Project Title - Sustainable Smart City Assistant Using IBM Granite LLM

Introduction :

Team ID : NM2025TMID06810

Team Size : 4

Team Leader : ARIVAZHAGAN A

Team member : ABINAYA P

Team member : AADHI LAKSHMI E

Team member : VIMAL RAJ A

Project Overview:

The Sustainable Smart City Assistant is an AI-powered platform that leverages IBM Watsonx's Granite LLM and modern data pipelines to support urban sustainability, governance, and citizen engagement. It integrates several modules like City Health Dashboard, Citizen Feedback, Document Summarization, Eco-Advice, Anomaly Detection, KPI forecasting and Chat Assistant through a modular FastAPI backend and a Streamlit- based frontend dashboard.

Use Case Scenarios

Policy Search & Summarization

A municipal planner uploads a complex city policy document to the assistant’s interface. In seconds, the assistant summarizes it into a concise, citizen-friendly version using IBM Granite LLM. This empowers planners to quickly interpret key points and make informed urban decisions.

Citizen Feedback Reporting

A resident notices a burst water pipe on a city street. Instead of calling helplines, they submit a report through the assistant's feedback form. The issue is logged instantly with category tagging (e.g., "Water") and can be reviewed by city administrators.

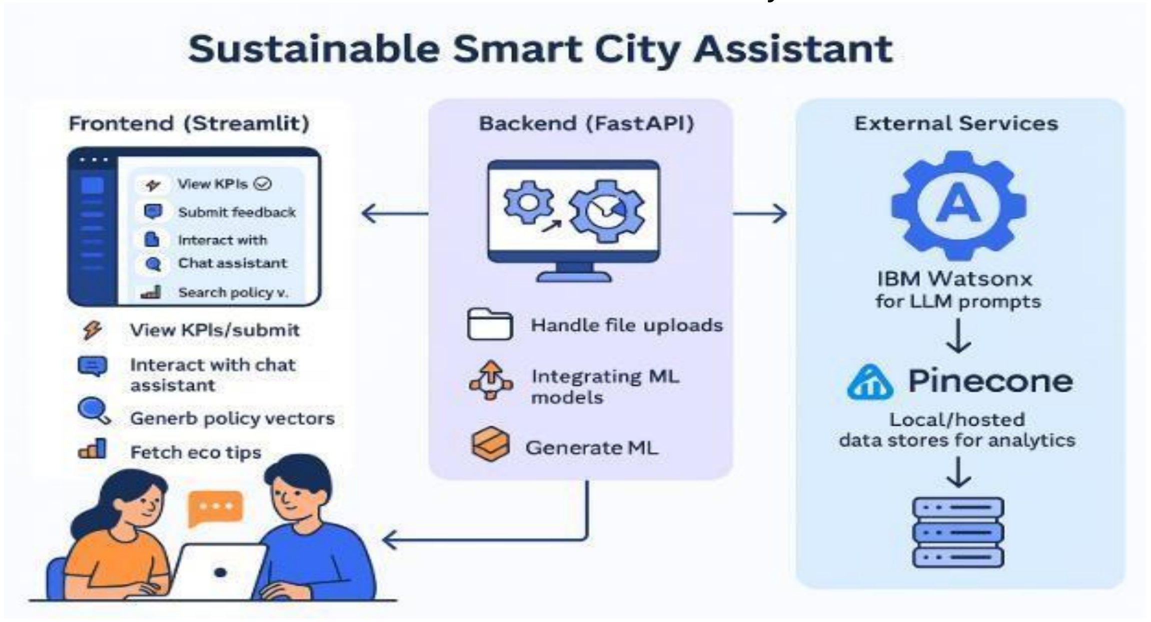
KPI Forecasting

A city administrator uploads last year's water usage KPI CSV. The assistant forecasts next year's consumption using built-in machine learning. This data is used in planning budgets and infrastructure upgrades.

Architecture

The architecture consists of three main layers:
Frontend (Streamlit): Provides a modular dashboard with options to view KPIs, submit feedback, interact with chat assistant, search policy vectors, generate reports, and fetch eco tips.
Backend (FastAPI): Manages API requests, handles file uploads, and integrates with ML models, Pinecone, and Watsonx Granite LLM.
External Services: IBM Watsonx for LLM promptsPinecone for vector indexing &

semantic search, and local/hosted data stores for analytics.



Project Flow

1. User Input:

Users interact with the **Streamlit frontend dashboard**, where they can:

- Submit **textual prompts** (for chat or policy summaries).
- Upload **policy documents** (.txt, .csv) for summarization and vector search.
- Choose a city to view **real-time KPIs** (water usage, air quality, energy).
- Submit **citizen feedback** (name, category, message).
- Ask sustainability queries via **chat interface**.
- Search for **eco-friendly tips** by entering a topic keyword.

UI Components Involved:
smart_dashboard.py, feedback_form.py, chat_assistant.py, eco_tips.py, summary_card.py

2. Backend Processing (FastAPI):

Each input request is sent to corresponding **FastAPI endpoints**, where:

- Feedback is stored and categorized through feedback_router.py.
- KPI .csv files are forecasted using internal ML models in kpi_file_forecaster.py.
- Text prompts (from chat, summarizer, eco tips) are sent to **IBM Granite LLM** using the granite_llm.py service.
- Anomaly detection is applied to uploaded datasets using statistical checks.

Key Backend Components:
vector_router.py, chat_router.py, kpi_upload_router.py, granite_llm.py, pinecone_client.py

3. AI Response Generation:

- The **Watsonx Granite LLM** processes chat queries, summaries, eco tips, and generates human-like natural language responses.
- **ML models** forecast future KPIs or detect anomalies in uploaded files.
- **Pinecone** retrieves the most relevant policy document chunks using semantic search powered by vector similarity.

Output Formats: JSON objects containing text summaries, search results, KPIs, anomaly alerts.

4. Frontend Display:

The **Streamlit frontend** dynamically renders:

- KPI data in **visually enhanced cards** (summary_card.py).
- AI-generated responses (chat, eco tips) directly in user input sections.
- Policy search results in readable formats.
- Submission success or errors through toast messages (e.g., feedback success).

Frontend Enhancements Done: Rounded input cards, Gradient background, Icon-rich sidebar, Themed buttons and layout improvements.

5. User Interaction:

Users are able to:

- Switch cities and compare urban KPIs dynamically.
- Ask follow-up queries in the chat assistant.
- Generate policy summaries and sustainability reports.
- Continuously explore eco tips with varied topics.
- Interact with updated dashboard metrics in real time.

Real-time interaction enabled by:

FastAPI + Streamlit two-way binding with updated backend JSON responses.

Prior Knowledge

You must have the prior knowledge of the following topics to complete this project:

Generative AI Concepts

NLP: https://www.tutorialspoint.com/natural_language_processing/index.htm

Generative AI: https://en.wikipedia.org/wiki/Generative_artificial_intelligence

IBM Watsonx Granite: https://cloud.ibm.com/watsonx/overview

LangChain:https://docs.langchain.com/docs/

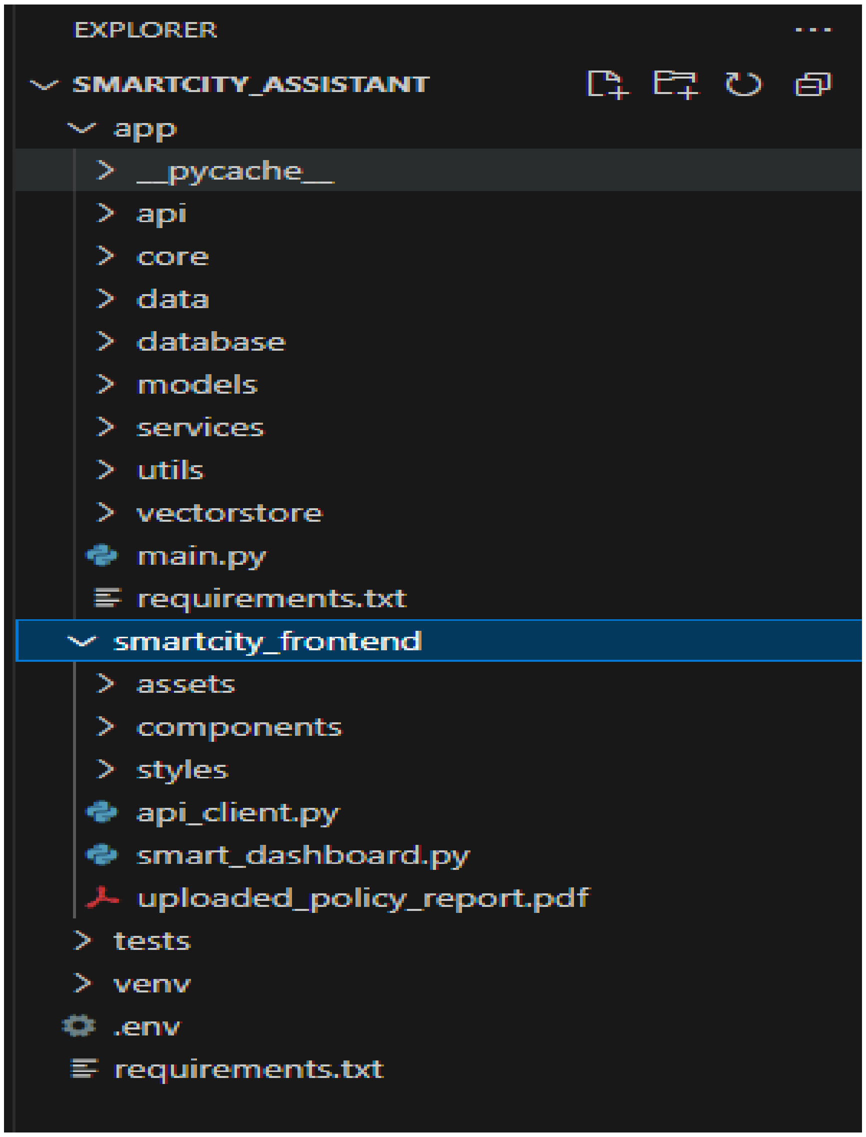
Pinecone: https://docs.pinecone.io/docs/overview

FastAPI: https://fastapi.tiangolo.com/
Streamlit: https://www.geeksforgeeks.org/a-beginners-guide-to-streamlit/

Project Milestones & Development Flow

Phase 1 – Project Initialization

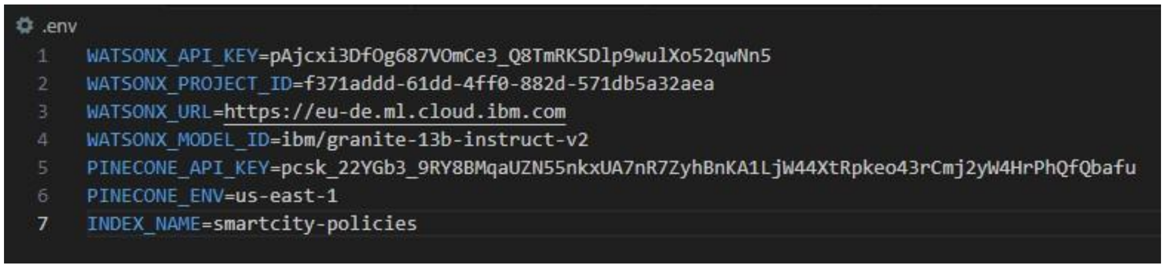
Modular Folder Structure Defined: Created separate folders for app/api, services, vectorstore,
core, frontend/components, and utils for organized and scalable development.



```
EXPLORER
SMARTCITY_ASSISTANT
  app
    __pycache__
    api
    core
    data
    database
    models
    services
    utils
    vectorstore
    main.py
    requirements.txt
  smartcity_frontend
    assets
    components
    styles
    api_client.py
    smart_dashboard.py
    uploaded_policy_report.pdf
  tests
  venv
  .env
  requirements.txt
```

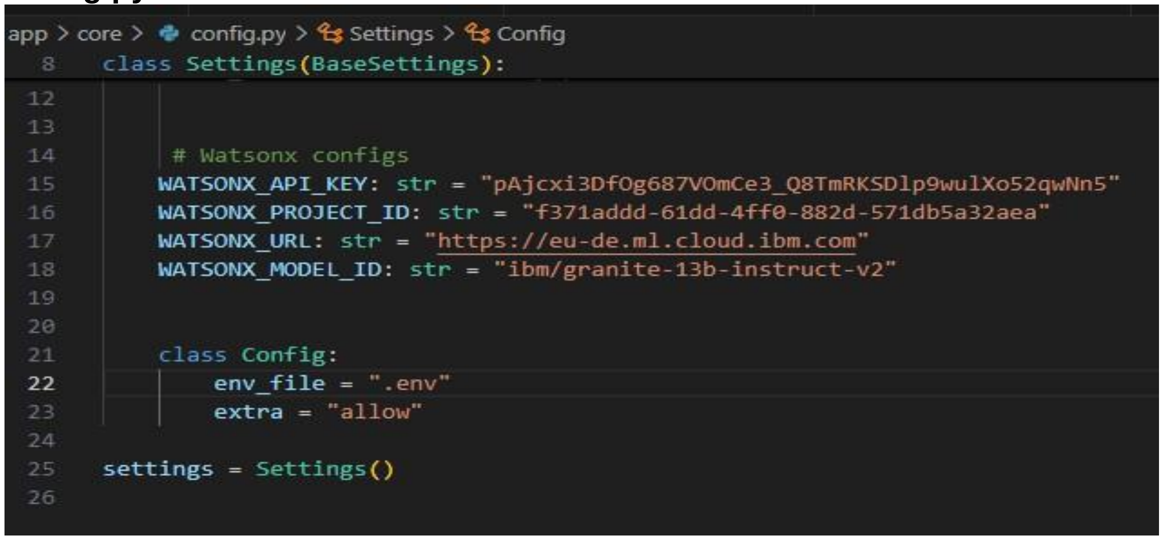
Environment Setup:
.env file created with keys for Pinecone and Watsonx. config.py loads environment variables securely using pydantic.

