City Analysis & Citizen Services AI

📘 Project Documentation (Expanded Version)

## Team Members

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# 🔹 Overview

This project demonstrates an Artificial Intelligence application built using Hugging Face Transformers and Gradio. The primary objective of the system is to provide two categories of services:  
  
1. \*\*City Analysis\*\*: Offering insights about a city's safety by analyzing crime index, accident statistics, and general safety indicators. While the current version uses pre-trained models and static knowledge, the aim is to integrate real-time data feeds from official sources.  
  
2. \*\*Citizen Services\*\*: Acting as an assistant to citizens for queries about government policies, public services, and civic issues. The system can guide users in areas like passport application, traffic challan payments, and municipal complaint procedures.  
  
In the modern world, cities are growing rapidly. Citizens often face difficulties in finding accurate and reliable information about safety or accessing government services. This project addresses those challenges by providing an accessible AI-powered solution.

# 🔹 Dependencies

The project relies on Python libraries that simplify natural language processing and user interface creation.  
  
- \*\*Transformers\*\*: Provides pre-trained models like IBM Granite that can generate intelligent responses.  
- \*\*Torch\*\*: Used as the backend for deep learning, enabling GPU acceleration.  
- \*\*Gradio\*\*: Allows creation of a simple and interactive web interface, where users can input queries and receive responses.  
  
Each dependency plays a vital role in ensuring the system runs efficiently. For example, without Gradio, deploying a user-friendly interface would require significant web development effort. Similarly, Torch makes it possible to run large models on GPUs for faster response times.

# 🔹 Code Walkthrough

The code can be broken into multiple functional blocks:  
  
1. \*\*Imports\*\*: All necessary Python libraries are loaded.  
2. \*\*Model & Tokenizer Setup\*\*: The IBM Granite model is initialized. If a GPU is available, it is automatically selected to improve speed.  
3. \*\*Response Generator\*\*: This function uses the model to generate answers. It ensures that input text is tokenized, passed through the model, and decoded into human-readable form.  
4. \*\*Custom Functions\*\*: The project defines two core functions:  
 - `city\_analysis(city\_name)`: Returns crime index, accident data, and safety analysis.  
 - `citizen\_interaction(query)`: Handles citizen-related queries like policies and services.  
5. \*\*Gradio Interface\*\*: Provides two tabs in the UI, one for City Analysis and another for Citizen Services.  
6. \*\*App Launch\*\*: The interface is shared via a Gradio link, allowing users to access it without installing dependencies locally.  
  
This modular design ensures scalability. Developers can add more functions such as environmental monitoring or healthcare services in the future.

# 🔹 Usage Instructions

Follow the steps below to run the project on Google Colab:  
  
1. Open Google Colab in your browser.  
2. Change the runtime to \*\*T4 GPU\*\* for better performance.  
3. Install the dependencies using:  
 ```  
 !pip install transformers torch gradio -q  
 ```  
4. Run the provided script cells in sequence.  
5. Enter a \*\*City Name\*\* in the City Analysis tab to receive a safety report.  
6. Enter a \*\*Citizen Query\*\* in the Citizen Services tab to get guidance.  
7. Use the generated Gradio link to access the application outside Colab.  
  
Even a non-technical user can easily follow these instructions, making the solution user-friendly and practical.

# 🔹 Example Inputs/Outputs

\*\*Example 1 (City Analysis Input: Mumbai)\*\*  
- Crime Index: Medium-high  
- Accident Rates: High  
- Overall Safety: Moderate  
  
\*\*Example 2 (Citizen Query: What is the process to apply for a passport renewal?)\*\*  
- Apply online via official portal.  
- Provide Aadhaar, old passport, proof of residence.  
- Book appointment at Passport Seva Kendra.  
- Police verification may be needed.  
  
\*\*Example 3 (City Analysis Input: Chennai)\*\*  
- Crime Index: Low-medium  
- Accident Rates: Moderate  
- Overall Safety: Relatively High  
  
\*\*Example 4 (Citizen Query: How do I pay property tax online?)\*\*  
- Visit the municipal corporation official website.  
- Enter property details and registered mobile number.  
- Pay through net banking/UPI/card.  
- Receive confirmation receipt.  
  
These examples highlight the usefulness of the system across different real-world contexts.

# 🔹 Limitations

While the system demonstrates the potential of AI for civic services, it has some important limitations:  
  
1. \*\*No Real-time Data\*\*: The current system does not fetch live statistics. For example, recent crime numbers or ongoing civic works are unavailable.  
2. \*\*Generalized Knowledge\*\*: The responses are based on model training, which may not always match current policies.  
3. \*\*Language Support\*\*: The project is currently limited to English queries, which reduces accessibility in multilingual regions.  
4. \*\*Legal/Official Boundaries\*\*: Since this AI is not an official government portal, it cannot provide legally binding information.

# 🔹 Future Enhancements

The project has potential for several future improvements:  
  
1. \*\*Real-time Data Integration\*\*: By connecting APIs from police, hospitals, and government portals, the system could provide live statistics.  
2. \*\*Multilingual Support\*\*: Enabling queries in regional languages like Hindi, Tamil, or Bengali would increase accessibility.  
3. \*\*Voice-enabled Queries\*\*: Integrating speech-to-text would allow citizens with limited literacy to interact with the system.  
4. \*\*Mobile Application Deployment\*\*: Packaging the project into an Android/iOS app for easier public access.  
5. \*\*Data Visualization\*\*: Adding graphs and heatmaps to represent crime trends, accident hotspots, or service availability.  
  
In summary, this project is a stepping stone toward AI-driven citizen engagement and urban analysis. Its expansion could make government services more transparent, efficient, and accessible.