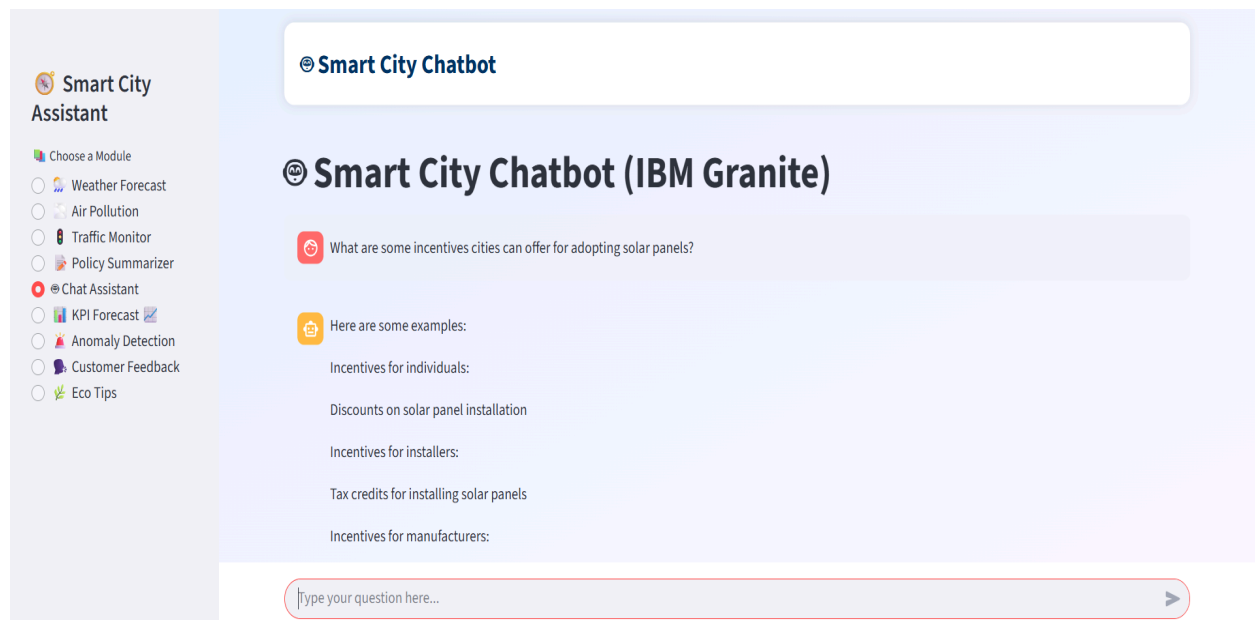


7. Results

The Smart City Assistant was tested across all functional modules, validating performance, accuracy, and usability. Below are screenshots and results captured from the working application:

7.1 Chat Assistant

- Built using IBM Watsonx's Granite LLM for natural language interaction.
- Understands queries related to smart city sustainability and governance.
- Responds with relevant eco-strategies, smart infrastructure tips, and urban planning suggestions.
- Maintains context-aware conversations with user-friendly interface.
- Acts as a virtual guide for citizens and municipal planners.