.env file



```
.env
WATSONX_API_KEY=pAjcxi3Df0g687VOmCe3_Q8TmRKSDlp9wulXo52qwNn5
WATSONX_PROJECT_ID=f371addd-61dd-4ff0-882d-571db5a32aea
WATSONX_URL=https://eu-de.ml.cloud.ibm.com
WATSONX_MODEL_ID=ibm/granite-13b-instruct-v2
PINECONE_API_KEY=pcsk_22YGb3_9RY8BMqaUZN55nkxUA7nR7ZyhBnKA1LjW44XtRpkeo43rCmj2yW4HrPhQfQbafu
PINECONE_ENV=us-east-1
INDEX_NAME=smartcity-policies
```

Config.py file

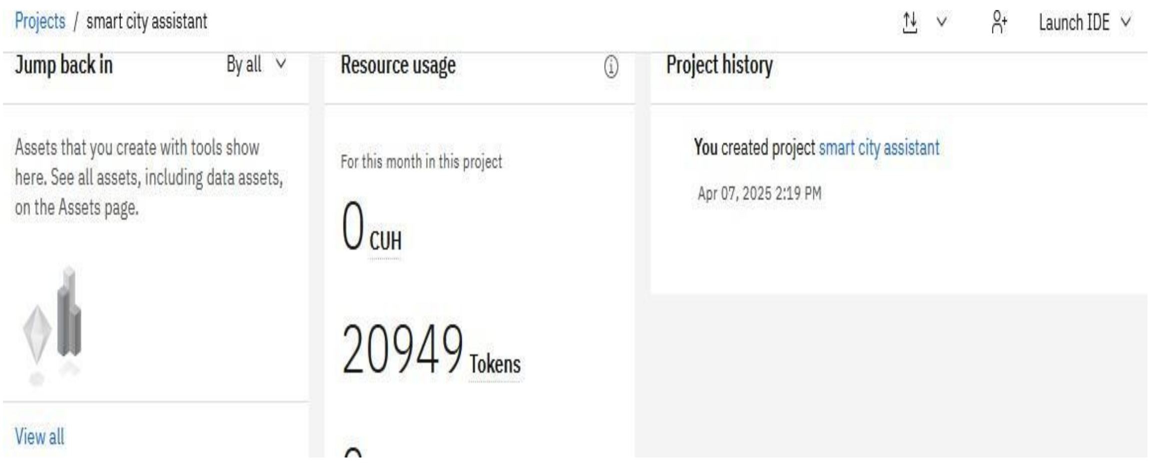


```
app > core > config.py > Settings > Config
class Settings(BaseSettings):



     # Watsonx configs
    WATSONX_API_KEY: str = "pAjcxi3Df0g687VOmCe3_Q8TmRKSDlp9wulXo52qwNn5"
    WATSONX_PROJECT_ID: str = "f371addd-61dd-4ff0-882d-571db5a32aea"
    WATSONX_URL: str = "https://eu-de.ml.cloud.ibm.com"
    WATSONX_MODEL_ID: str = "ibm/granite-13b-instruct-v2"


    class Config:
        env_file = ".env"
        extra = "allow"

settings = Settings()

```

Pinecone Initialization:
pinecone_client.py written to initialize the Pinecone vector index (smartcity-policies). Ensured creation with correct dimension=384 matching embedding model.

Phase 2 – IBM Watsonx Integration

Watsonx Key & Model
Configuration: Set up .env with:
WATSONX_API_KEY, PROJECT_ID, MODEL_ID



Projects / smart city assistant

Jump back in — By all

Assets that you create with tools show here. See all assets, including data assets, on the Assets page.

View all

Resource usage

For this month in this project

0 CUH

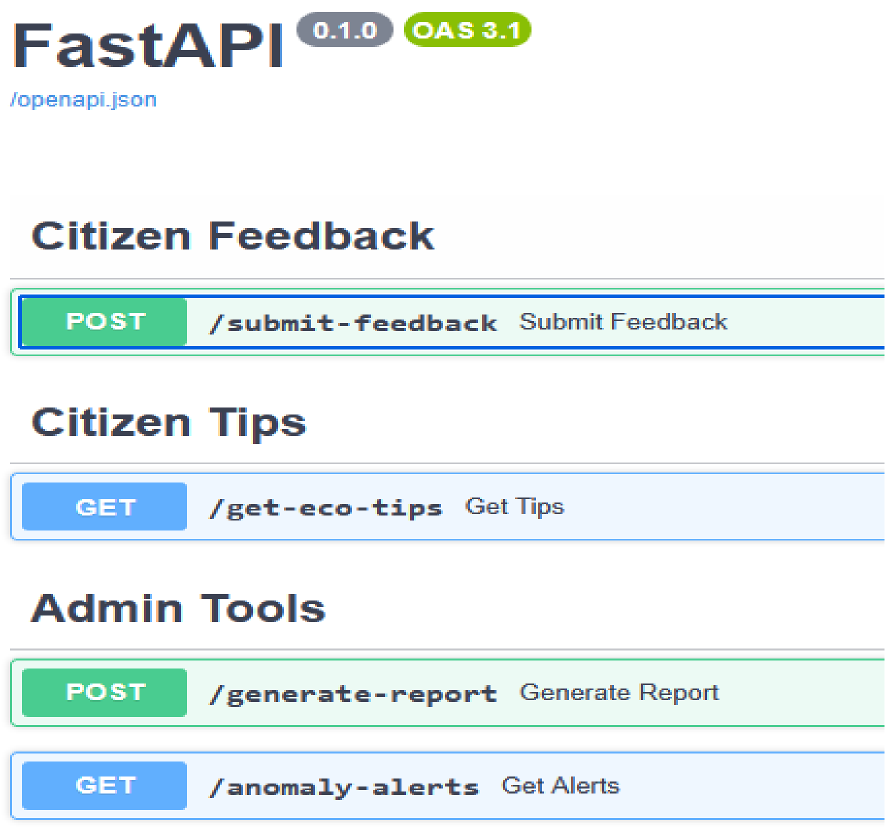
20949 Tokens

Project history

You created project smart city assistant

Apr 07, 2025 2:19 PM

Endpoint Testing:
Validated /chat, /policy/summarize, and /get-eco-tips FastAPI routes using Swagger UI.



FastAPI 0.1.0 OAS 3.1

/openapi.json

Citizen Feedback

POST /submit-feedback Submit Feedback

Citizen Tips

GET /get-eco-tips Get Tips

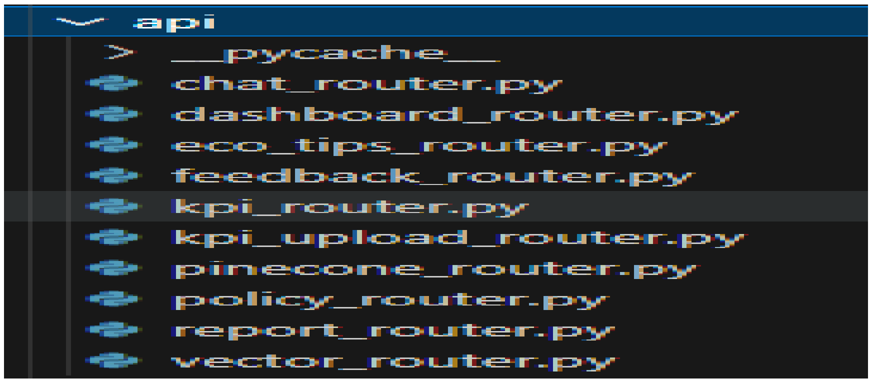
Admin Tools

POST /generate-report Generate Report

GET /anomaly-alerts Get Alerts

Phase 3 – Backend API Routers
API Routes Implemented:
Developed modular routers:

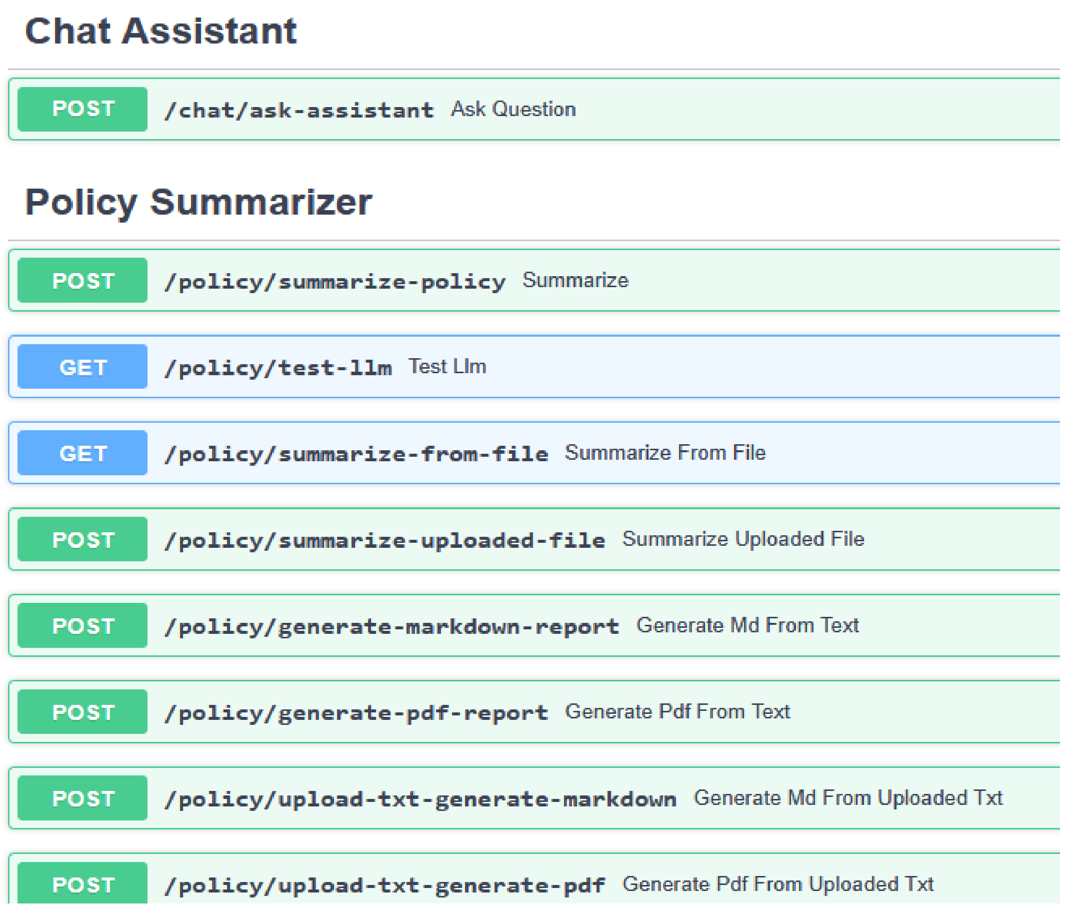
- chat_router.py
- feedback_router.py
- eco_tips_router.py
- kpi_upload_router.py
- anomaly_checker.py
- vector_router.py, etc.



```
api
  > __pycache__
  chat_router.py
  dashboard_router.py
  eco_tips_router.py
  feedback_router.py
  kpi_router.py
  kpi_upload_router.py
  pinecone_router.py
  policy_router.py
  report_router.py
  vector_router.py
```

Testing & Validation:
Each route tested for:

- JSON payload correctness
- File upload parsing
- Error handling & logging
- Swagger auto-documentation generation



Chat Assistant

POST /chat/ask-assistant Ask Question

Policy Summarizer

POST /policy/summarize-policy Summarize

GET /policy/test-llm Test Llm

GET /policy/summarize-from-file Summarize From File

POST /policy/summarize-uploaded-file Summarize Uploaded File

POST /policy/generate-markdown-report Generate Md From Text

POST /policy/generate-pdf-report Generate Pdf From Text

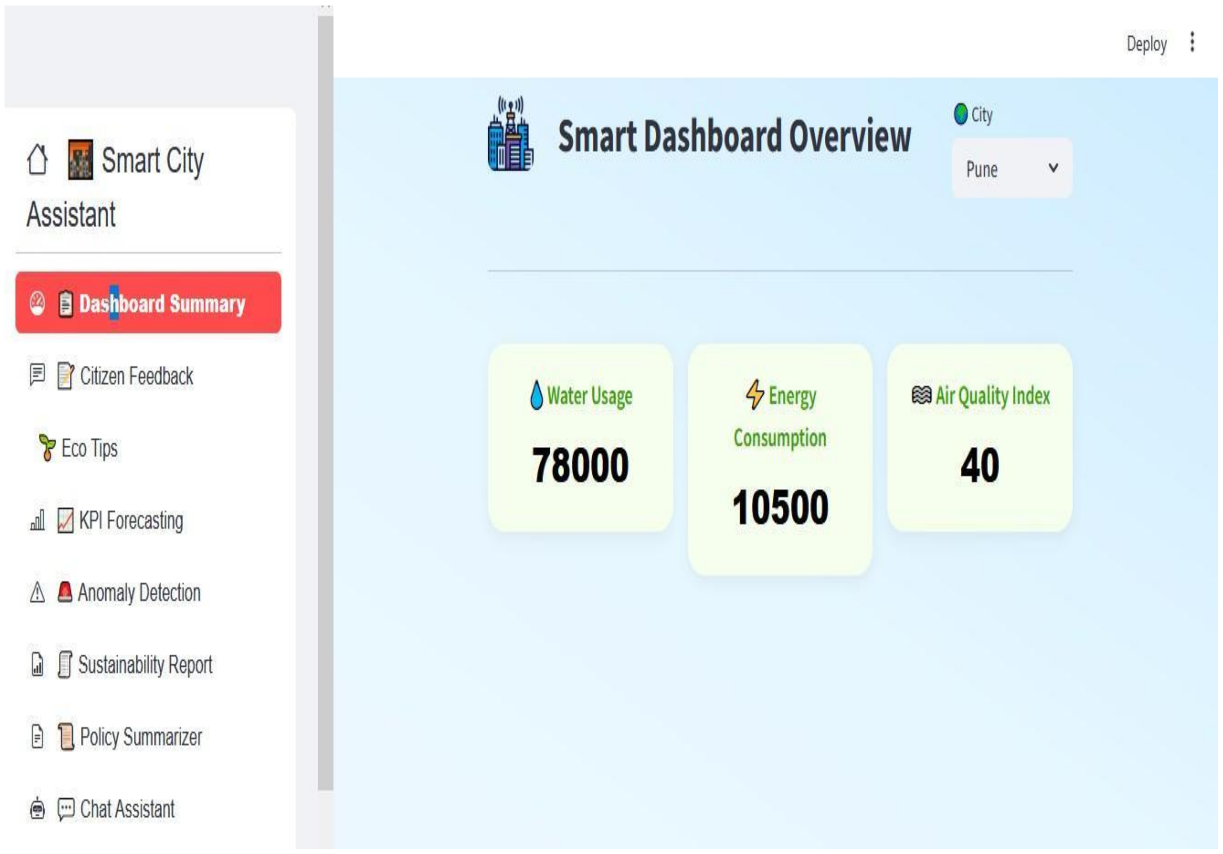
POST /policy/upload-txt-generate-markdown Generate Md From Uploaded Txt

