python script citizen_ai.py or run the notebook in Colab.

2. Gradio interface opens in the browser.

3. User flow: - Enter a query → Click Send → View AI response.

4. Use Quick Question Buttons for instant responses.

5. Use Clear Chat to reset conversation.

API Documentation:

(Note**:** Current version runs as a Gradio interface; no REST API implemented. Optional future enhancement could add FastAPI backend.)

Inputs: User query (Textbox or Quick Question button)

Outputs: AI response (Text), Chat history (Downloadable file)

Authentication:

1.Current version runs in an open environment.

2.No authentication implemented.

3.Future enhancement: Add login system and role-based access.

User Interface:

1.Minimalist chatbot interface with Gradio.

2.Includes: Text input field Action buttons (Send, Clear)

3.Quick Question buttons (RTI, Aadhaar, Voter ID, Railway)

4.Gradient-based background for improved visual appeal.

Testing:

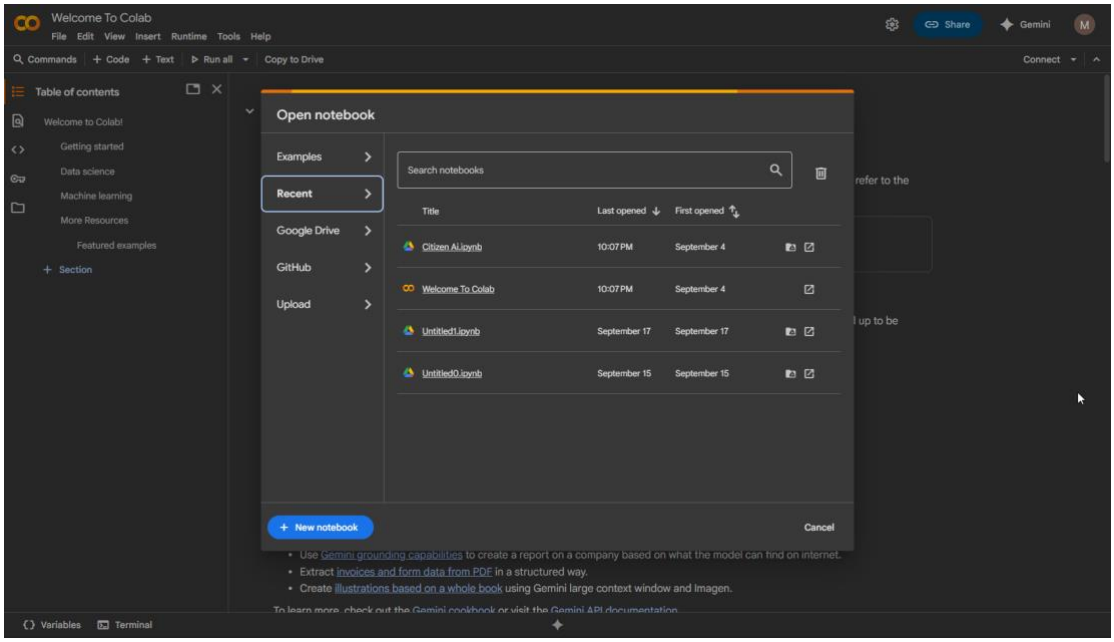
Unit Testing:
Validate input handling and model response.

Manual Testing: Ask queries on government services and verify responses.

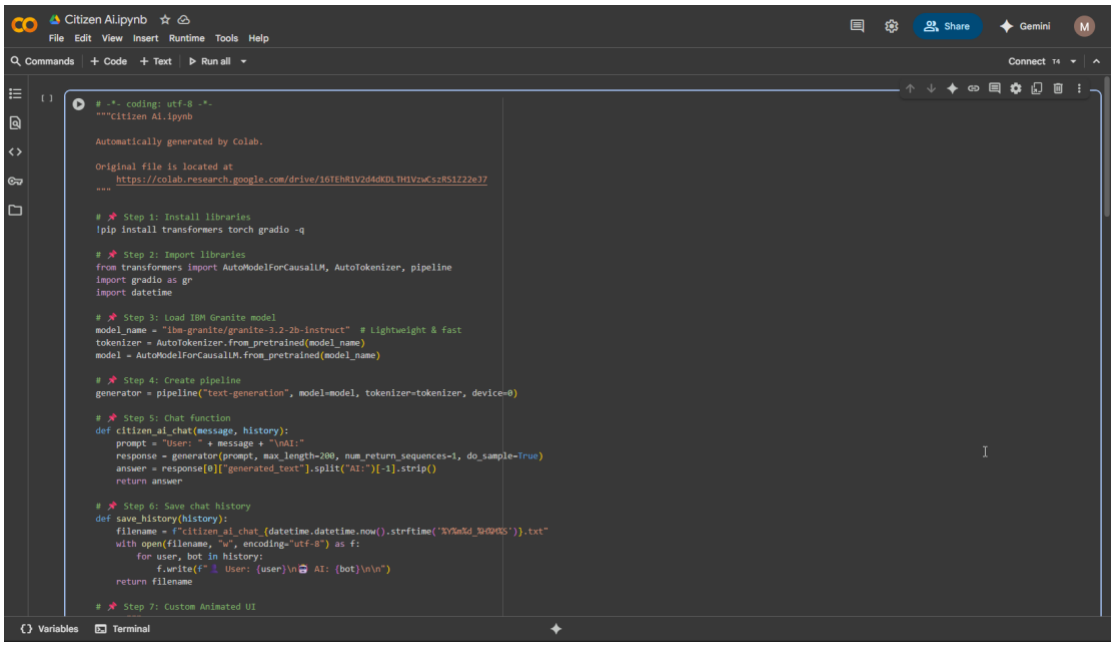
Edge Case Handling: Empty input, repeated queries, long text.

