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Idea Proposal

1. Project Idea

Title: Predicting PM2.5/AQI for Chiang Rai Using Weather & Seasonal Data
Problem: Chiang Rai often faces severe air pollution, especially during burning seasons, affecting public health and student life at Mae Fah Luang University.
Goal: Develop a simple machine learning model to forecast next-day PM2.5 levels and AQI categories using local weather and pollution data.
Deliverable: A small web dashboard displaying predicted AQI status ("Good," "Moderate," "Unhealthy," etc.) with daily updates.

2. Relevance to SDGs

• SDG 3 – Good Health & Well-Being: Provides early warnings to minimize exposure to polluted air.
• SDG 11 – Sustainable Cities & Communities: Supports data-driven air-quality management for local authorities.
• SDG 13 – Climate Action: Raises awareness about seasonal emissions and climate-related pollution.

3. Literature Examples

1. Upper Northern Thailand PM2.5 Prediction (2011–2020): Used meteorological and fire-hotspot data to estimate PM2.5, showing strong seasonal dependence.
2. Chiang Rai PM10 Forecasting by Season: Demonstrated that temperature, humidity, and wind significantly influence pollution prediction accuracy.

4. Data Description

• Air Quality Data: PM2.5 and PM10 from OpenAQ API (JSON → CSV, aggregated to daily averages for 3–5 years).
• Weather Data: Temperature, humidity, wind speed/direction, rainfall, and pressure from Open-Meteo or OpenWeather API.
• Preprocessing: Merge datasets by date, handle missing values, normalize, and split by time (train/test).

5. Approach (Machine Learning)

• Method: Classical ML for simplicity and interpretability.
• Models: Linear Regression, Random Forest, and Gradient Boosting (XGBoost).
• Targets: Predict PM2.5 concentration (regression) and AQI category (classification).
• Evaluation: MAE/RMSE for PM2.5; Accuracy/F1 for AQI.
• Output: A lightweight Streamlit or Next.js web app showing recent data, predicted AQI, and advice (e.g., "Wear a mask outdoors").