POST /policy/upload-txt-generate-pdf Generate Pdf From Uploaded Txt

Phase 4 – Frontend UI Design

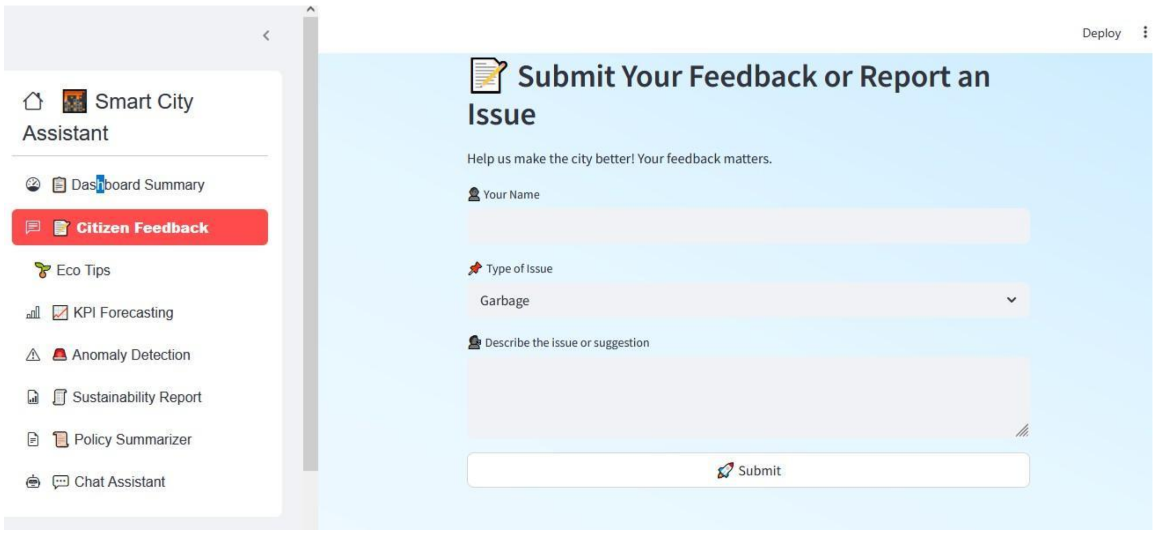
Streamlit UI Structure Implemented:

Created central file smart_dashboard.py with conditional rendering for each module using sidebar navigation.



Component Development:

Developed reusable Streamlit components:
summary_card.py – Beautiful KPI cards
chat_assistant.py – Text prompt and AI reply
feedback_form.py, eco_tips.py, report_generator.py, etc.



📝 Submit Your Feedback or Report an Issue

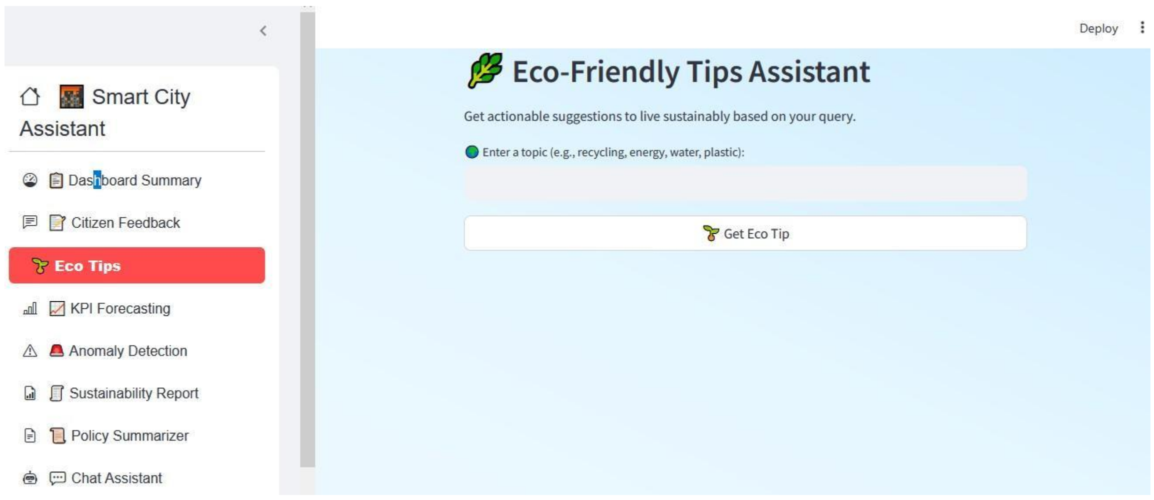
Help us make the city better! Your feedback matters.

Your Name

Type of Issue

Garbage

Describe the issue or suggestion



Eco-Friendly Tips Assistant

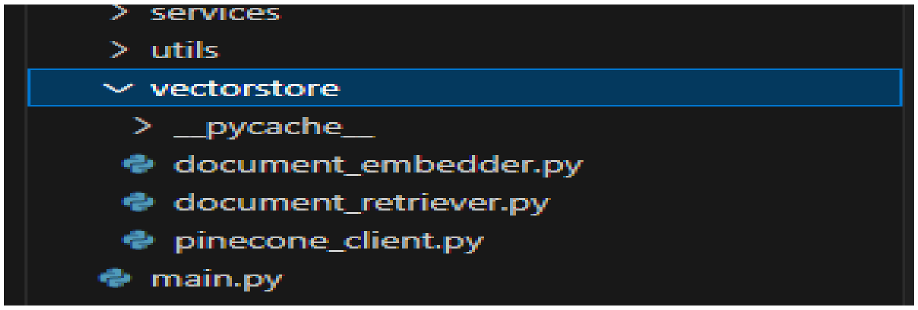
Get actionable suggestions to live sustainably based on your query.

Enter a topic (e.g., recycling, energy, water, plastic):

UI Enhancements Done:
Gradient backgrounds
Icon-rich sidebar using streamlit-option-menu
Rounded buttons, font styles, padding fixes

Phase 5 – Pinecone & Document Embedding

Embedding Logic Built:
Created document_embedder.py and document_retriever.py using sentence-transformers.



```
> services
> utils
v vectorstore
  > __pycache__
  document_embedder.py
  document_retriever.py
  pinecone_client.py
main.py
```

Phase 6 – Report Generation & Deployment

Granite LLM Report Generator:
report_generator.py takes city name and KPI data, generates detailed city sustainability report using Granite LLM prompts.
Markdown & PDF Support:
Output formatted to text block for copy/paste or PDF download (optional).
End-to-End Integration Testing:
Final dashboard tested on all 8 features: KPI dashboard, feedback form, policy summarization, eco tips, chat, anomaly check, vector search, report generation.

Milestone 1: Requirements Specification

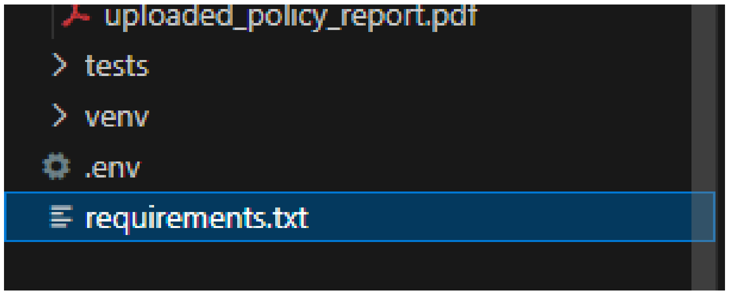
Objective: Establish the foundational libraries and packages for both frontend and backend to ensure reproducibility and easy environment setup.

Activity 1: Create requirements.txt

Duration: 0.5 Hrs

Skill Tags:

Activity 1: Create requirements.txt



uploaded_policy_report.pdf
tests
venv
.env
requirements.txt

Define the required libraries:

streamlit: For building interactive dashboard interfaces

fastapi: Backend API framework for rapid development

uvicorn: ASGI server to run FastAPI

requests: For API communication from frontend

python-dotenv: Manage environment variables

sentence-transformers: Text embedding model

pydantic-settings: Handle configuration management

pinecone-client: For semantic document search

scikit-learn, pandas: For anomaly detection and forecasting

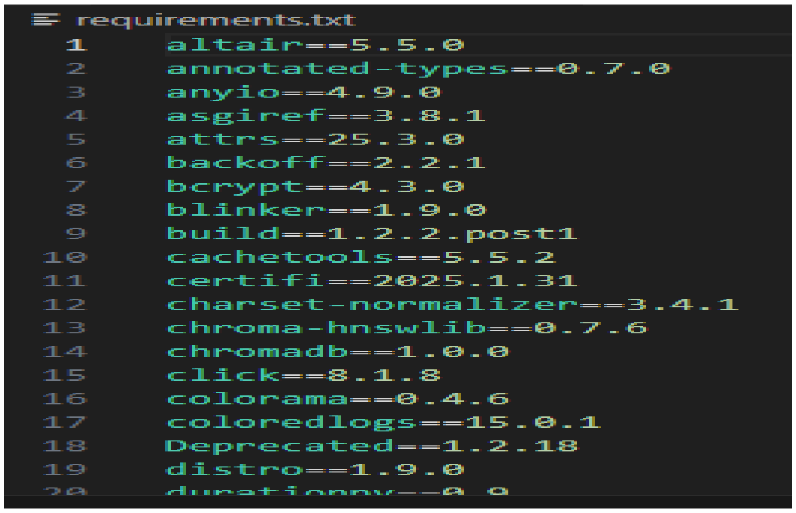
matplotlib: For report visualization

Activity 2 Install all dependencies

Duration: 0.5 Hrs

Skill Tags:

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



```
requirements.txt
altair==5.5.0
annotated-types==0.7.0
anyio==4.9.0
asgiref==3.8.1
attrs==25.3.0
backoff==2.2.1
bcrypt==4.3.0
blinker==1.9.0
build==1.2.2.post1
cachetools==5.5.2
certifi==2025.1.31
charset-normalizer==3.4.1
chroma-hnswlib==0.7.6
chromadb==1.0.0
click==8.1.8
colorama==0.4.6
coloredlogs==15.0.1
Deprecated==1.2.18
distro==1.9.0
```

Milestone 2: Environment Initialization & API Key Setup

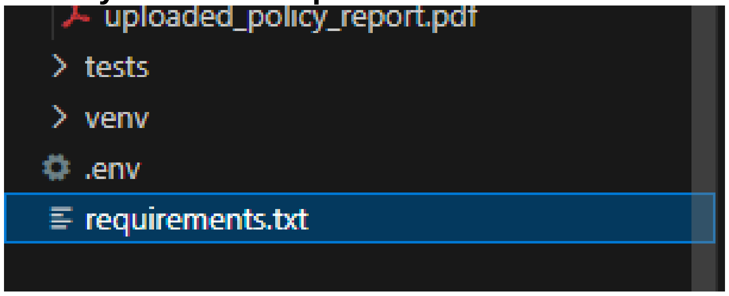
Objective: Configure and secure external service credentials (Watsonx & Pinecone).