Screenshots:

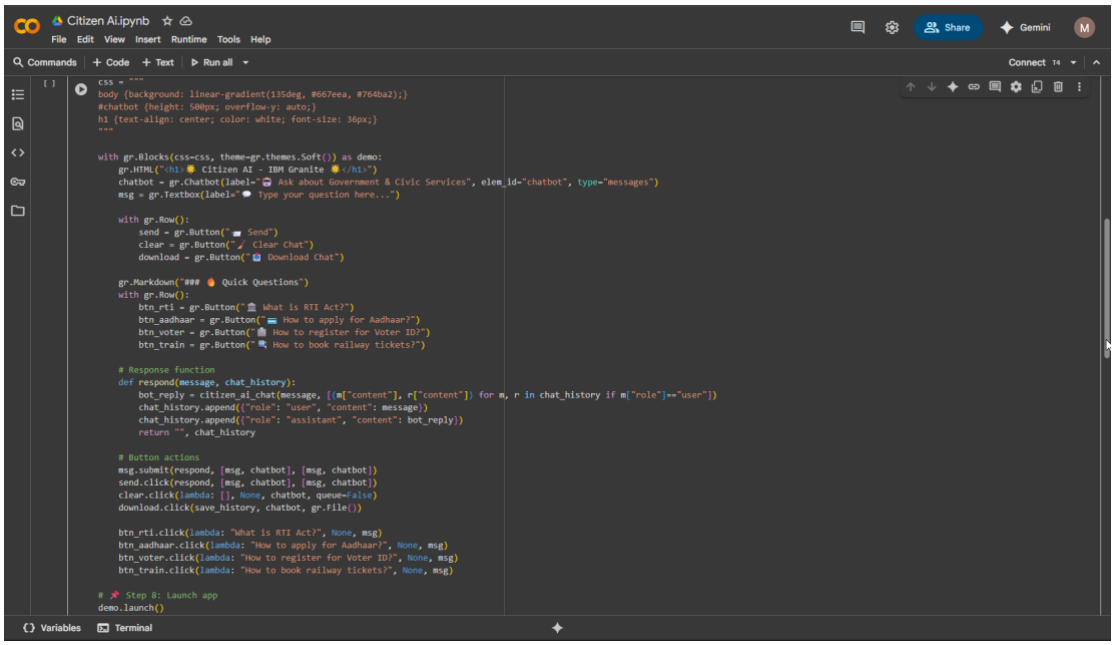
TOOLS:



CODING:

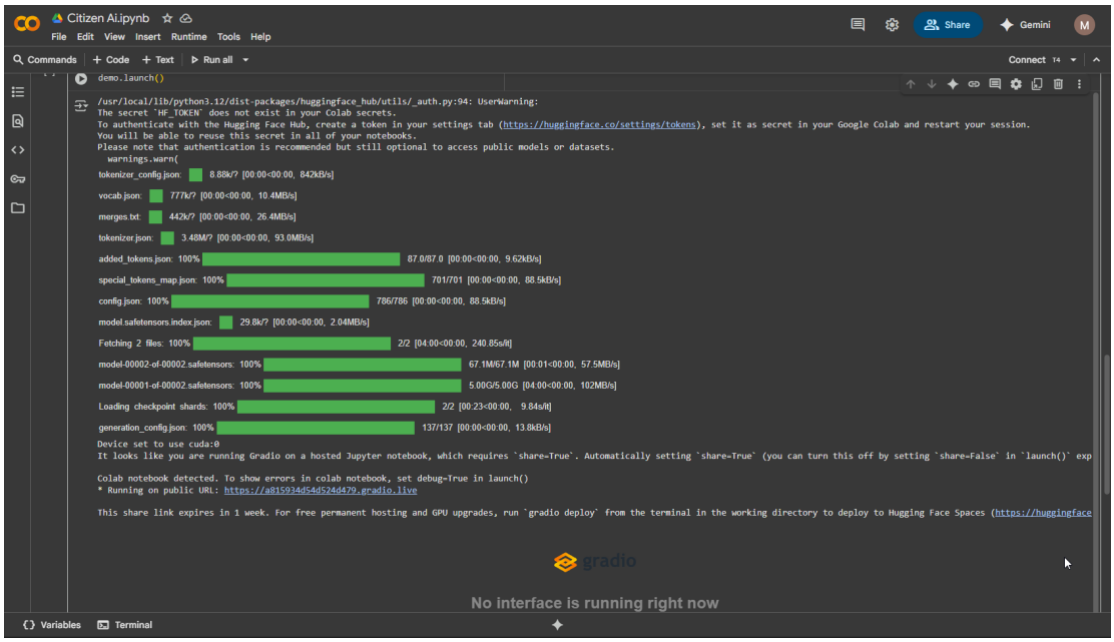


```
# -*- coding: utf-8 -*-
"""Citizen AI.ipynb

Automatically generated by Colab.

Original file is located at
    https://colab.research.google.com/drive/16TEhR1V2d4dKDLTH1VzwCszRS1Z22e37
"""

# 📌 Step 1: Install libraries
!pip install transformers torch gradio -q

# 📌 Step 2: Import libraries
from transformers import AutoModelForCausalLM, AutoTokenizer, pipeline
import gradio as gr
import datetime

# 📌 Step 3: Load IBM Granite model
model_name = "ibm-granite/granite-3.2-2b-instruct"  # Lightweight & fast
tokenizer = AutoTokenizer.from_pretrained(model_name)
model = AutoModelForCausalLM.from_pretrained(model_name)

# 📌 Step 4: Create pipeline
generator = pipeline("text-generation", model=model, tokenizer=tokenizer, device=0)

# 📌 Step 5: Chat function
def citizen_ai_chat(message, history):
    prompt = "User: " + message + "\nAI:"
    response = generator(prompt, max_length=200, num_return_sequences=1, do_sample=True)
    answer = response[0]["generated_text"].split("AI:")[-1].strip()
    return answer

# 📌 Step 6: Save chat history
def save_history(history):
    filename = f"citizen_ai_chat_{datetime.datetime.now().strftime('%Y%m%d_%H%M%S')}.txt"
    with open(filename, "w", encoding="utf-8") as f:
        for user, bot in history:
            f.write(f"🧑 User: {user}\n🤖 AI: {bot}\n\n")
    return filename

# 📌 Step 7: Custom Animated UI
```

