

Advanced Air Pollution Prediction Using Geolocation And Machine Learning

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Abstract – Air Pollution is a growing concern worldwide, affecting public health, the environment , and overall quality of life, Accurate Prediction of air pollution levels can help individuals and authorities take preventive measures.This project aims to develop a web-based application that uses GPS to detect the users current location, fetches real-time weather data, and allows users to select any location predict future air pollution levels. By leveraging machine learning models, system analysis historical weather and pollution data to forcast air quality , enabling users to make informed decisions.

Key words - Air Quality Index , Global Positioning System , Data Flow Diagram ,Unified Modeling Language , User Interfcae , Applications Programming Interface , China Air Quality Index , Long Short Term Memory.

1 . INTRODUCTION

Air Pollution as became a critical global issue, posing significant risks to public health the environment , and overall quality of life . with the increasing urbanization and industrial activities, the need for reliable and timely information on air quality is more important than ever. Accurate forecasting of air pollution levels can empower individuals, communities , and authorities to take informed and preventive actions. This project, presents a web-based application is designed to monitor and predict air pollution levels using advanced machine learning techniques. The system integrates GPS functionality to automatically detect .The User's current location , fetches real-time weather data, and provides air quality forecasts. Additionally, users have the options to select any location to interest to view both the current weather conditions and future air pollution predictions for that area. By analysing historical weather and air quality data, the machine model delivers forecasts the help users better understand environmental conditions and make safer choices , such as planning outdoor activities or taking protective health measures. This project, aims to bridge the gap between environmental data and everyday decision-making through and intuitive and accessible digital platform.

2 .SYSTEM ANALYSIS

2.1.EXISTING SYSTEM

Currently , various is quality monitoring application and web platforms exists to inform users, about pollution levels in specific areas. These Systems typically rely on fixed-location monitoring stations and satellite data to display air quality indices (AQI) and weather conditions. However, these platforms often have limitations in terms of predictions capabilities and user personalization. Most of them system requires users to manually enter a location to get a pollution data. Which may not always be accurate or convenient. Additionally , many of the available services do not offer predictive insights or machine learning-based forecasting. This means users are limited viewing only current or near-real-time air quality data, without guidance on how pollution levels may change in the future. To overcome these limitations, our proposed system integrates

geolocation, real-time weather data , and machine learning-based prediction to provide a more accurate and user-focused solution.

Disadvantages:

- i)Lack of intelligent forecasting
- ii)As limited personalization

2.2.PROPOSED SYSTEM

This web app provides real-time air quality info and pollution forecasting using GPS location detection and machine learning. It offers personalized , intelligent , and interactive features, allowing users to view current conditions and predicted pollution levels for their location or any other area. The app's user-friendly interface enables easy navigation, empowering users to make informed decision about their health and activities.

Advantages:

- i)**Real-time awareness** : Users receive up-to-date air quality information based on their current GPS location, enabling timely and location-specific decisions.
- ii)**Predictive Insights**: By Forecasting future pollution levels using machine learning, the system helps individuals , and authorities plan activities and take preventive measures in advance.

3 .DATASET

Date	Time	Location	Latitude	Longitude	Temperature (°C)	Humidity (%)	Speed (km/h)	Pressure (hPa)	PM2.5 (µg/m³)	PM10 (µg/m³)	CO (ppm)	NO2 (ppm)	SO2 (ppm)	O3 (ppm)	AQI	Weather Description	Rain (mm)	Snow (mm)
2025-04-01	08:00	New York	40.7128	-74.0060	18.2	55	5.4	1013	30	50	100	65	20	40	85	Clearly	0.0	0.0
2025-04-01	09:00	New York	40.7128	-74.0060	18.8	52	4.8	1012	25	45	90	55	18	38	80	Clearly	0.0	0.0
2025-04-01	10:00	New York	40.7128	-74.0060	17.3	50	6.2	1010	40	60	120	65	25	45	90	Cloudy	0.0	0.0
2025-04-01	11:00	Los Angeles	34.0522	-118.2437	25.5	40	7.2	1015	15	25	70	40	15	35	75	Sunny	0.0	0.0

4 .DOMAIN INTRODUCTION

Introduction to Artificial Intelligence(AI):

Artificial Intelligence is a Branch of Computer science focused on building systems that can perform tasks requiring human-like intelligence . such as learning, reasoning, decision-making, and pattern recognition.