Activity 1: Create requirements.txt

Duration: 0.5 Hrs

Skill Tags:

Activity 1: Create requirements.txt



```
uploaded_policy_report.pdf
> tests
> venv
.env
requirements.txt
```

Define the required libraries:

streamlit: For building interactive dashboard interfaces fastapi: Backend API framework for rapid development

uvicorn: ASGI server to run FastAPI

: For API communication from frontend

python-dotenv: Manage environment variables

sentence-transformers: Text embedding model

pydantic-settings: Handle configuration management

pinecone-client: For semantic document search

scikit-learn, pandas: For anomaly detection and forecasting

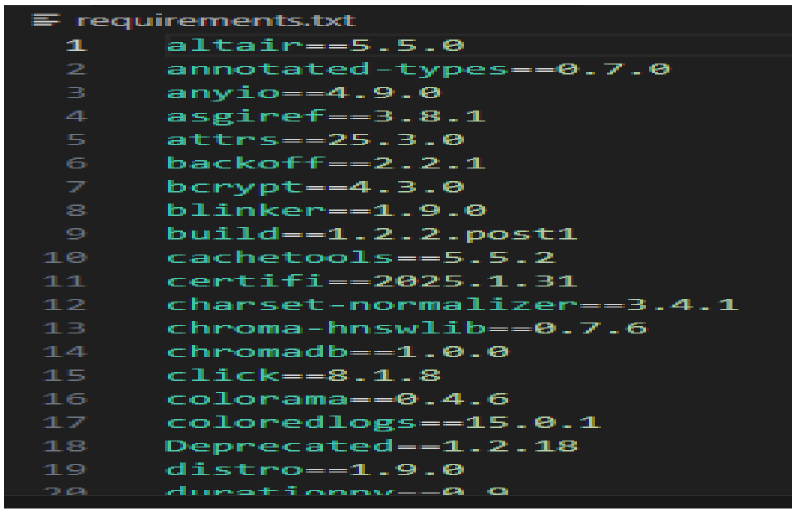
matplotlib: For report visualizations

Activity 2: Install all dependencies

Duration: 0.5 Hrs

Skill Tags:

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



requirements.txt

```
altair==5.5.0
annotated-types==0.7.0
anyio==4.9.0
asgiref==3.8.1
attrs==25.3.0
backoff==2.2.1
bcrypt==4.3.0
blinker==1.9.0
build==1.2.2.post1
cachetools==5.5.2
certifi==2025.1.31
charset-normalizer==3.4.1
chroma-hnswlib==0.7.6
chromadb==1.0.0
click==8.1.8
colorama==0.4.6
coloredlogs==15.0.1
Deprecated==1.2.18
distro==1.9.0
```

Milestone 3: AI Model Integration

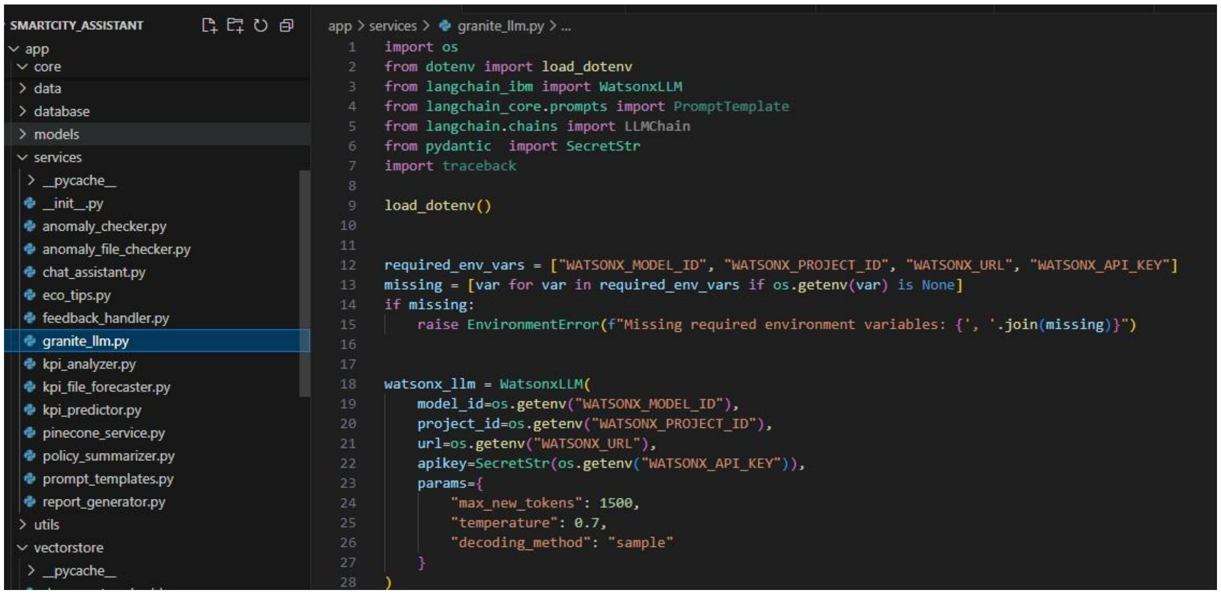
Objective: Integrate Watsonx Granite LLM with a centralized service layer.

Activity 1: Watsonx Integration

Duration: 0.5 Hrs

Skill Tags:

- Load env variables using python-dotenv
- Set up granite_llm.py to handle summarization, chat, eco tips, and sustainability reports
- Test LLM endpoints using dummy prompts



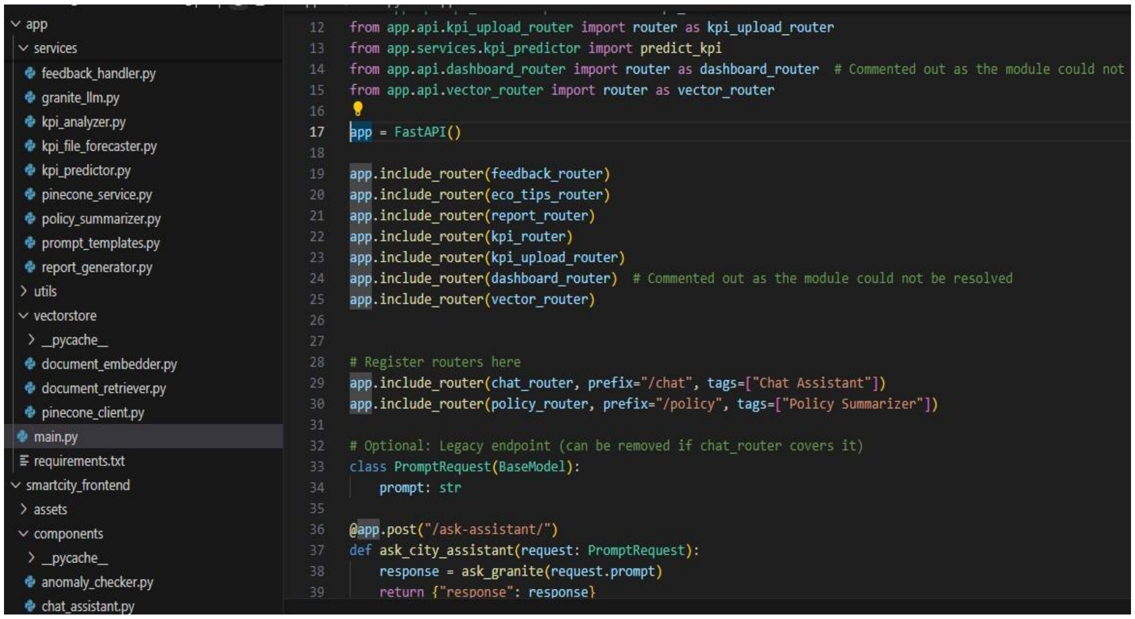
```python
import os
from dotenv import load_dotenv
from langchain_ibm import WatsonxLLM
from langchain_core.prompts import PromptTemplate
from langchain.chains import LLMChain
from pydantic  import SecretStr
import traceback

load_dotenv()


required_env_vars = ["WATSONX_MODEL_ID", "WATSONX_PROJECT_ID", "WATSONX_URL", "WATSONX_API_KEY"]
missing = [var for var in required_env_vars if os.getenv(var) is None]
if missing:
    raise EnvironmentError(f"Missing required environment variables: {', '.join(missing)}")


watsonx_llm = WatsonxLLM(
    model_id=os.getenv("WATSONX_MODEL_ID"),
    project_id=os.getenv("WATSONX_PROJECT_ID"),
    url=os.getenv("WATSONX_URL"),
    apikey=SecretStr(os.getenv("WATSONX_API_KEY")),
    params={
        "max_new_tokens": 1500,
        "temperature": 0.7,
        "decoding_method": "sample"
    }
)
```

Activity 2: Implement LLM Service Functions

Duration: 0.5 Hrs

Skill Tags:

- ask_granite(prompt) for chat
- generate_summary(text) for policy summarization
- generate_eco_tip(topic) for environmental suggestions
- generate_city_report(kpi_data) for sustainability reports



```python
from app.api.kpi_upload_router import router as kpi_upload_router
from app.services.kpi_predictor import predict_kpi
from app.api.dashboard_router import router as dashboard_router  # Commented out as the module could not
from app.api.vector_router import router as vector_router

app = FastAPI()

app.include_router(feedback_router)
app.include_router(eco_tips_router)
app.include_router(report_router)
app.include_router(kpi_router)
app.include_router(kpi_upload_router)
app.include_router(dashboard_router)  # Commented out as the module could not be resolved
app.include_router(vector_router)


# Register routers here
app.include_router(chat_router, prefix="/chat", tags=["Chat Assistant"])
app.include_router(policy_router, prefix="/policy", tags=["Policy Summarizer"])

# Optional: Legacy endpoint (can be removed if chat_router covers it)
class PromptRequest(BaseModel):
    prompt: str

@app.post("/ask-assistant/")
def ask_city_assistant(request: PromptRequest):
    response = ask_granite(request.prompt)
    return {"response": response}
```

Milestone 4: Backend API Development

Objective: Build modular RESTful API routes using FastAPI.

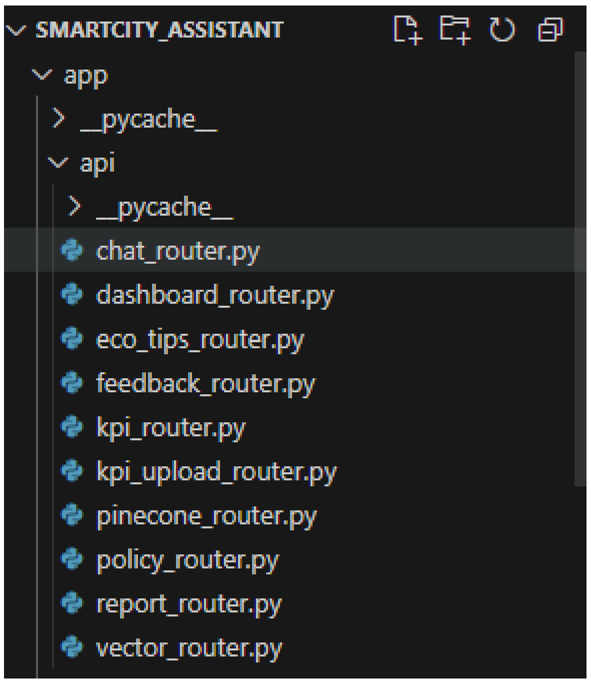
Activity 1: Create Routers

Duration: 0.5 Hrs

Skill Tags:

Modules created in app/api/:

- chat_router.py
- policy_router.py
- eco_tips_router.py
- feedback_router.py
- report_router.py
- vector_router.py
- kpi_upload_router.py
- dashboard_router.py



```
SMARTCITY_ASSISTANT
  app
    __pycache__
    api
      __pycache__
      chat_router.py
      dashboard_router.py
      eco_tips_router.py
      feedback_router.py
      kpi_router.py
      kpi_upload_router.py
      pinecone_router.py
      policy_router.py
      report_router.py
      vector_router.py
```

Activity 2: Test Routes

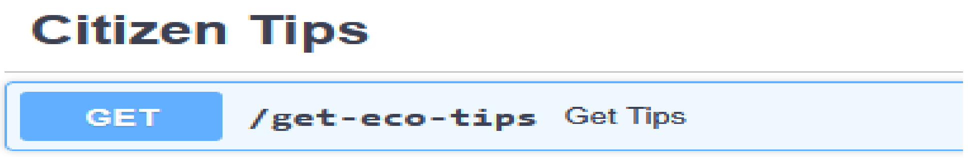
Duration: 0.5 Hrs

Skill Tags:

Use Swagger UI to validate:

- POST /upload-doc

- GET /search-docs
- GET /get-eco-tips?topic=energy
- POST /submit-feedback


Citizen Tips

GET /get-eco-tips Get Tips

Milestone 5: Streamlit Frontend UI Development

Objective: Design a user-friendly dashboard for real-time interaction.

Activity 1: Page Structure

Duration: 0.5 Hrs

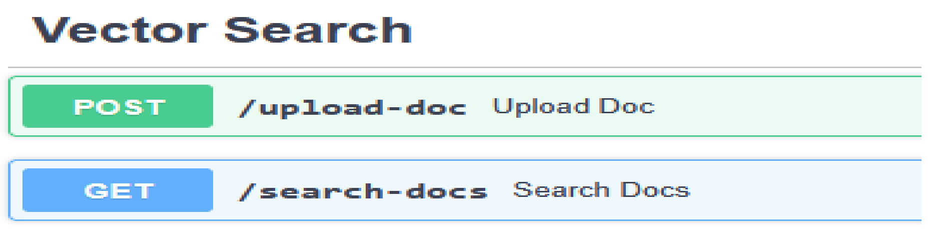
Skill Tags:

- Sidebar navigation using streamlit-option-menu
- Separate pages for: Dashboard, Feedback, Eco Tips, Chat, Policy Search, Anomaly Checker, KPI Forecasting

Milestone 6: Pinecone Semantic Search Integration

Objective: Embed uploaded documents and enable semantic policy search. **Document Embedding**

- Use sentence-transformers model (MiniLM) to convert .txt into 384-d vectors
- Store documents in Pinecone via document_embedder.py


Vector Search

POST /upload-doc Upload Doc

GET /search-docs Search Docs

Milestone 7: ML-based Forecasting and Anomaly Detection

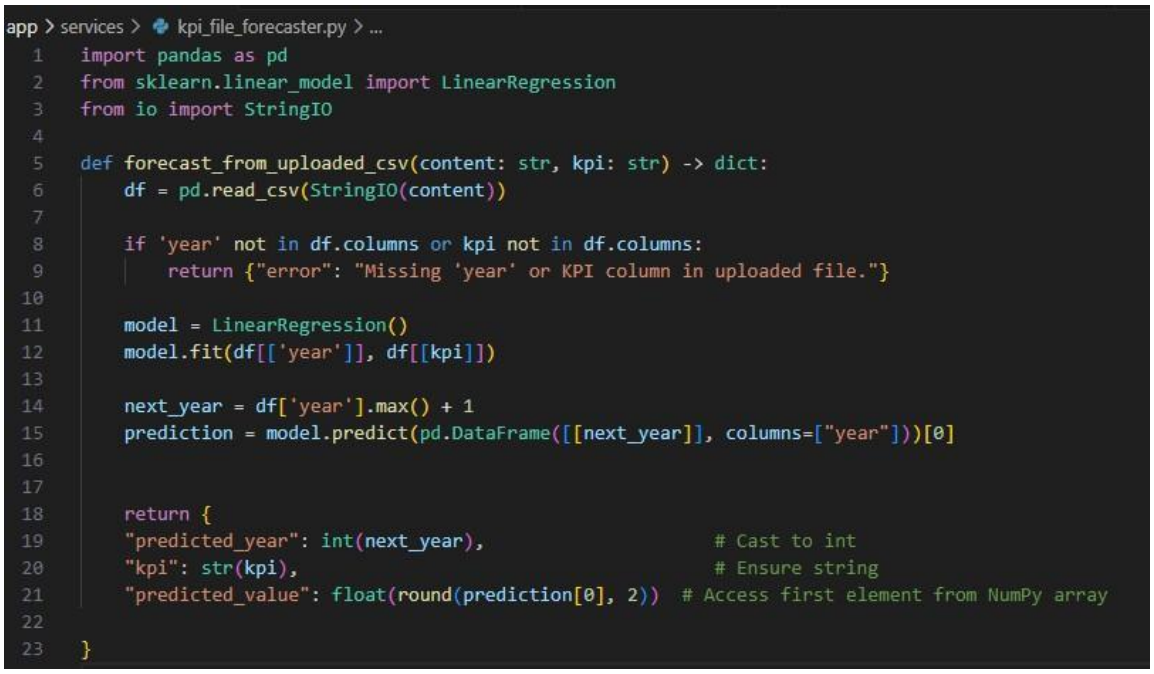
Objective: Analyze uploaded CSV files and predict future trends or irregularities.

