Pearls AQI Predictor

Project Overview

Let's predict the Air Quality Index (AQI) in your city in the next 3 days, using a 100% serverless stack. This project involves building an end-to-end machine learning pipeline for AQI forecasting with automated data collection, feature engineering, model training, and real-time predictions through a web dashboard. - Project Description: https://drive.google.com/file/d/1HPf17hvqI6icNTjRPkPuydkV1ub_lxO5/view?usp=sharing

Technology Stack

Required technologies and tools:

PythonScikit-learnTensorFlowHopsworks or Vertex AIApache Airflow or GitHub ActionsStreamlitFlaskAQICN or OpenWeather APIsSHAPGit

Key Features

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Feature Pipeline Development

•Fetch raw weather and pollutant data from external APIs like AQICN or OpenWeather

•Compute features from raw data including time-based features (hour, day, month) and derived features like AQI change rate

•Store processed features in Feature Store (Hopsworks or Vertex AI)

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Historical Data Backfill

•Run feature pipeline for past dates to generate training data

- Create comprehensive dataset for model training and evaluation

Training Pipeline Implementation

- Fetch historical features and targets from Feature Store
- Experiment with various ML models (Random Forest, Ridge Regression, TensorFlow/PyTorch)
- Evaluate performance using RMSE, MAE, and R^2 metrics
- Store trained models in Model Registry

Automated CI/CD Pipeline

- Feature pipeline runs every hour automatically
- Training pipeline runs daily for model updates
- Use Apache Airflow, GitHub Actions, or similar tools

Web Application Dashboard

•Load models and features from Feature Store

•Compute real-time predictions for next 3 days

•Display interactive dashboard with Streamlit/Gradio and Flask/FastAPI

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Advanced Analytics Features

•Perform Exploratory Data Analysis (EDA) to identify trends

•Use SHAP or LIME for feature importance explanations

•Implement alerts for hazardous AQI levels

•Support multiple forecasting models from statistical to deep learning

Projects Resources

Helpful resources and tutorials:

https://drive.google.com/file/d/1HPf17hvqI6icNTjRPkPuydkV1ub_lxO5/view?usp=sharing
Pending
Due: Feb 13, 2026 at 6:20 PM
48 days remaining