Output: Smart City Assistant

7.2 Policy Document Summarizer

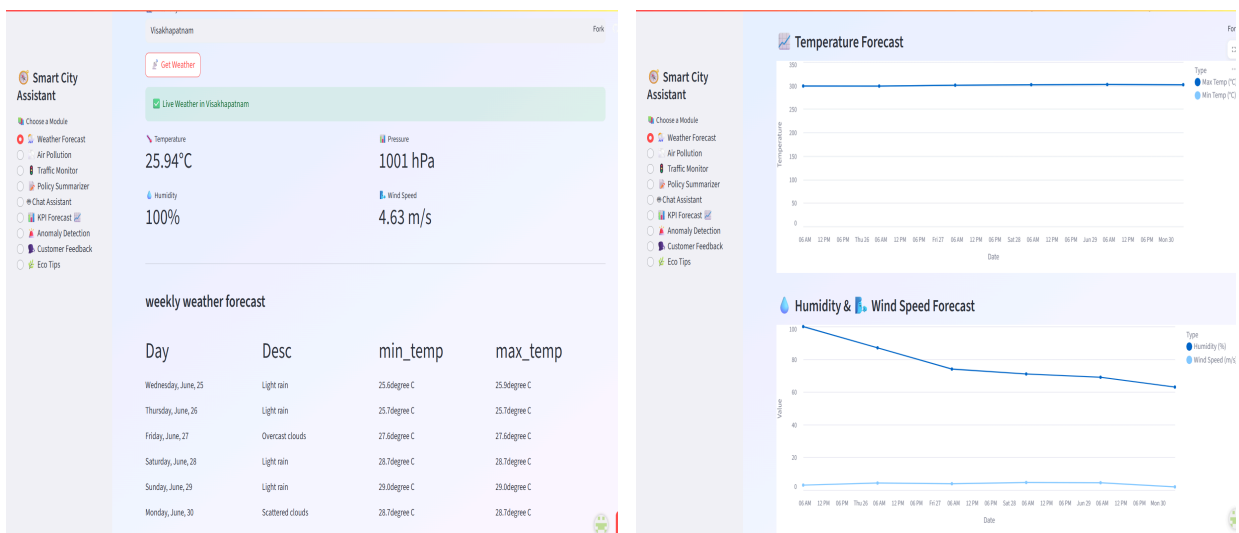
- Accepts policy documents (PDF or TXT) as input from users.
- Uses IBM Granite LLM to summarize complex policy language into citizen-friendly text.
- Helps municipal officers extract key information quickly.
- Encourages greater transparency and accessibility of city regulations.
- Saves time for planners in drafting, reviewing, and communicating policies.

The screenshot shows the 'Smart City Assistant' interface. On the left is a sidebar with a 'Choose a Module' section containing radio buttons for Weather Forecast, Air Pollution, Traffic Monitor, Policy Summarizer (selected), Chat Assistant, KPI Forecast, Anomaly Detection, Customer Feedback, and Eco Tips. The main area is titled 'Policy Summarizer' and 'Text & Document Summarizer using IBM Granite'. It has a 'Choose input type:' section with 'Text' and 'Document' (selected) options. Below is an 'Upload document (TXT, PDF, DOCX)' section with a 'Drag and drop file here' area (limit 200MB per file) and a 'Browse files' button. A file named 'Smart_Water_Policy_Document.docx' (36.3KB) is shown. An 'Extracted Text Preview' section displays the following text: 'Urban Water Sustainability Policy – 2025', 'The Urban Water Sustainability Policy aims to ensure equitable, efficient, and sustainable management of water resources in smart cities.', 'Objectives:', 'Reduce non-revenue water losses by 30% over 5 years.', 'Promote rainwater harvesting and decentralized treatment plants.', 'Digitize water distribution using IoT and AI-powered leakage detection.', 'Encourage citizen participation through water audits and awareness drives.', 'Enforce smart metering across all urban households by 2027.', and 'References:'. A 'Summarize' button is at the bottom.