Activity 1: Forecasting

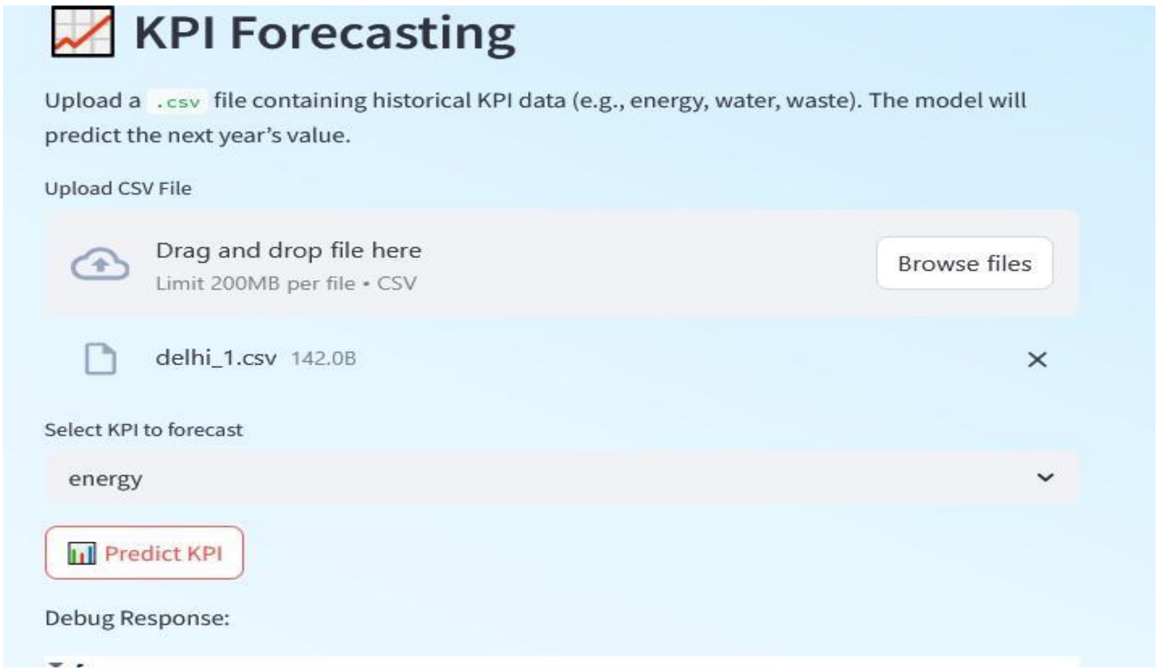
Duration: 0.5 Hrs

Skill Tags:

- Use Linear Regression in kpi_file_forecaster.py
- Predict water/energy use based on past data
- Display forecast on dashboard



```
app > services > kpi_file_forecaster.py > ...
import pandas as pd
from sklearn.linear_model import LinearRegression
from io import StringIO

def forecast_from_uploaded_csv(content: str, kpi: str) -> dict:
    df = pd.read_csv(StringIO(content))

    if 'year' not in df.columns or kpi not in df.columns:
        return {"error": "Missing 'year' or KPI column in uploaded file."}

    model = LinearRegression()
    model.fit(df[['year']], df[[kpi]])

    next_year = df['year'].max() + 1
    prediction = model.predict(pd.DataFrame([[next_year]], columns=["year"]))[0]


    return {
    "predicted_year": int(next_year),                       # Cast to int
    "kpi": str(kpi),                                        # Ensure string
    "predicted_value": float(round(prediction[0], 2))  # Access first element from NumPy array

}
```



KPI Forecasting

Upload a `.csv` file containing historical KPI data (e.g., energy, water, waste). The model will predict the next year's value.

Upload CSV File

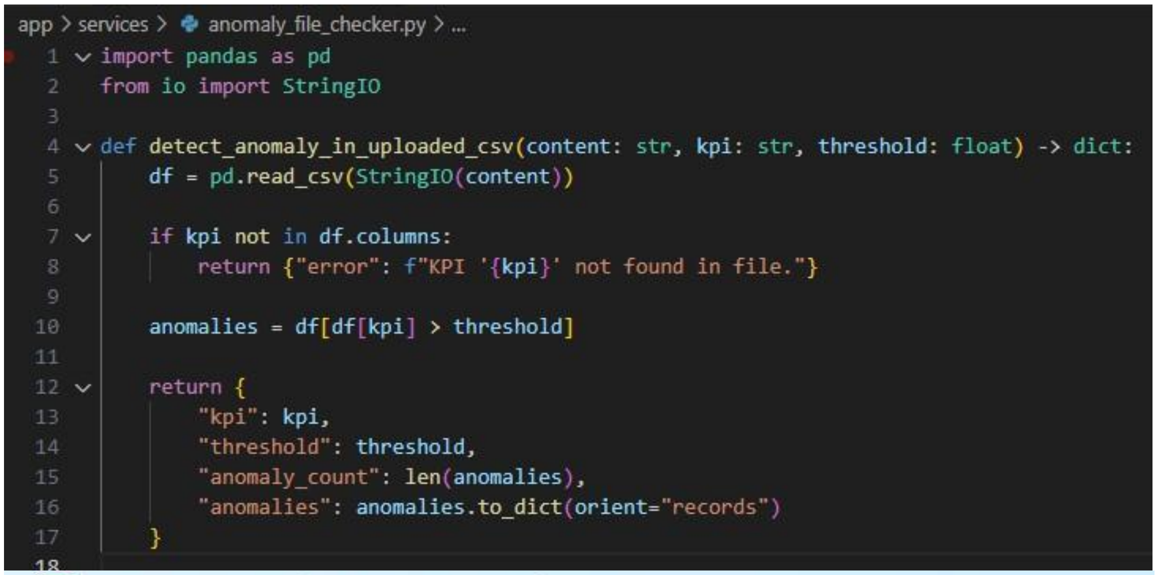
Activity 2: Anomaly Detection

Duration: 0.5 Hrs

Skill Tags:

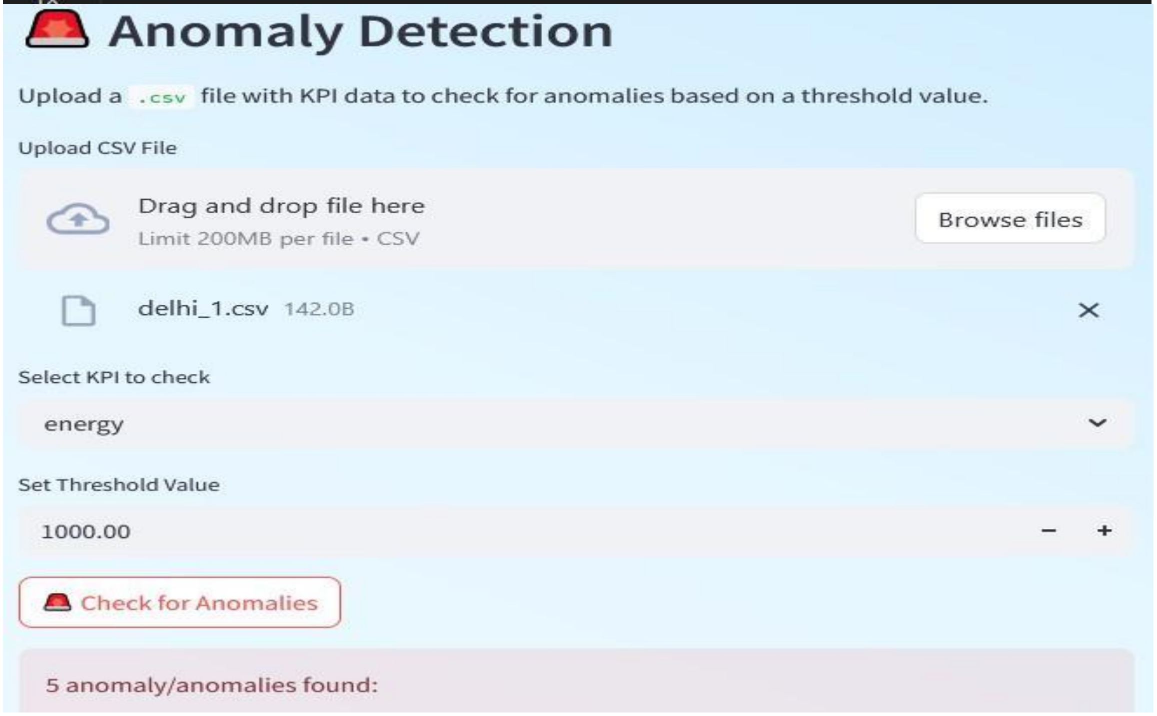
- anomaly_file_checker.py flags abnormal spikes

- Display results in tabular or colored badge format



app > services > anomaly_file_checker.py > ...

```python
import pandas as pd
from io import StringIO

def detect_anomaly_in_uploaded_csv(content: str, kpi: str, threshold: float) -> dict:
    df = pd.read_csv(StringIO(content))

    if kpi not in df.columns:
        return {"error": f"KPI '{kpi}' not found in file."}

    anomalies = df[df[kpi] > threshold]

    return {
        "kpi": kpi,
        "threshold": threshold,
        "anomaly_count": len(anomalies),
        "anomalies": anomalies.to_dict(orient="records")
    }
```



Anomaly Detection

Upload a `.csv` file with KPI data to check for anomalies based on a threshold value.

Upload CSV File

Drag and drop file here
Limit 200MB per file • CSV

Browse files

delhi_1.csv 142.0B

Select KPI to check
energy

Set Threshold Value
1000.00

Check for Anomalies

5 anomaly/anomalies found:

Milestone 8: Sustainability Report Generation

Objective: Generate a city-wise AI-powered sustainability summary.

Activity 1: Prompt Engineering

Duration: 0.5 Hrs

Skill Tags:

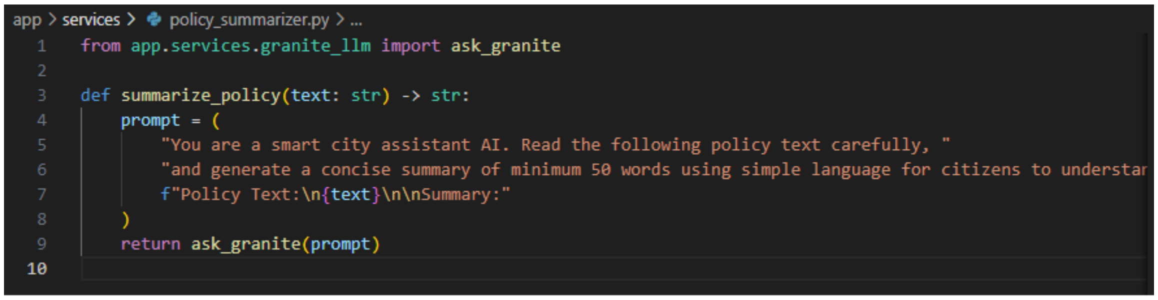
- report_generator.py uses a custom prompt to generate an AI-written report from KPI inputs

