CitizenAI – Intelligent Citizen Engagement Platform

Project Documentation

1. Introduction

Project Title:
CitizenAI – Intelligent Citizen Engagement Platform

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2. Project Overview

Purpose

The purpose of **CitizenAI** is to enhance citizen–government interaction by leveraging AI and real-time data. The platform allows citizens to:

- Ask questions about government services and policies,
- Submit feedback,
- Report issues or concerns, and
- View responses instantly through a conversational AI assistant.

For government officials, CitizenAI acts as a **decision-making partner** by providing:

- Real-time sentiment analysis,
- Visualization of feedback and reported issues,
- Actionable insights to improve services and public trust.

Ultimately, CitizenAI bridges **technology, governance, and community engagement**, leading to a **more transparent, efficient, and responsive government**.

Features

- **Conversational Interface**
  - Key Point: Real-time natural language interaction
  - Functionality: Citizens can ask questions and get instant answers using an AI-powered assistant.
- **Policy Information & Summarization**
  - Key Point: Easy-to-understand information
  - Functionality: Converts government guidelines and policies into simplified, citizen-friendly responses.

- **Sentiment Analysis**

    - Key Point: Public opinion tracking
    - Functionality: Analyzes citizen feedback and classifies it as Positive, Neutral, or Negative.
- **Concern Reporting**
    - Key Point: Issue escalation
    - Functionality: Allows citizens to report civic issues directly through the platform for government follow-up.
- **Dynamic Dashboard**
    - Key Point: Data-driven decision making
    - Functionality: Displays live sentiment distribution, engagement trends, and recent issues for administrators.
- **User-Friendly Interface (Flask/Gradio)**
    - Key Point: Accessibility for both citizens and government officials
    - Functionality: Clean, responsive web interface that works across devices.

3. Architecture

Frontend (Flask + HTML/CSS or Gradio for Colab Demo)

- Pages: `index.html`, `chat.html`, `dashboard.html`, `login.html`
- Responsive design for easy navigation
- Provides chat input forms, feedback forms, and dashboards

Backend (Flask Framework)

- Handles user requests (`/ask`, `/feedback`, `/concern`)
- Generates responses by calling IBM Granite model
- Stores in-memory chat history and feedback data (future-ready for database integration)

AI Layer (IBM Granite via Hugging Face)

- Natural Language Understanding & Generation
- Sentiment Analysis Pipeline

Data & Analytics

- Real-time in-memory storage of chats, concerns, feedback
- Aggregated statistics for dashboard visualization

4. Setup Instructions

Prerequisites

- Python 3.8+
- Flask web framework
- PyTorch with CUDA support (if GPU available)
- Hugging Face libraries: `transformers`, `accelerate`, `bitsandbytes`
- Internet connection (to download IBM Granite model)

Installation Steps

1. Clone or create project folder
2. Create virtual environment:

```
python -m venv venv
source venv/bin/activate  # Linux/Mac
venv\Scripts\activate     # Windows
```

3. Install dependencies:

```
pip install -r requirements.txt
```

4. Run Flask app:

```
python app.py
```

5. Open `http://127.0.0.1:5000` in a browser

5. Folder Structure

```
CitizenAI/
│
├── app.py              # Main Flask backend
├── requirements.txt    # Dependencies
│
├── templates/          # HTML templates
│   ├── index.html
│   ├── chat.html
│   ├── dashboard.html
│   ├── login.html
│   └── about.html
│
├── static/             # Static assets
│   ├── css/styles.css
│   └── images/
│
└── .env                # Environment variables (MODEL_PATH, SECRET_KEY)
```

6. Running the Application

1. Launch Flask backend (or Gradio app if using Colab).
2. Navigate to chat page, enter a query, and receive an AI-generated response.
3. Submit feedback to trigger sentiment analysis.
4. Report a concern and verify it appears on the dashboard.
5. Open dashboard page to view overall sentiment counts and reported issues.

All interactions happen in **real time**.

7. API Documentation

Available Routes

- `GET /` – Home page
- `GET /chat` – Chat interface
- `POST /ask` – Accepts a user query, returns AI-generated response
- `POST /feedback` – Accepts citizen feedback, returns sentiment analysis
- `POST /concern` – Logs a reported concern
- `GET /dashboard` – Displays aggregated sentiment data & concerns
- `GET, POST /login` – Handles user authentication

8. Authentication

- Session-based login/logout implemented with Flask session.
- Future enhancement: JWT-based authentication for API endpoints, and role-based access (Citizen/Admin).

9. User Interface

- **Sidebar Navigation:** Home, Chat, Dashboard, Login/Logout
- **Chat Page:** Input box for queries, feedback form, concern reporting
- **Dashboard:** Real-time sentiment distribution, latest reported issues
- **Responsive Design:** Optimized for desktop and mobile devices

10. Testing

- **Unit Testing:** Verified AI response generation and sentiment classification
- **Integration Testing:** Tested form submissions, login/logout flow
- **Manual Testing:** Checked dashboard updates after feedback & concerns
- **Edge Case Handling:**
  - Empty input detection
  - Invalid login credentials
  - Long query handling without crash