AI in this project primarily falls under:

- 1.**Narrow AI (Weak AI)**: The system is designed to performed a specific task-predicting air pollution – using historical data and environmental variables.
- 2.**Machine Learning (ML)**: The core of the system users ML models that learn from past data to predict future air quality indices.
- 3.**Deep learning** : For more Advanced forecasting, deep learning models such as LSTM (Long short-Term memory) networks can be used to analyse time-series data.

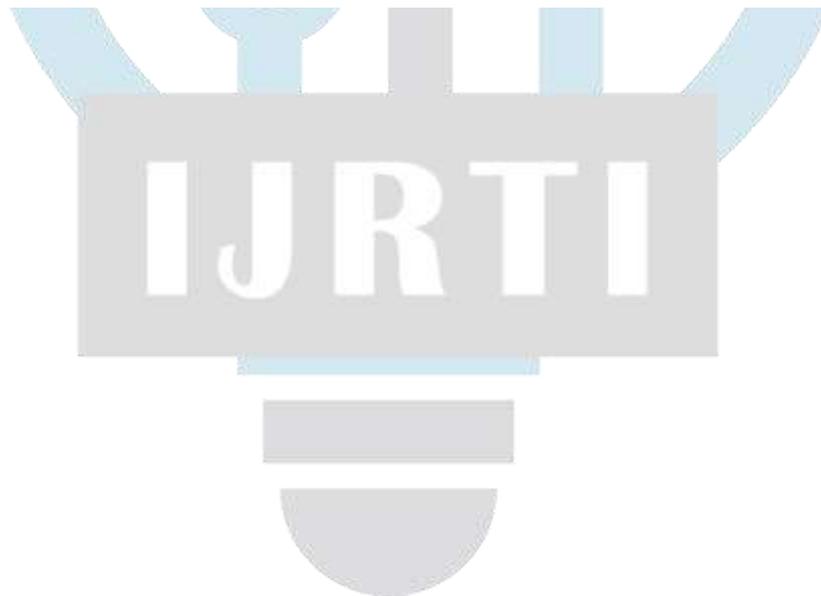
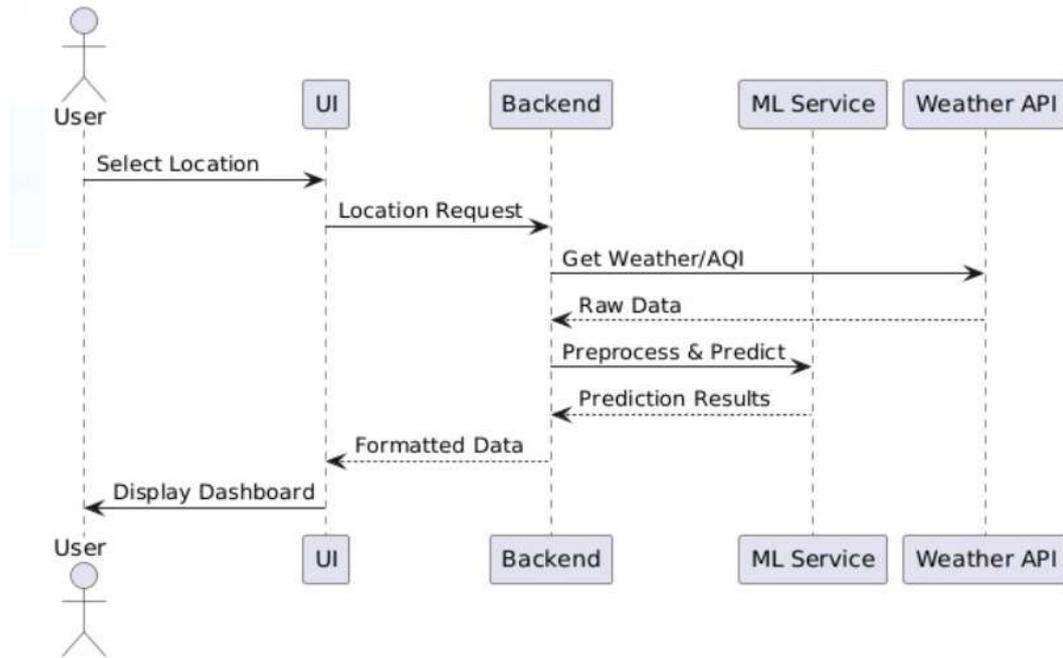
Key AI techniques used in this project includes:

1. **Machine Learning**: To train predictive models based on weather patterns and pollutant concentrations.