Activity 2: Display/Download

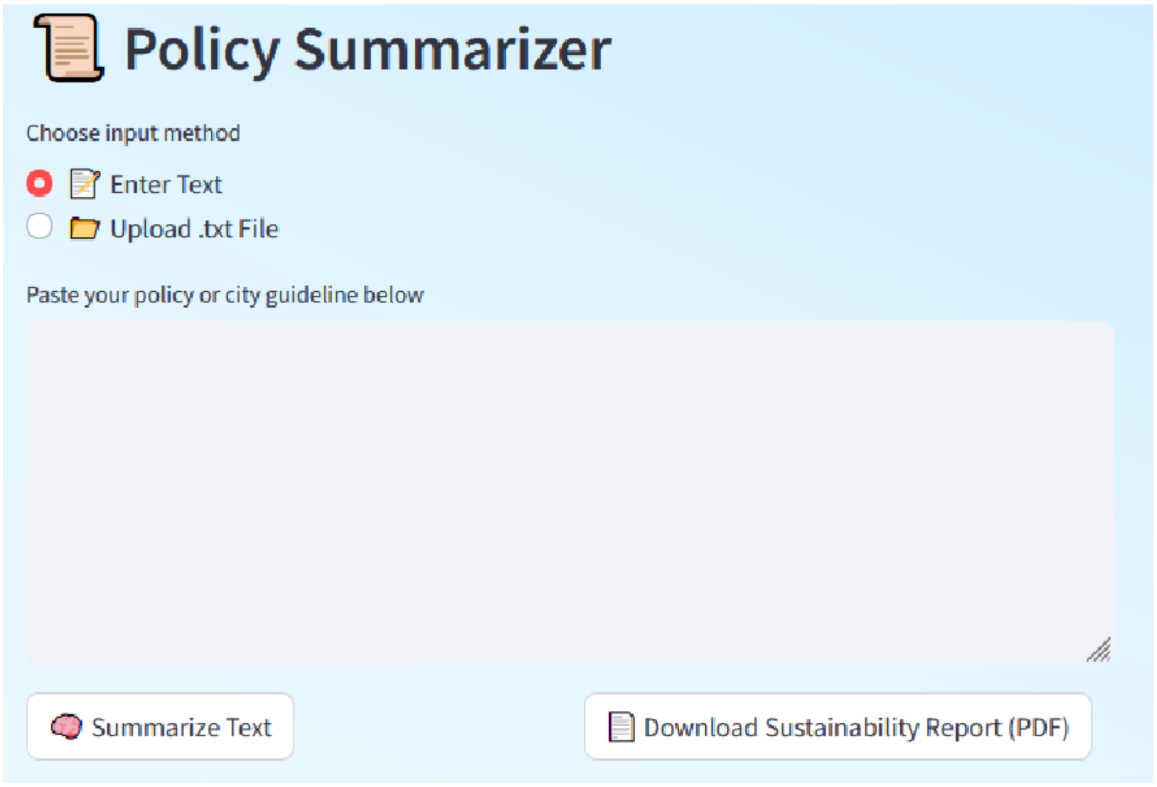
Duration: 0.5 Hrs

Skill Tags:

- Render AI report on frontend
- Optionally provide markdown/PDF output


app > services > policy_summarizer.py > ...

```python
from app.services.granite_llm import ask_granite

def summarize_policy(text: str) -> str:
    prompt = (
        "You are a smart city assistant AI. Read the following policy text carefully, "
        "and generate a concise summary of minimum 50 words using simple language for citizens to understar
        f"Policy Text:\n{text}\n\nSummary:"
    )
    return ask_granite(prompt)
```

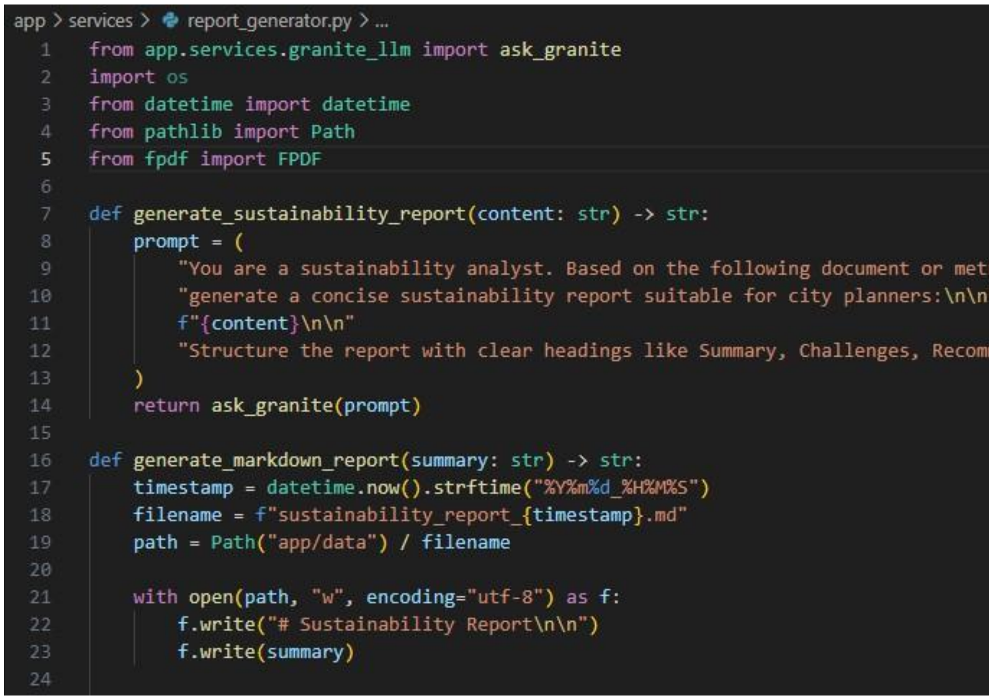

Policy Summarizer

Choose input method

[✓ Enter Text]

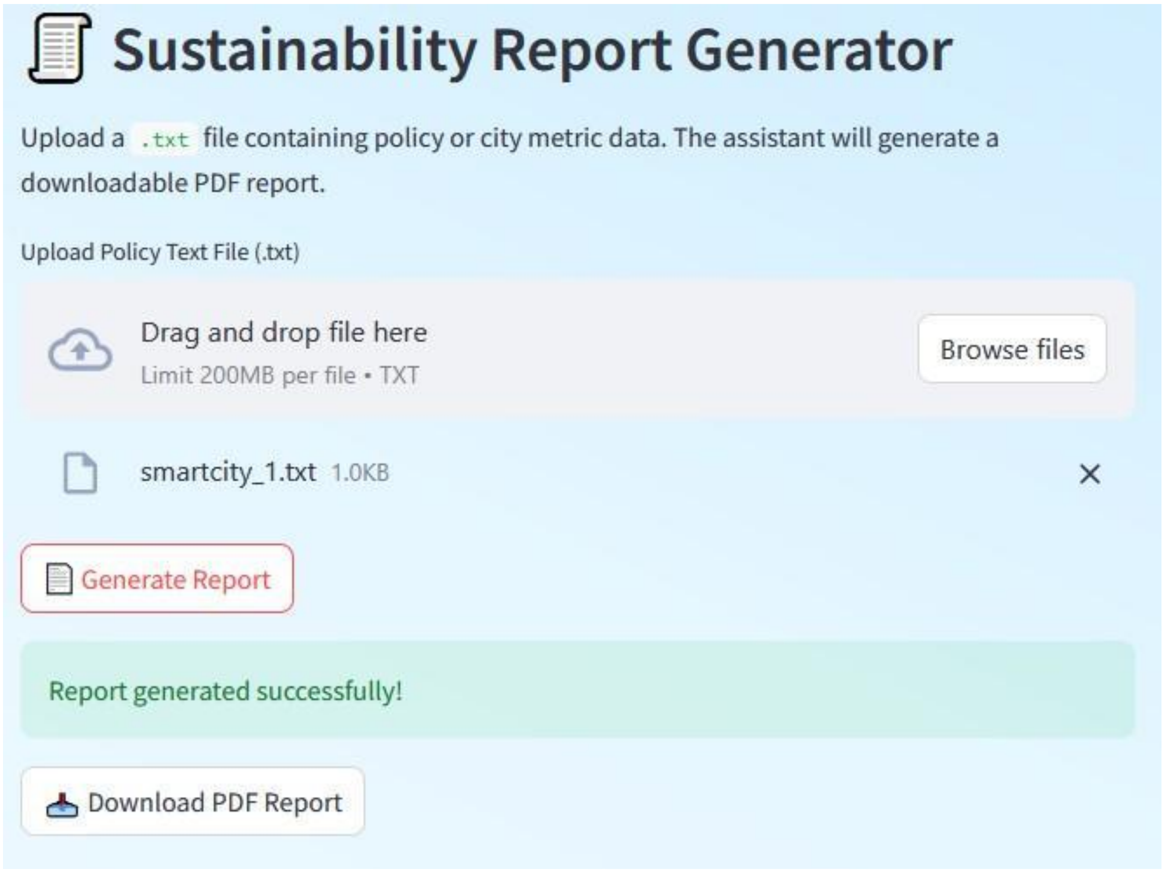
Upload .txt File

Paste your policy or city guideline below



app > services > report_generator.py > ...

```
from app.services.granite_llm import ask_granite
import os
from datetime import datetime
from pathlib import Path
from fpdf import FPDF

def generate_sustainability_report(content: str) -> str:
    prompt = (
        "You are a sustainability analyst. Based on the following document or met
        "generate a concise sustainability report suitable for city planners:\n\n
        f"{content}\n\n"
        "Structure the report with clear headings like Summary, Challenges, Recom
    )
    return ask_granite(prompt)

def generate_markdown_report(summary: str) -> str:
    timestamp = datetime.now().strftime("%Y%m%d_%H%M%S")
    filename = f"sustainability_report_{timestamp}.md"
    path = Path("app/data") / filename

    with open(path, "w", encoding="utf-8") as f:
        f.write("# Sustainability Report\n\n")
        f.write(summary)

```



Sustainability Report Generator

Upload a `.txt` file containing policy or city metric data. The assistant will generate a downloadable PDF report.

Upload Policy Text File (.txt)

Report generated successfully!

Milestone 9: Chat Assistant Creation

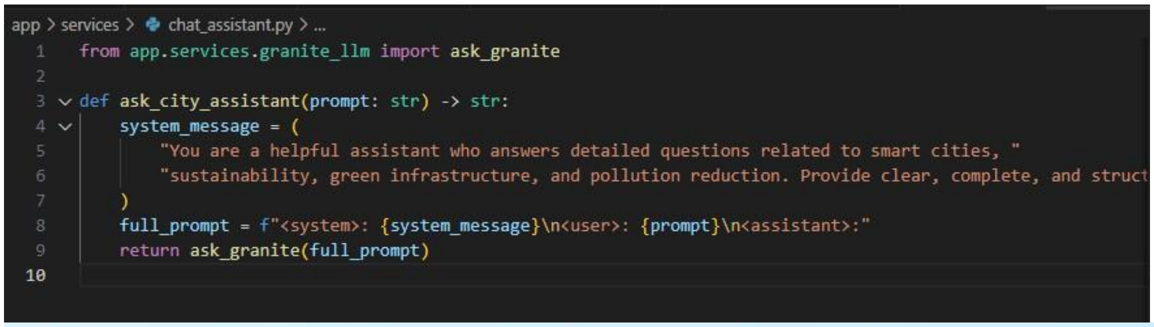
Objective: Build an interactive chat module where users can ask AI-driven questions related to sustainability, city governance, and smart living—powered by IBM Watsonx Granite LLM.

Activity 1: Define Backend Route

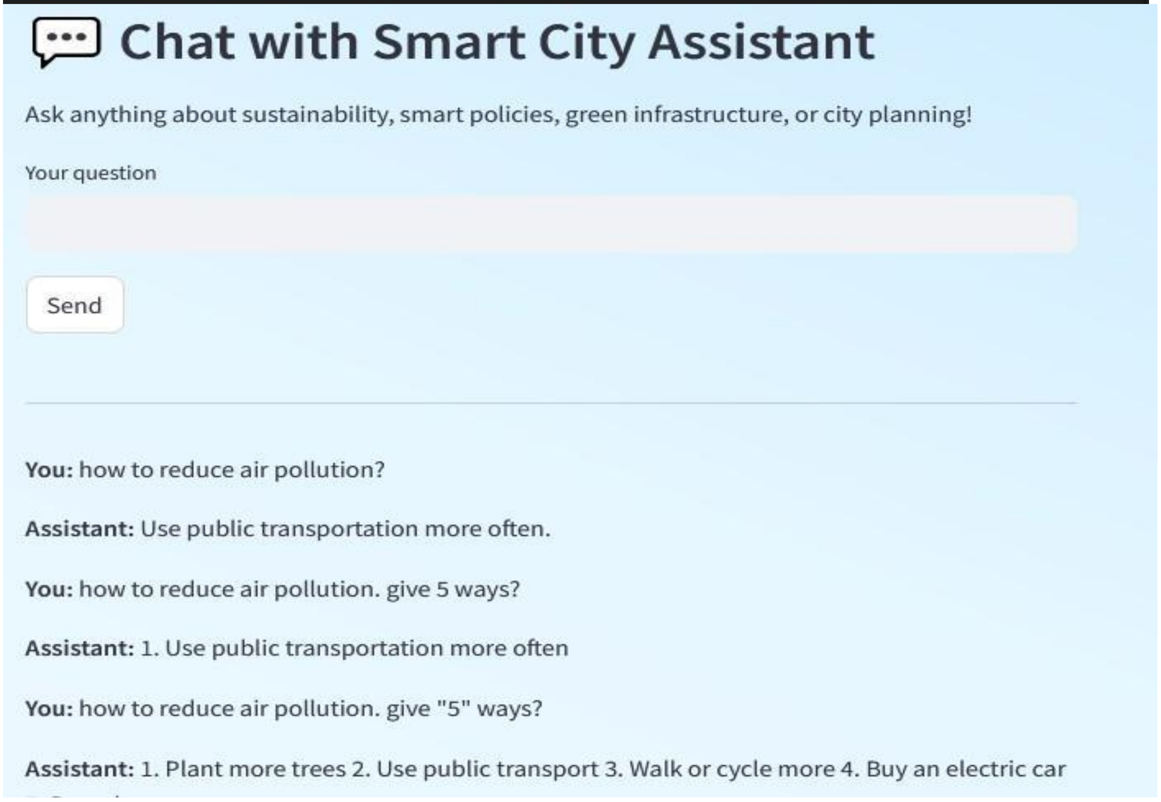
Duration: 0.5 Hrs

Skill Tags:

- Create chat_router.py in the app/api/ directory.
- Endpoint /chat/ask accepts a prompt string as input.
- Calls the ask_granite() function from granite_llm.py to generate the response.


app > services > chat_assistant.py > ...

```python
from app.services.granite_llm import ask_granite

def ask_city_assistant(prompt: str) -> str:
    system_message = (
        "You are a helpful assistant who answers detailed questions related to smart cities, "
        "sustainability, green infrastructure, and pollution reduction. Provide clear, complete, and struct
    )
    full_prompt = f"<system>: {system_message}\n<user>: {prompt}\n<assistant>:"
    return ask_granite(full_prompt)

```


Chat with Smart City Assistant

Ask anything about sustainability, smart policies, green infrastructure, or city planning!