Output : Document Summarizer

7.3 Weather Forecast

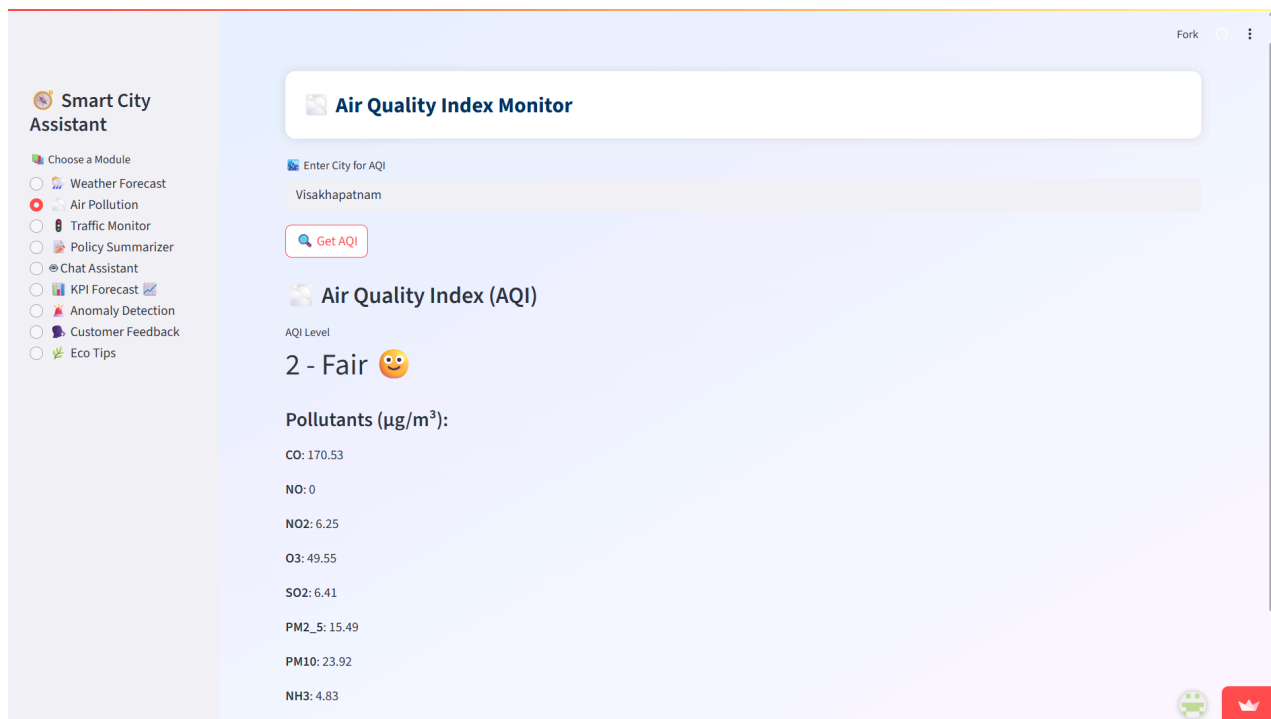
- Fetches 7-day weather forecast for any city entered by the user.
- Displays real-time metrics such as:
 - 🌡️ Temperature in °C
 - 💧 Humidity percentage
 - 🌬️ Wind speed in m/s
 - 📊 Pressure in hPa
- Visualizes forecast trends using interactive charts.
- Enables city officials to plan maintenance, events, or advisories.



Output : Weather Forecast

7.4 Air Pollution

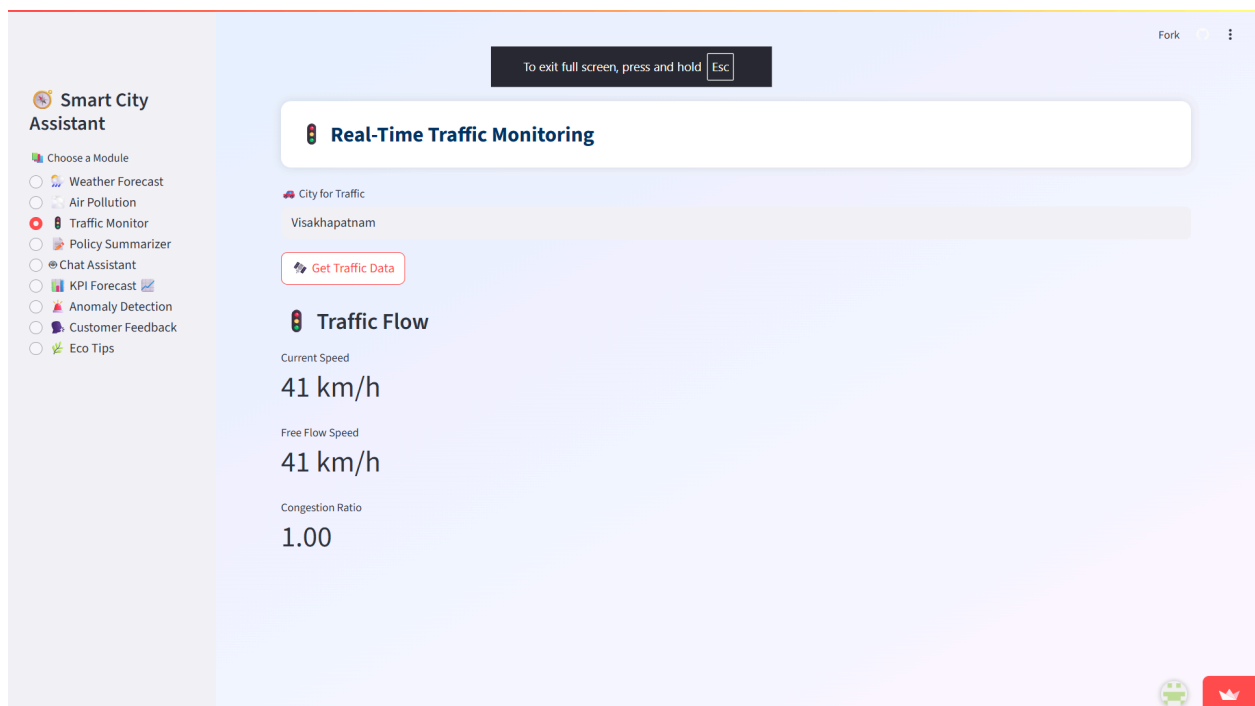
- Retrieves and visualizes AQI (Air Quality Index) for selected cities.
- Provides pollutant breakdown:
 - PM2.5, PM10, CO, NO₂, SO₂, O₃
- Displays health advisories for sensitive groups.
- Helps authorities trigger alerts or restrictions when pollution is high.