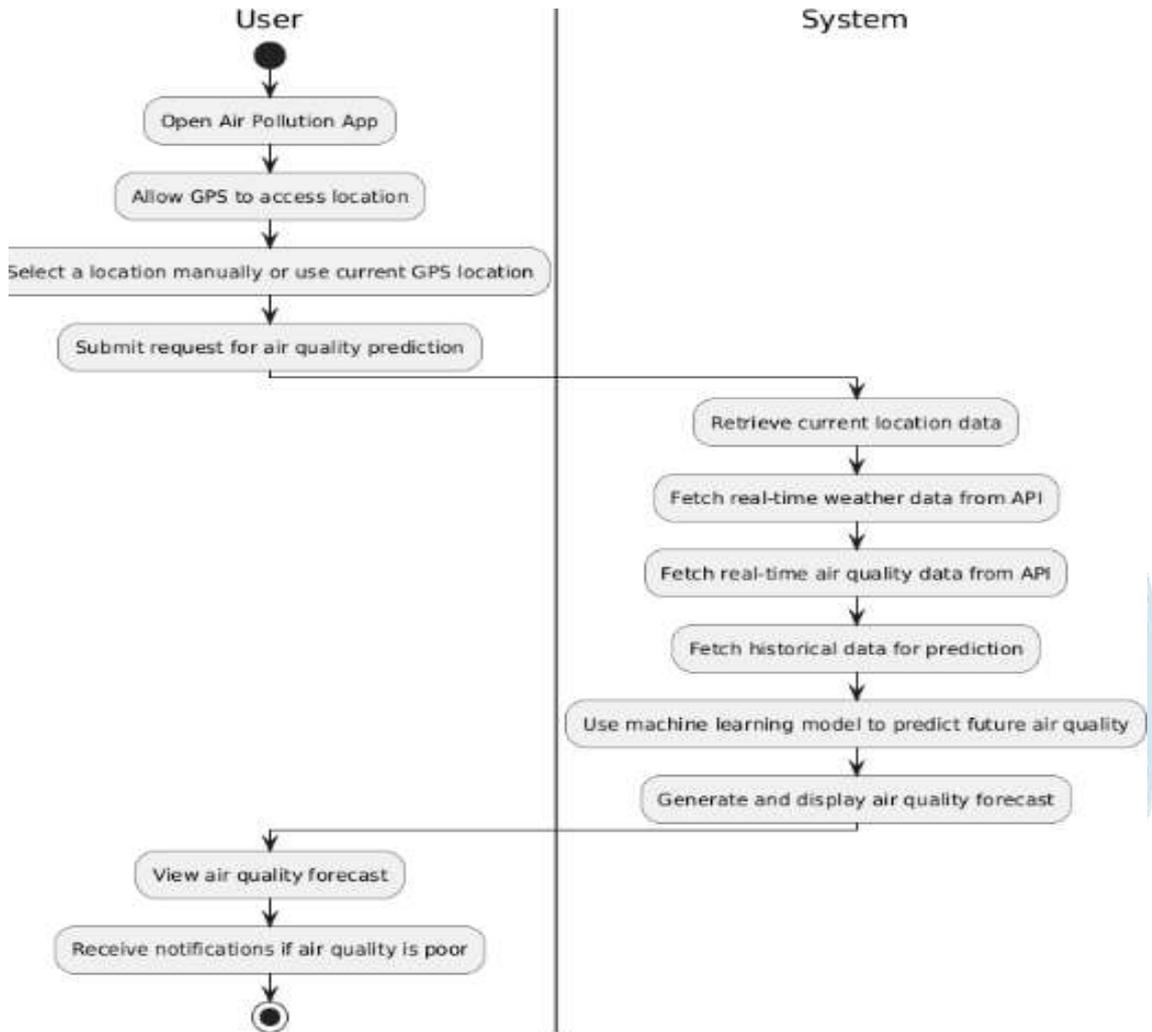
2. **Data Preprocessing & Feature Engineering** : To clean, and enhance input data for better model accuracy.
3. **Geolocation-Based Analysis** : Combining GPS data with AI to provide location-specific predictions.