Your question

You: how to reduce air pollution?

Assistant: Use public transportation more often.

You: how to reduce air pollution. give 5 ways?

Assistant: 1. Use public transportation more often

You: how to reduce air pollution. give "5" ways?

Assistant: 1. Plant more trees 2. Use public transport 3. Walk or cycle more 4. Buy an electric car

Milestone 10: Final Integration & Testing

Objective: Ensure smooth interaction across modules.

Activity 1: Connect All Pages

Duration: 0.5 Hrs

Skill Tags:

- Navigation working via sidebar

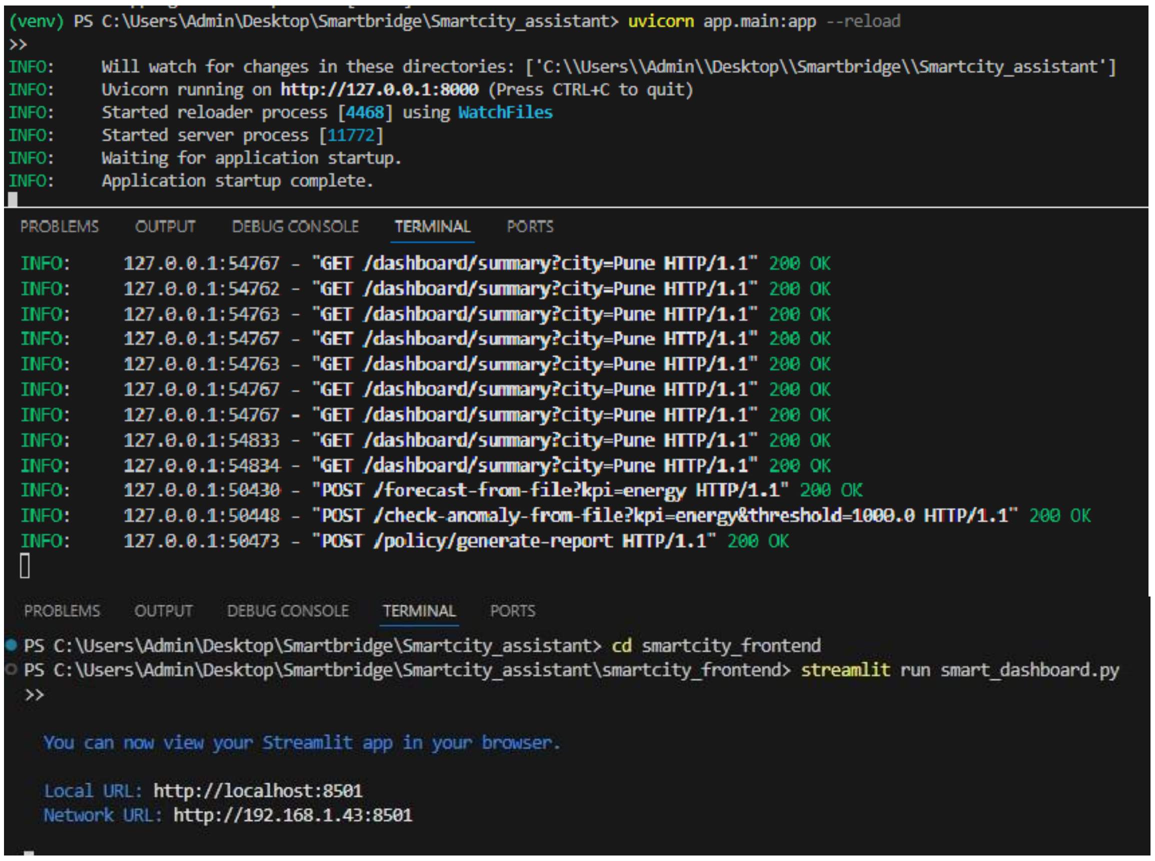
- Real-time API interactions tested

Activity 2: Run Final Test

Duration: 0.5 Hrs

Skill Tags:

uvicorn app.main:app --reload streamlit run smart_dashboard.py

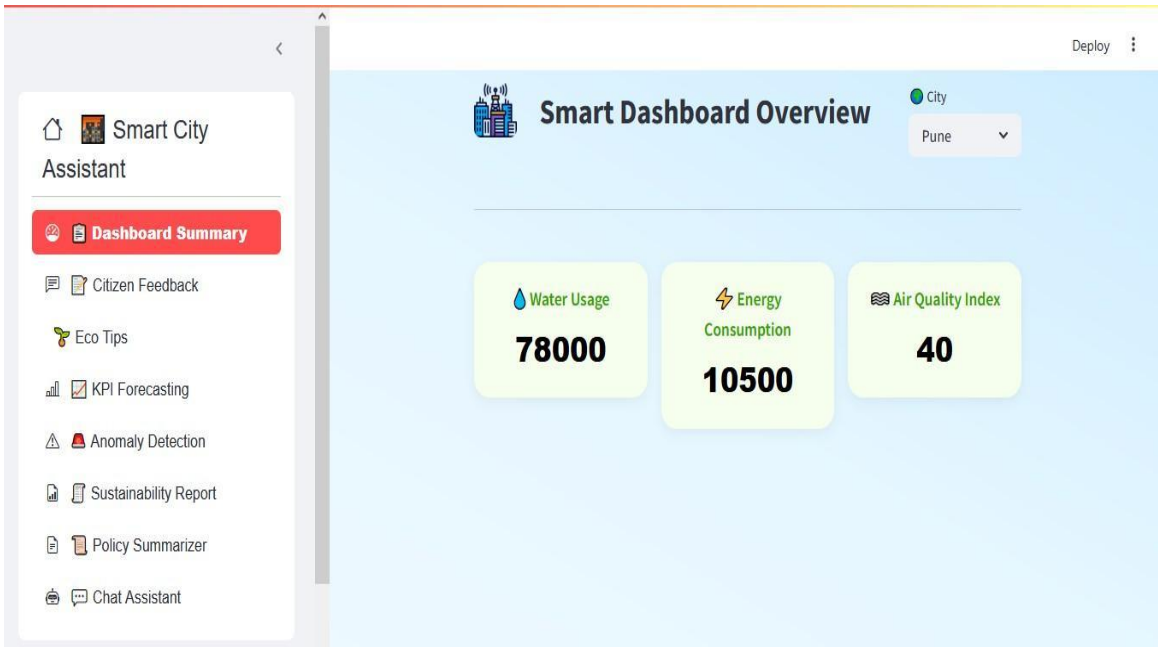


```
(venv) PS C:\Users\Admin\Desktop\Smartbridge\Smartcity_assistant> uvicorn app.main:app --reload
>>
INFO:     Will watch for changes in these directories: ['C:\\Users\\Admin\\Desktop\\Smartbridge\\Smartcity_assistant']
INFO:     Uvicorn running on http://127.0.0.1:8000 (Press CTRL+C to quit)
INFO:     Started reloader process [4468] using WatchFiles
INFO:     Started server process [11772]
INFO:     Waiting for application startup.
INFO:     Application startup complete.
```

```
INFO:     127.0.0.1:54767 - "GET /dashboard/summary?city=Pune HTTP/1.1" 200 OK
INFO:     127.0.0.1:54762 - "GET /dashboard/summary?city=Pune HTTP/1.1" 200 OK
INFO:     127.0.0.1:54763 - "GET /dashboard/summary?city=Pune HTTP/1.1" 200 OK
INFO:     127.0.0.1:54767 - "GET /dashboard/summary?city=Pune HTTP/1.1" 200 OK
INFO:     127.0.0.1:54763 - "GET /dashboard/summary?city=Pune HTTP/1.1" 200 OK
INFO:     127.0.0.1:54767 - "GET /dashboard/summary?city=Pune HTTP/1.1" 200 OK
INFO:     127.0.0.1:54767 - "GET /dashboard/summary?city=Pune HTTP/1.1" 200 OK
INFO:     127.0.0.1:54833 - "GET /dashboard/summary?city=Pune HTTP/1.1" 200 OK
INFO:     127.0.0.1:54834 - "GET /dashboard/summary?city=Pune HTTP/1.1" 200 OK
INFO:     127.0.0.1:50430 - "POST /forecast-from-file?kpi=energy HTTP/1.1" 200 OK
INFO:     127.0.0.1:50448 - "POST /check-anomaly-from-file?kpi=energy&threshold=1000.0 HTTP/1.1" 200 OK
INFO:     127.0.0.1:50473 - "POST /policy/generate-report HTTP/1.1" 200 OK
```

```
PS C:\Users\Admin\Desktop\Smartbridge\Smartcity_assistant> cd smartcity_frontend
PS C:\Users\Admin\Desktop\Smartbridge\Smartcity_assistant\smartcity_frontend> streamlit run smart_dashboard.py
>>

  You can now view your Streamlit app in your browser.

  Local URL: http://localhost:8501
  Network URL: http://192.168.1.43:8501
```

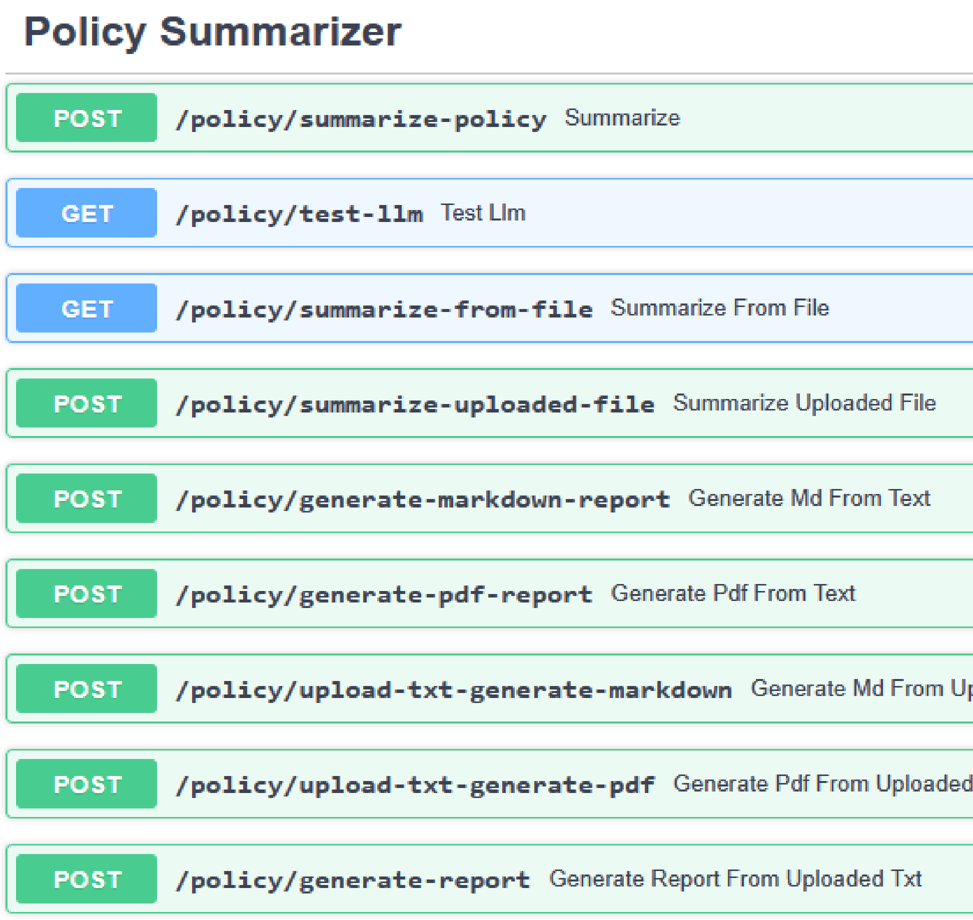
Screenshots / Outputs:



Smart Dashboard Overview

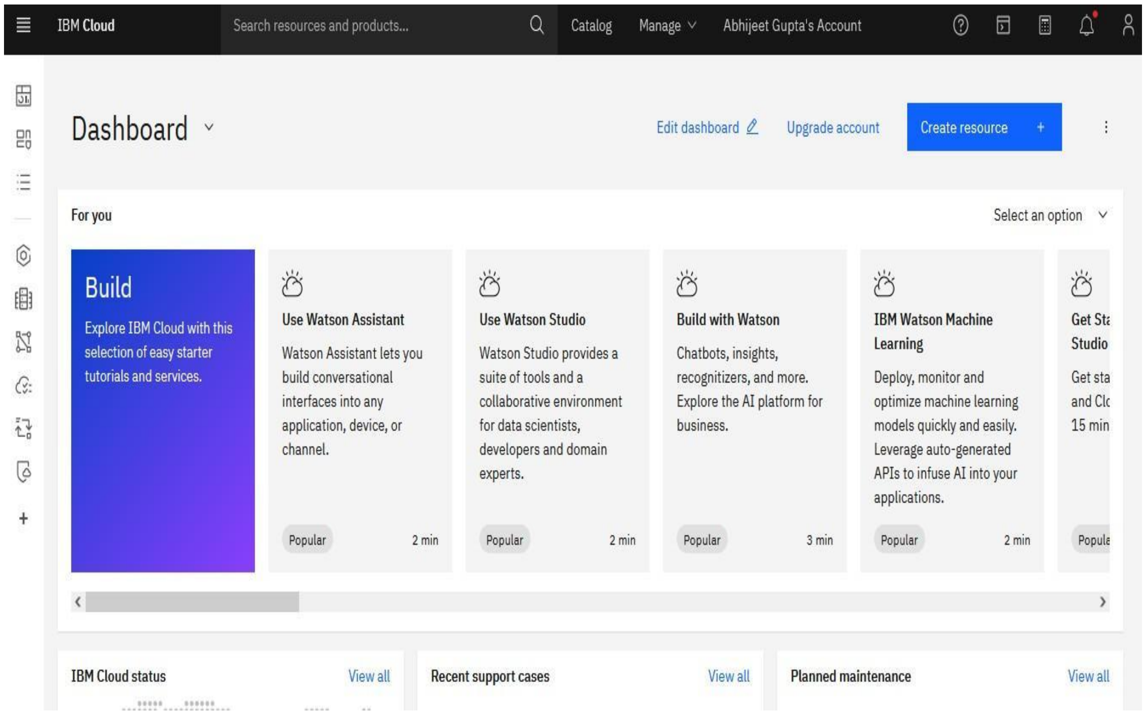
City: Pune

Water Usage	Energy Consumption	Air Quality Index
78000	10500	40



Policy Summarizer

```
POST /policy/summarize-policy  Summarize
GET  /policy/test-llm  Test Llm
GET  /policy/summarize-from-file  Summarize From File
POST /policy/summarize-uploaded-file  Summarize Uploaded File
POST /policy/generate-markdown-report  Generate Md From Text
POST /policy/generate-pdf-report  Generate Pdf From Text
POST /policy/upload-txt-generate-markdown  Generate Md From Up
POST /policy/upload-txt-generate-pdf  Generate Pdf From Uploaded
POST /policy/generate-report  Generate Report From Uploaded Txt
```



Build

Explore IBM Cloud with this selection of easy starter tutorials and services.