Output : Air Quality Monitor

7.5 Traffic Monitor

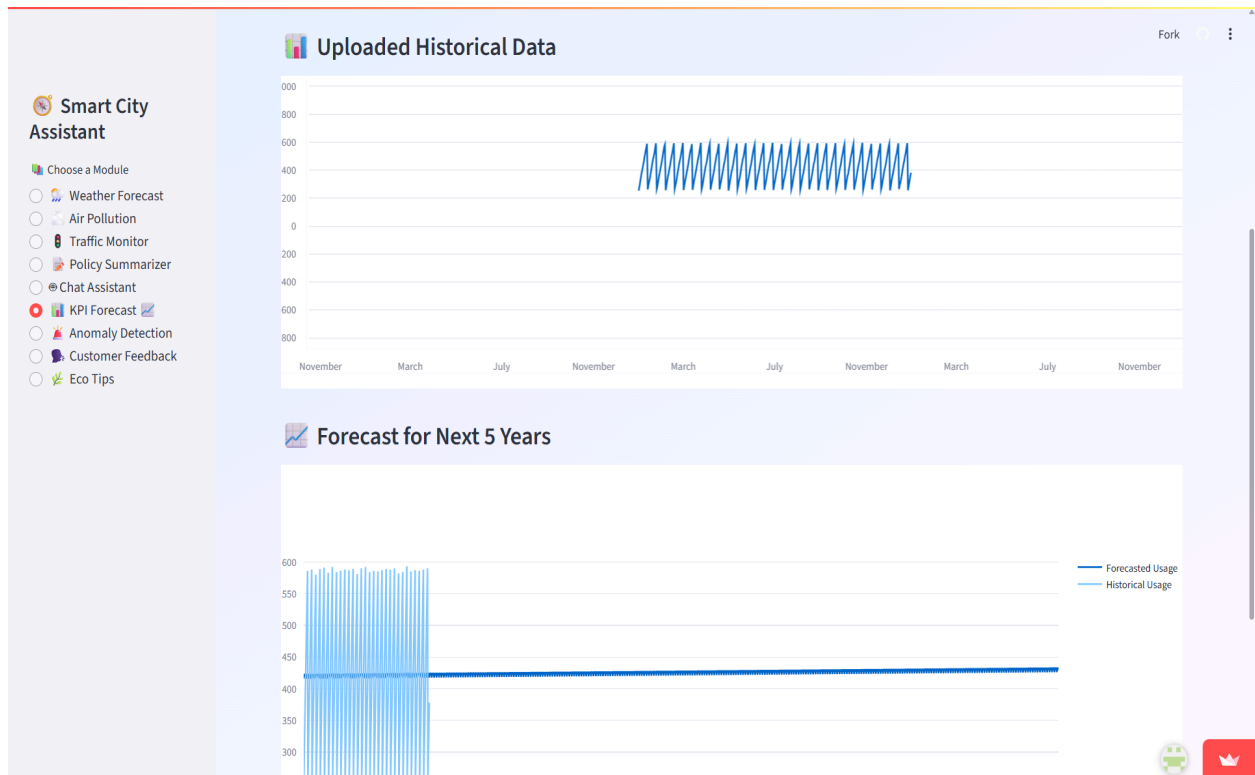
- Uses GPS coordinates to fetch live traffic congestion levels.
- Integrates TomTom API to show:
 - Road density status
 - Speed patterns in key urban sectors
- Assists in dynamic rerouting or emergency response planning.
- Useful for citizens, transport departments, and city planners.



