Team Name : Moon landers

Team Leader Name : S.Vyas

Problem Statement : Developing an Algorithm for Air Quality Visualizer and Forecast App to generate granular, real-time, and predictive air quality information, especially in smaller cities or rural areas

Team Members

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Project Overview

The Air Quality AI Agent is a machine learning–powered system designed to predict and visualize pollution levels across Indian cities. By combining government-sourced datasets, geolocation intelligence, and user-friendly web technologies, the tool enables proactive health awareness and scalable environmental impact monitoring.

Brief about the Idea:

The Air Quality AI Agent is a smart web-based system that predicts and visualizes pollution levels across Indian cities. It uses historical pollutant data (PM2.5, PM10, SO_2, NO_2), machine learning (Random Forest), and geolocation to:

- **Predict AQI** from user inputs
- **Display city-level pollution reports**
- **Show live pollution maps** using Plotly
- **Provide health advisories** based on AQI severity

Designed for public awareness and rural accessibility, the app runs on Gradio and delivers an intuitive dashboard experience—combining technical accuracy with social impact.

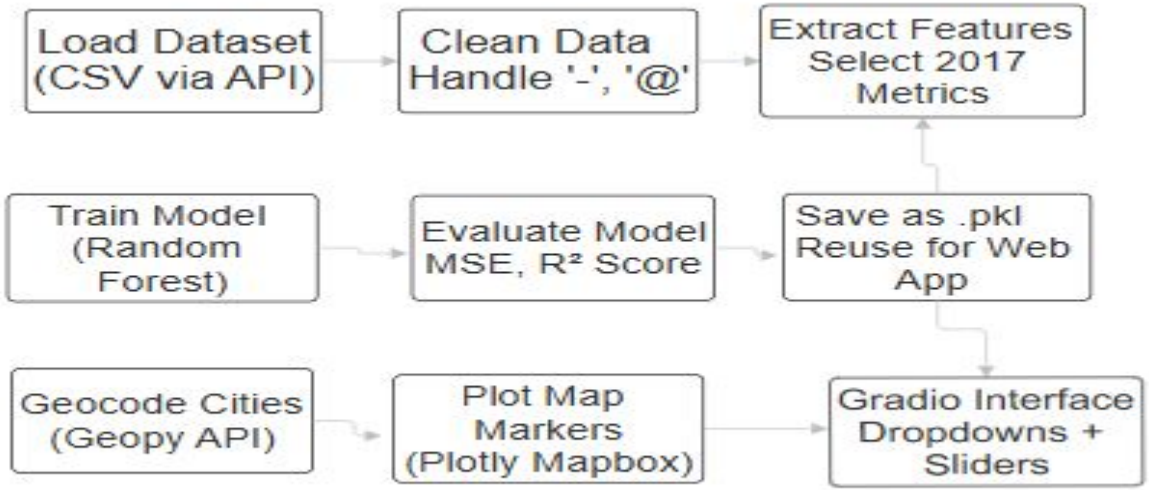
Opportunity should be able to explain the following:

- Environmental Awareness: India's growing air quality concerns demand real-time, localized insights—especially in underserved rural areas.
- Tech Accessibility: A lightweight web interface powered by Gradio ensures easy usage across devices with minimal infrastructure.
- Government Integration Potential: The system is well-aligned with initiatives like National Clean Air Programme (NCAP) and Smart Cities Mission.
- Scalability: Can be expanded to include satellite metrics (e.g., AOD), real-time sensor feeds, and mobile notifications.
- Social Impact: Enables citizens, health workers, and policymakers to make informed decisions and take timely precautions

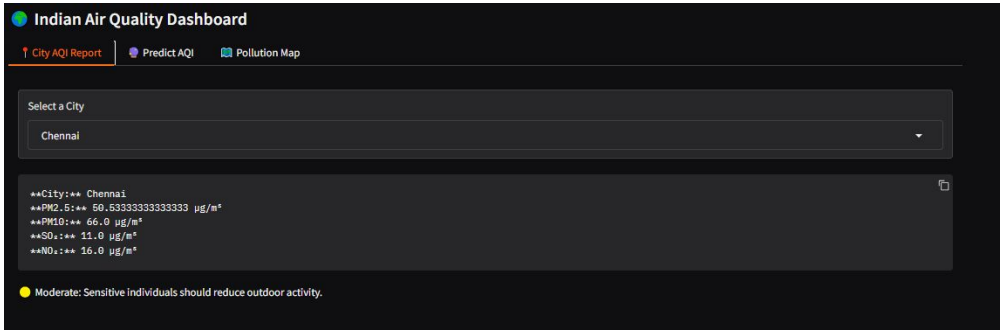
List of features offered by the solution