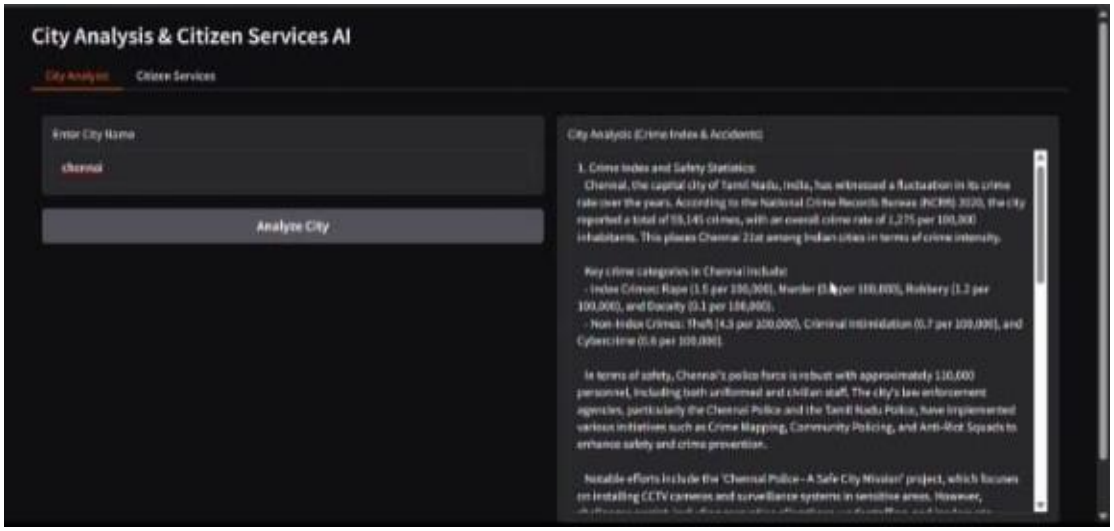


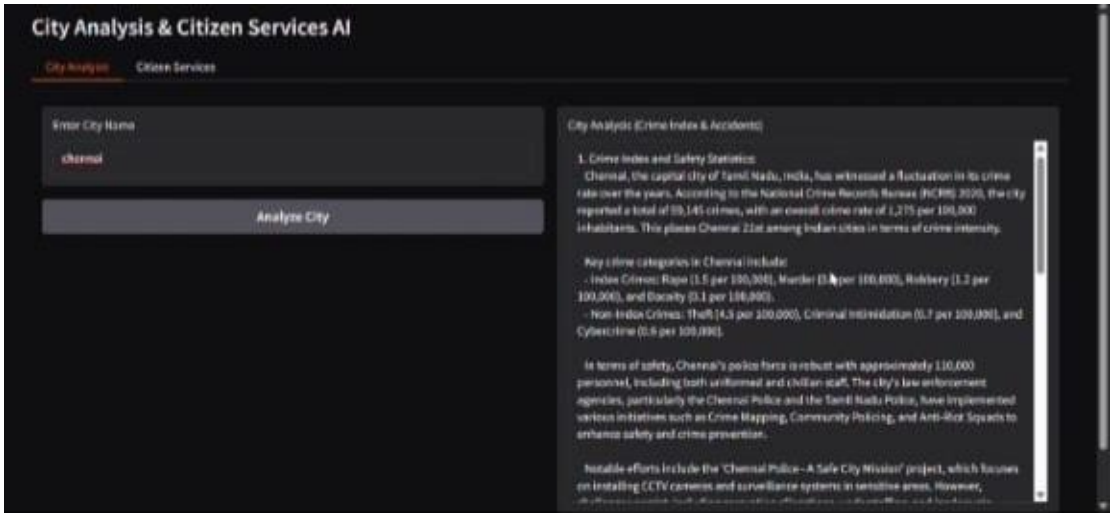
```
css = """
body {background: linear-gradient(135deg, #667eea, #764ba2);}
#chatbot {height: 500px; overflow-y: auto;}
h1 {text-align: center; color: white; font-size: 36px;}
"""

with gr.Blocks(css=css, theme=gr.themes.Soft()) as demo:
    gr.HTML("<h1>🌐 Citizen AI – IBM Granite 🤖</h1>")
    chatbot = gr.Chatbot(label="🤖 Ask about Government & Civic Services", elem_id="chatbot", type="messages")
    msg = gr.Textbox(label="💬 Type your question here...")

    with gr.Row():
        send = gr.Button("📨 Send")
        clear = gr.Button("🧹 Clear Chat")
        download = gr.Button("💾 Download Chat")

    gr.Markdown("### 🔥 Quick Questions")
    with gr.Row():
        btn_rti = gr.Button("🏛️ What is RTI Act?")
        btn_aadhaar = gr.Button("💳 How to apply for Aadhaar?")
        btn_voter = gr.Button("🗳️ How to register for Voter ID?")
        btn_train = gr.Button("🚆 How to book railway tickets?")

    # Response function
    def respond(message, chat_history):
        bot_reply = citizen_ai_chat(message, [(m["content"], r["content"]) for m, r in chat_history if m["role"]=="user"])
        chat_history.append({"role": "user", "content": message})
        chat_history.append({"role": "assistant", "content": bot_reply})
        return "", chat_history

    # Button actions
    msg.submit(respond, [msg, chatbot], [msg, chatbot])
    send.click(respond, [msg, chatbot], [msg, chatbot])
    clear.click(lambda: [], None, chatbot, queue=False)
    download.click(save_history, chatbot, gr.File())

    btn_rti.click(lambda: "What is RTI Act?", None, msg)
    btn_aadhaar.click(lambda: "How to apply for Aadhaar?", None, msg)
    btn_voter.click(lambda: "How to register for Voter ID?", None, msg)
    btn_train.click(lambda: "How to book railway tickets?", None, msg)

# 📌 Step 8: Launch app
demo.launch()
```

OUTPUT LINK:



FINAL OUTPUT:





Known Issues:

1.Large queries may exceed model’s maximum token limit.

2.Some responses may be generic due to limited domain training.

3.Free Colab session may disconnect, stopping the app.

Future Enhancements:

1.Deploy permanently on Hugging Face Spaces or Streamlit Cloud.

2.Add voice input and voice output (speech-to-text and text-to-speech).

3.Add dashboard for sentiment analysis of citizen feedback. - Enable multilingual support (e.g., Tamil, Telugu, Hindi, etc.).