Use Watson Assistant

Watson Assistant lets you build conversational interfaces into any application, device, or channel.

Use Watson Studio

Watson Studio provides a suite of tools and a collaborative environment for data scientists, developers and domain experts.

Build with Watson

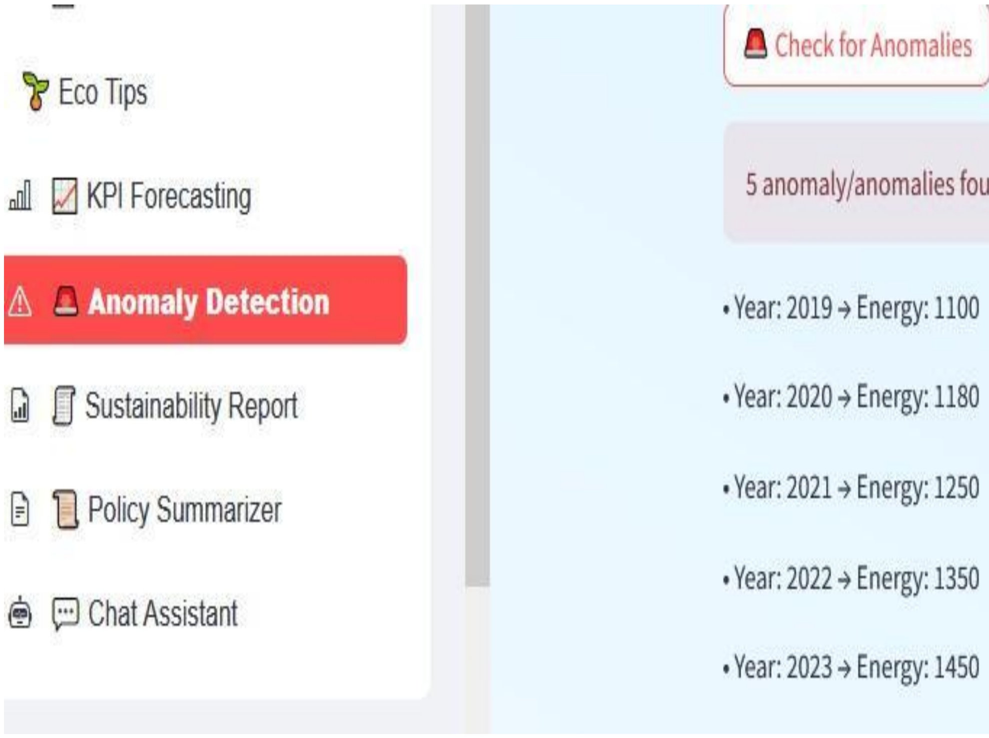
Chatbots, insights, recognizers, and more. Explore the AI platform for business.

IBM Watson Machine Learning

Deploy, monitor and optimize machine learning models quickly and easily. Leverage auto-generated APIs to infuse AI into your applications.

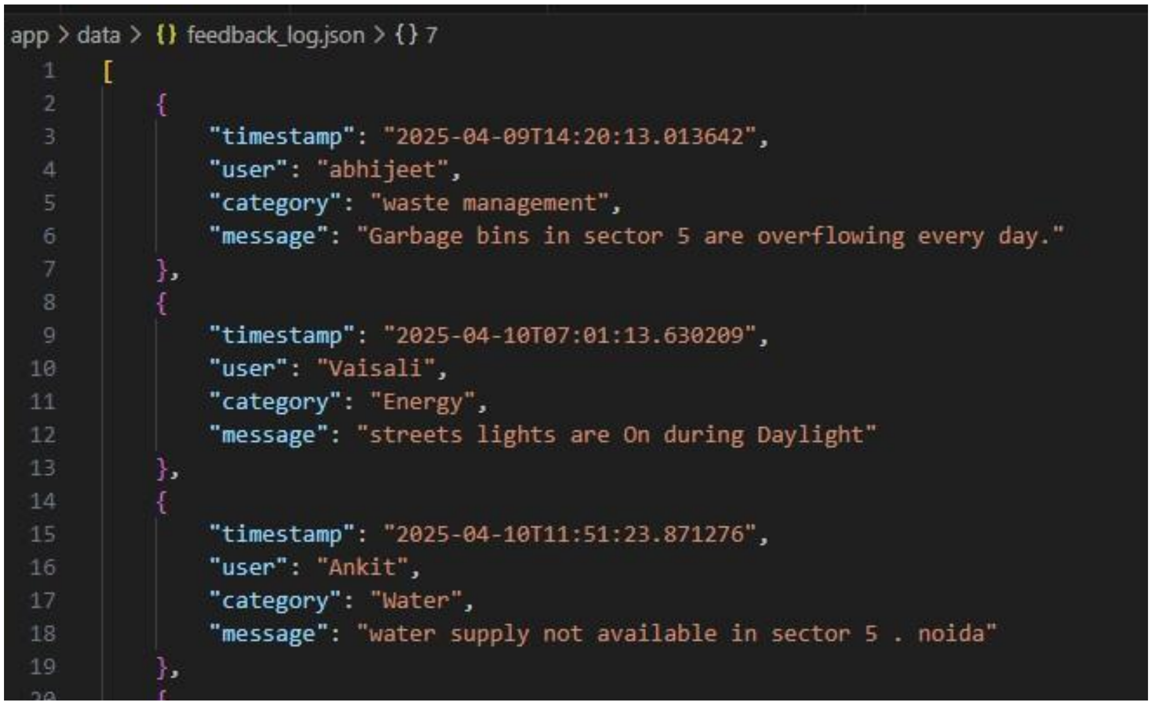
Get Sta
Studio

Get sta
and Clc
15 min



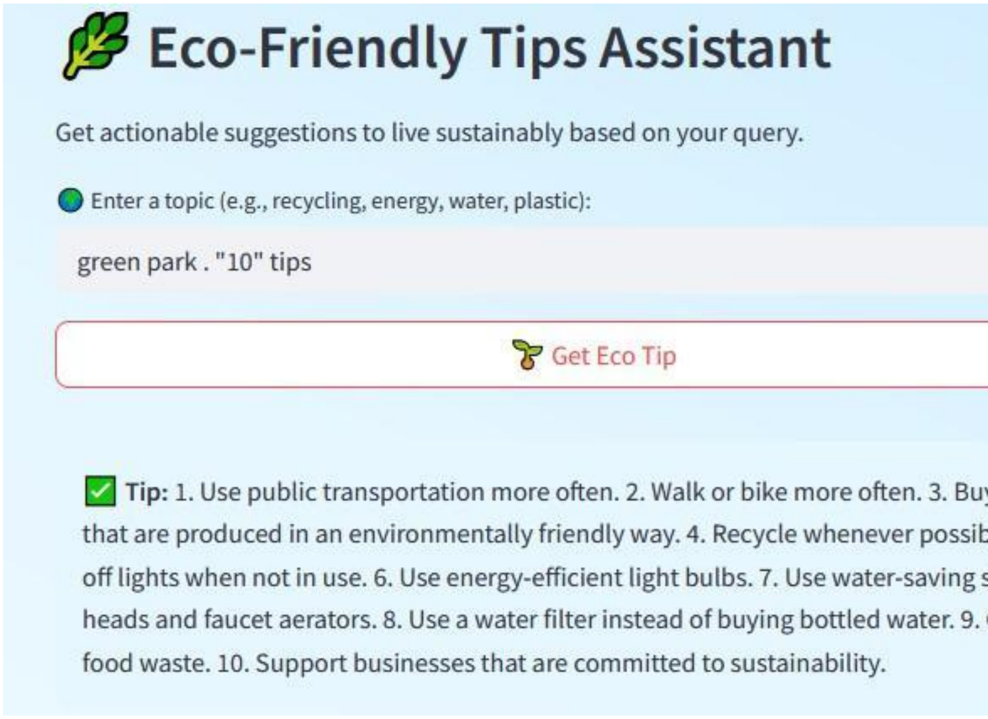
5 anomaly/anomalies fou

- Year: 2019 → Energy: 1100
- Year: 2020 → Energy: 1180
- Year: 2021 → Energy: 1250
- Year: 2022 → Energy: 1350
- Year: 2023 → Energy: 1450



app > data > {} feedback_log.json > {} 7

```
[
    {
        "timestamp": "2025-04-09T14:20:13.013642",
        "user": "abhijeet",
        "category": "waste management",
        "message": "Garbage bins in sector 5 are overflowing every day."
    },
    {
        "timestamp": "2025-04-10T07:01:13.630209",
        "user": "Vaisali",
        "category": "Energy",
        "message": "streets lights are On during Daylight"
    },
    {
        "timestamp": "2025-04-10T11:51:23.871276",
        "user": "Ankit",
        "category": "Water",
        "message": "water supply not available in sector 5 . noida"
    },
```



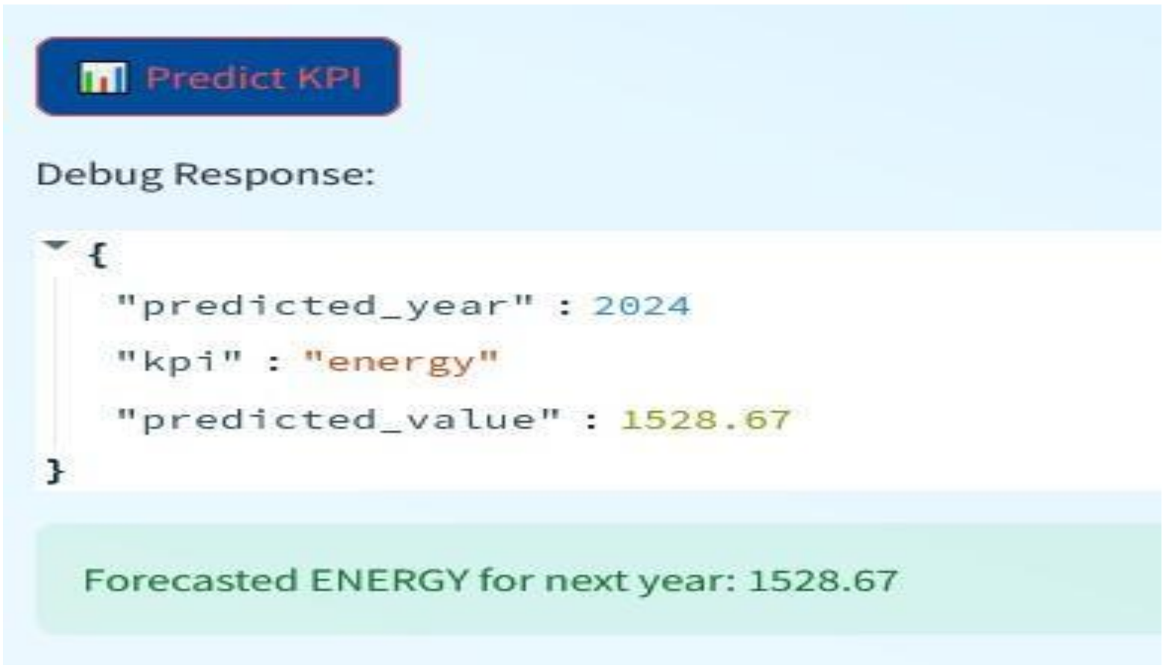
🌿 Eco-Friendly Tips Assistant

Get actionable suggestions to live sustainably based on your query.

🌍 Enter a topic (e.g., recycling, energy, water, plastic):

green park . "10" tips

✅ **Tip:** 1. Use public transportation more often. 2. Walk or bike more often. 3. Bu
that are produced in an environmentally friendly way. 4. Recycle whenever possib
off lights when not in use. 6. Use energy-efficient light bulbs. 7. Use water-saving s
heads and faucet aerators. 8. Use a water filter instead of buying bottled water. 9.
food waste. 10. Support businesses that are committed to sustainability.



Debug Response:

```
{
  "predicted_year" : 2024
  "kpi" : "energy"
  "predicted_value" : 1528.67
}
```

Forecasted ENERGY for next year: 1528.67