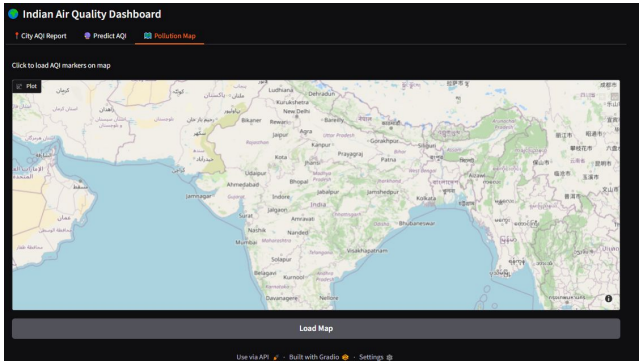
- **AQI Prediction Module** Uses pollutant inputs (PM2.5, PM10, SO_2, NO_2) and a Random Forest model to predict air quality levels accurately.
- **City-wise Pollution Report** Provides detailed pollution metrics per city using historical data, including individual pollutant concentrations.
- **Health Advisory Engine** Automatically generates personalized health precautions based on AQI severity (Good, Moderate, Unhealthy, etc.).
- **Interactive Pollution Map** Displays district-level pollution hotspots with geolocation markers and hoverable AQI info via Plotly Mapbox.
- **Gradio-Based Web Interface** User-friendly sliders, dropdowns, and visual outputs make the model accessible without coding knowledge.
- **Feature Importance Visualization** Highlights which pollutants most influence AQI predictions using bar charts.
- **Model Export & Deployment Ready** Trained model is saved as `.pkl` for reuse or integration into other platforms like mobile or IoT systems.
- **Geolocation Support** Auto-fetches latitude/longitude from city names using `geopy` for accurate map rendering.

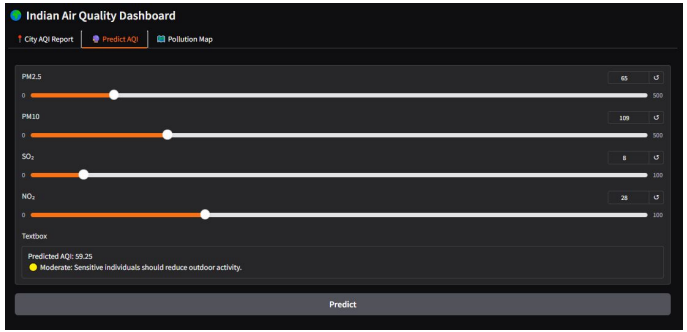
Process flow diagram or Use-case diagram



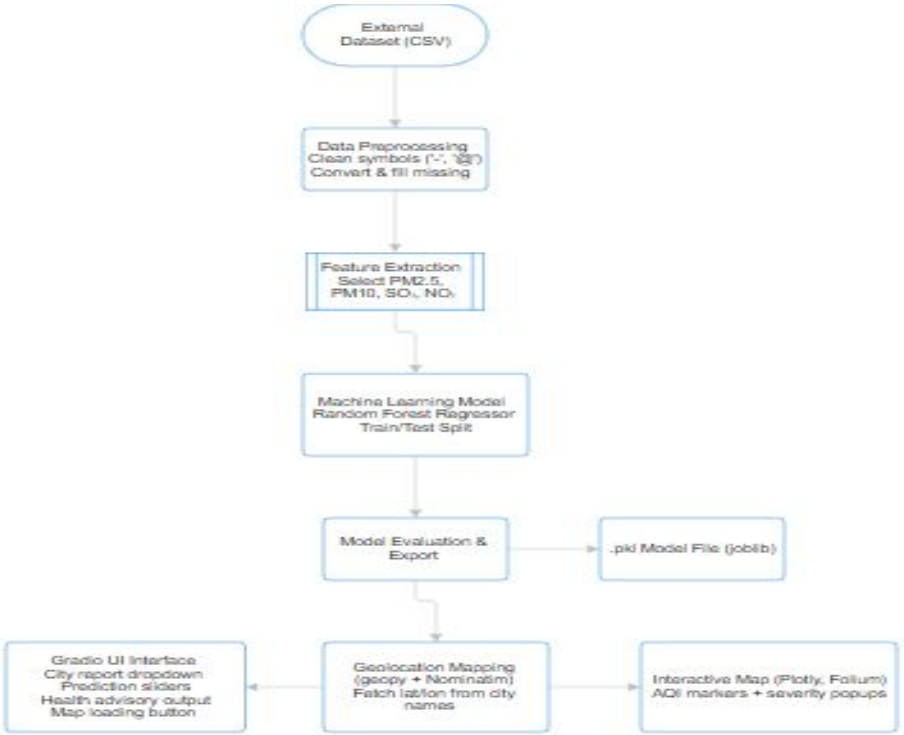
Wireframes/Mock diagrams of the proposed solution







Architecture diagram of the proposed solution



Technologies to be used in the solution:

💡Data & Modeling:

- Python 3.8+
- Pandas, NumPy – Data cleaning & preprocessing
- Scikit-learn – Machine learning (Random Forest)
- Joblib – Model serialization

Mapping & Location:

- Geopy – City geocoding
- Plotly (Mapbox), Folium – Interactive pollution maps

Interface & Deployment:

- Gradio – Web-based user interface (sliders, dropdowns, live maps)
- VS Code – Development environment
- KaggleHub – Dataset access automation

Visualization:

- Matplotlib, Plotly – Graphs and performance charts

Estimated implementation cost

Component	Description	Estimated Cost (INR)
💻 Development	Model training, Gradio interface, geolocation mapping	₹5,000
🛠️ Libraries & Tools	Open-source (Gradio, pandas, scikit-learn, etc.)	₹0
📦 Hosting (Prototype)	Free via Gradio sharing or local deployment	₹0
🌐 Production Deployment	Optional cloud hosting (e.g., Streamlit/Heroku/AWS)	₹1,000–₹5,000/month
🛰️ Satellite Data Access	Future integration (e.g., ISRO, open APIs)	Varies (optional)

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THANK YOU