11. Screenshots

Citizen AI.ipynb

File Edit View Insert Runtime Tools Help

Commands + Code + Text Run all

[1] 13s

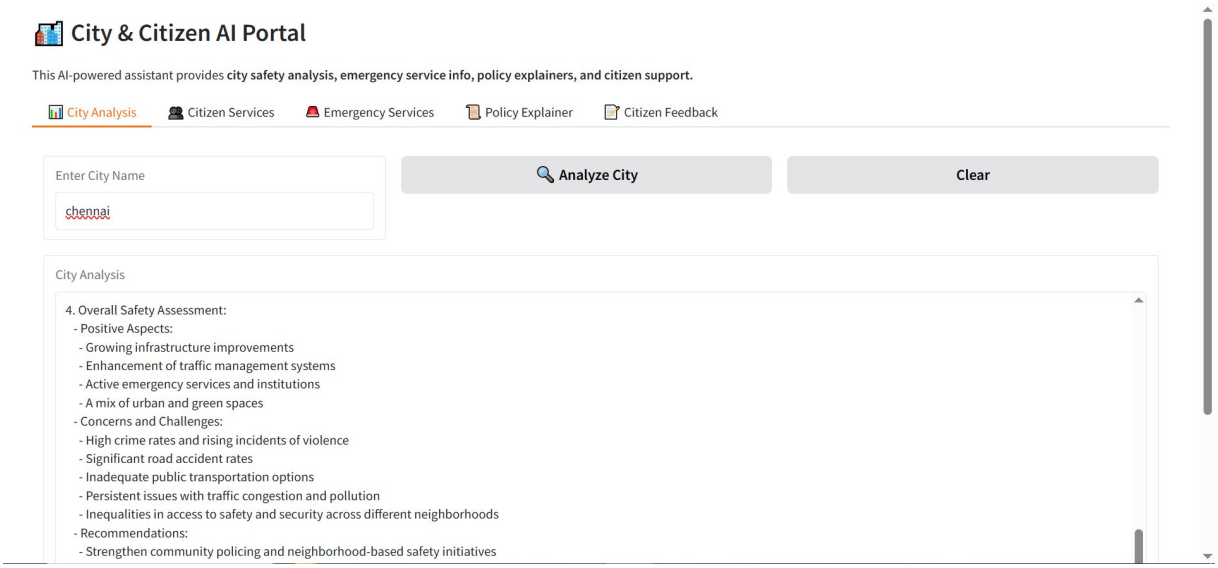
```
!pip install transformers torch gradio -q
```

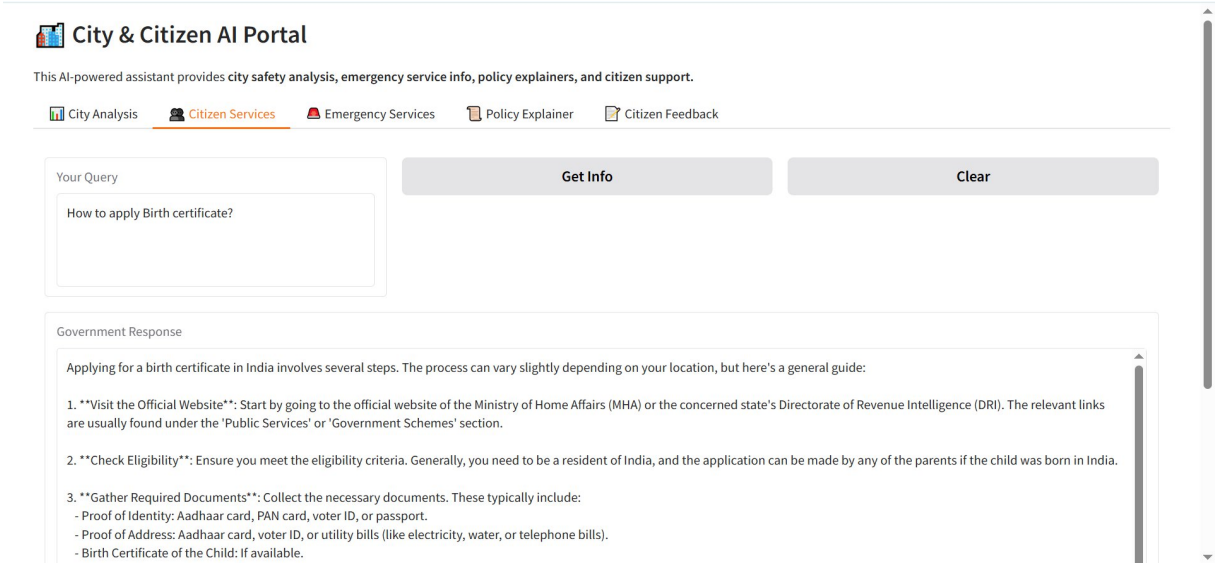
[2] 3m

```
import gradio as gr
import torch
from transformers import AutoTokenizer, AutoModelForCausalLM

# Load model and tokenizer
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

# Core LLM Response Generator
def generate_response(prompt, max_length=1024):
    inputs = tokenizer(prompt, return_tensors="pt", truncation=True, max_length=512)
```

Variables Terminal 5:53 PM T4 (Python 3)

User Interface dashboard:





12. Known Issues

- Running Granite model on CPU is slow – GPU recommended
- Currently uses in-memory storage (data lost after restart)
- No persistent user session history yet

13. Future Enhancements

- Migrate to database for permanent storage
- Add voice-based query input and multi-language support
- Integrate SMS/WhatsApp for issue reporting
- Deploy on cloud for production-level scalability
- Role-based access for government departments