Output : Real-Time Traffic Monitoring

7.6 KPI Forecasting

- Allows city officials to upload historical KPI datasets (CSV format).
- Uses Prophet (ML model) to forecast metrics like energy or water consumption.
- Generates interactive trend visualizations using Plotly.
- Aids in data-driven budget allocation, infrastructure scaling, and sustainability planning.
- Option to download forecast results for report sharing or archiving.



Output : KPI Forecasting

7.7 Anomaly Detection

- Accepts monthly energy consumption KPI data from different city zones.
- Automatically flags unusual spikes or drops in resource usage.
- Helps detect unauthorized construction or faulty infrastructure.
- Visual indicators allow quick spotting of anomalies on charts.
- Enhances city resource auditing and policy enforcement.

The screenshot displays the 'Smart City Assistant' interface. On the left sidebar, under 'Choose a Module', 'Anomaly Detection' is selected. The main content area is titled 'Anomaly Detection' and features an 'Upload CSV File' section with a 'Drag and drop file here' instruction and a 'Browse files' button. Below this, a green notification bar states 'File Uploaded Successfully'. The 'Preview of Data' section shows a table with the following data:

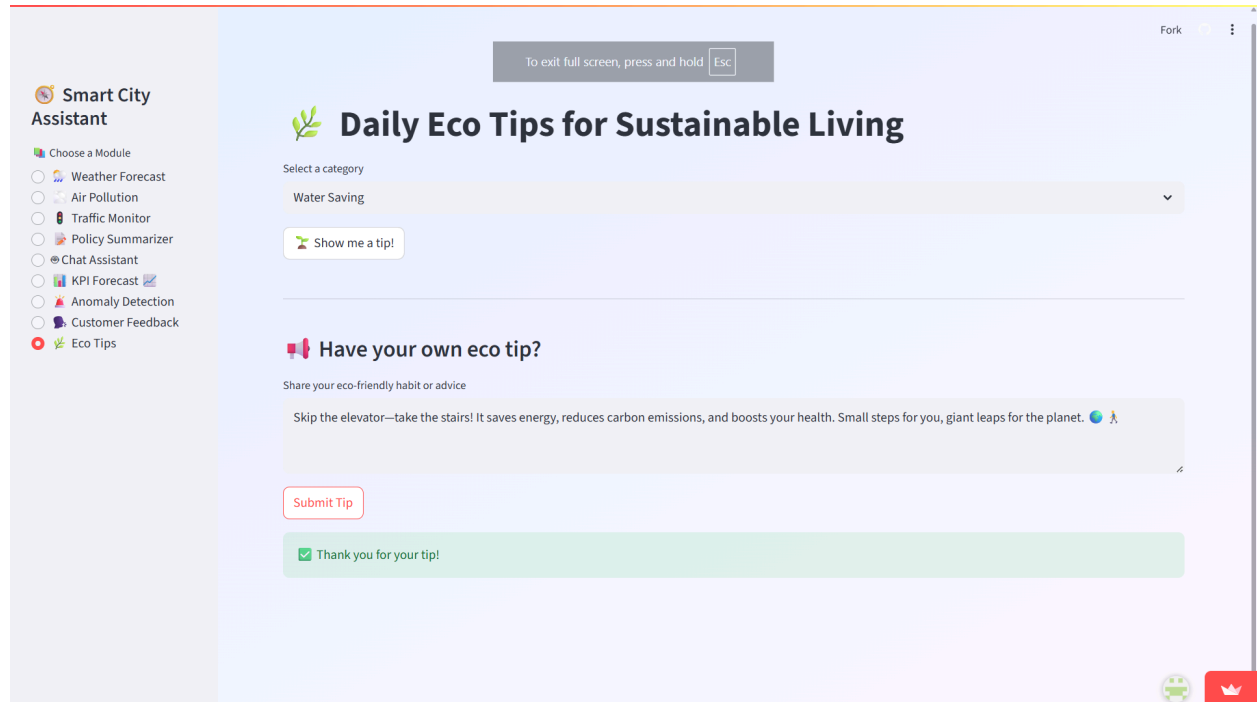
	date	zone	energy_usage_kwh
0	2022-01-01	Zone-5	524.84
1	2022-01-02	Zone-5	493.09
2	2022-01-03	Zone-5	532.38
3	2022-01-04	Zone-5	576.15
4	2022-01-05	Zone-5	488.29