6.SYSTEM DESIGN

6.1. Sequence Diagram

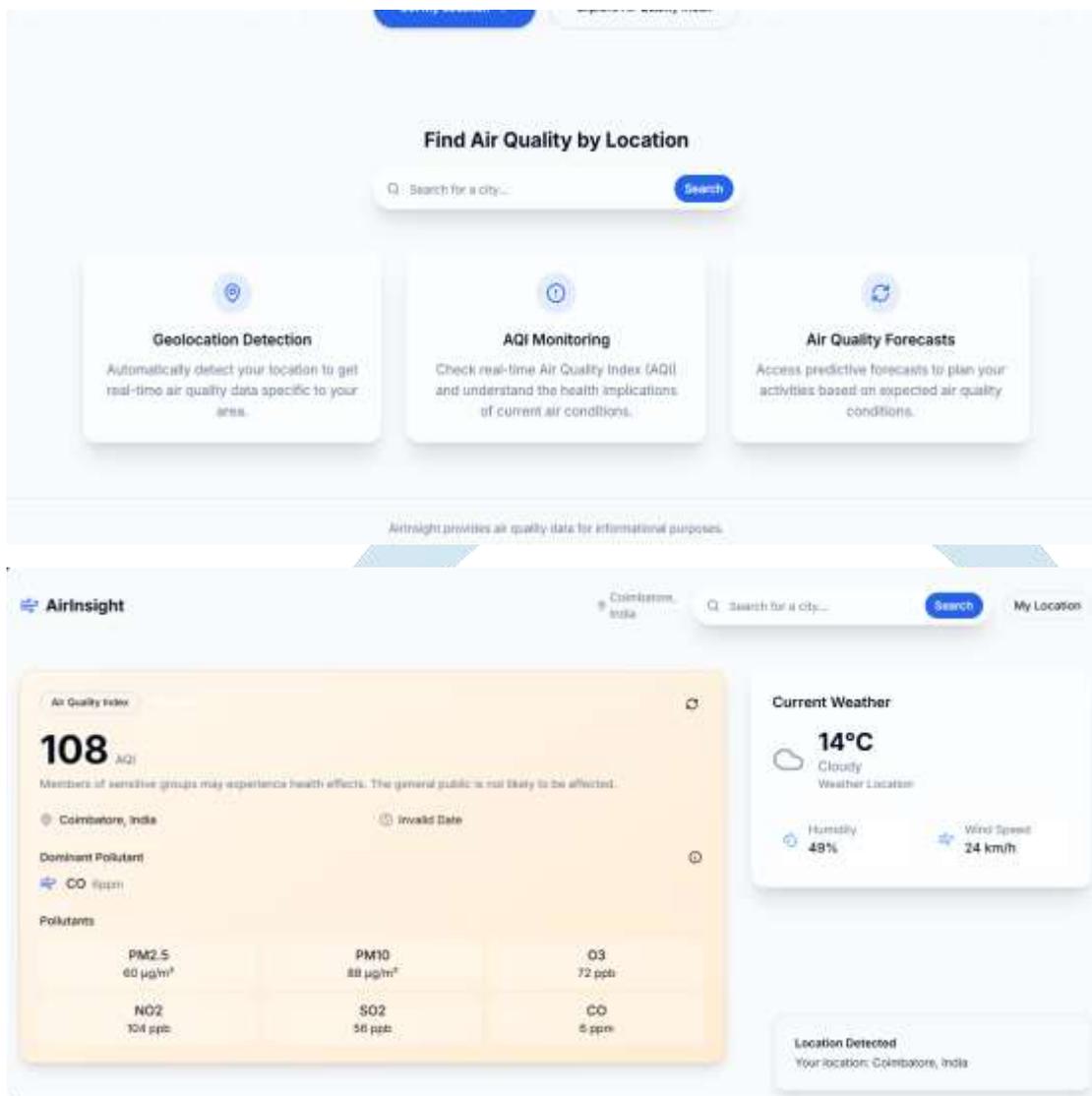


6.2. DATA-FLOW DIAGRAM



7 .SCREENSHOT LAYOUT





8.CONCLUSION

The development of an air pollution prediction system utilizing real-time weather data, historical pollution data, and machine learning models has the potential to significantly enhance public health and environmental awareness. This system empowers users by providing valuable insights into air quality, helping them make informed decisions regarding their health and well-being. By leveraging advanced data analytics and predictive models, we can forecast air pollution levels for various locations, offering users timely and actionable information. The integration of GPS-based location tracking and the ability to select different locations ensures that the application is both user-friendly and globally accessible.

9.REFERENCES

1. Agarwal, P., & Nagendra, S. S. (2022). Air pollution prediction with machine learning: A case study of Indian cities. *International Journal of Environmental Science and Technology*.
2. Zhang, Y., & Tao, S. (2023). The application of machine learning to air pollution research: A bibliometric analysis. *Environmental Pollution*.
3. Li, J., & Wang, Y. (2024). Application of artificial intelligence in air pollution monitoring and forecasting: A comprehensive review. *Environmental Modelling & Software*.