Below the table, there is a 'Select column to detect anomalies' dropdown menu with 'energy_usage_kwh' selected.

Output : Anomaly Detection

7.8 Eco Tips Generator

- Accepts environment-related keywords like “plastic,” “solar,” or “transport.”
- Generates concise, actionable tips for sustainable living.
- Ideal for use in educational campaigns, schools, and community drives.
- Powered by Granite LLM for smart, human-like suggestions.
- Promotes daily green habits among citizens.



Output : Echo Tips

7.9 Customer Feedback

- Citizens can submit issues via a structured feedback form (e.g., "water pipe burst").
- Categorizes inputs into predefined tags (e.g., Water, Waste, Roads).
- Stores entries for review and action by administrators.
- Encourages participatory governance and faster grievance redressal.
- Reduces burden on physical complaint centers or helplines.

The screenshot displays the 'Share Your Feedback' form within the 'Smart City Assistant' application. On the left, a sidebar lists various modules: Weather Forecast, Air Pollution, Traffic Monitor, Policy Summarizer, Chat Assistant, KPI Forecast, Anomaly Detection, Customer Feedback (highlighted with a red dot), and Eco Tips. The main form area is titled 'Share Your Feedback' and includes fields for 'Name' (filled with 'Ravi') and 'City' (filled with 'Visakhapatnam'). Below these is a rating section 'Rate your experience (1-5)' with a red progress bar indicating a score of 5. The 'Your Feedback' text area contains a positive review of the Smart City Assistant for Visakhapatnam. A 'Submit Feedback' button is located below the text area. At the bottom, a green confirmation message reads 'Thank you for your valuable feedback!'. The interface also features a 'Fork' button and a menu icon in the top right corner, and a status bar at the bottom with a green robot icon and a red crown icon.

Smart City Assistant

Choose a Module

- ☐ Weather Forecast
- ☐ Air Pollution
- ☐ Traffic Monitor
- ☐ Policy Summarizer
- ☐ Chat Assistant
- ☐ KPI Forecast
- ☐ Anomaly Detection
- ☒ Customer Feedback
- ☐ Eco Tips

Share Your Feedback

Name: Ravi

City: Visakhapatnam

★ Rate your experience (1-5)

1 5

Your Feedback

The Smart City Assistant for Visakhapatnam is an outstanding initiative! The platform is clean, user-friendly, and offers relevant modules like traffic monitoring, pollution data, and eco tips that are perfect for an evolving city like Vizag. I especially loved how intuitive the feedback system is—this gives a real sense of citizen involvement. Looking forward to future updates like live city dashboards and more localized features. Keep up the great work!

Submit Feedback

✓ Thank you for your valuable feedback!

Output : Customer Feedback