Smart Agriculture Startup

Weather Forecasting System - Report 02

21-Day Rainfall Prediction Using Machine Learning

intelliHack 5.0 - IEEE Computer Society UCSC

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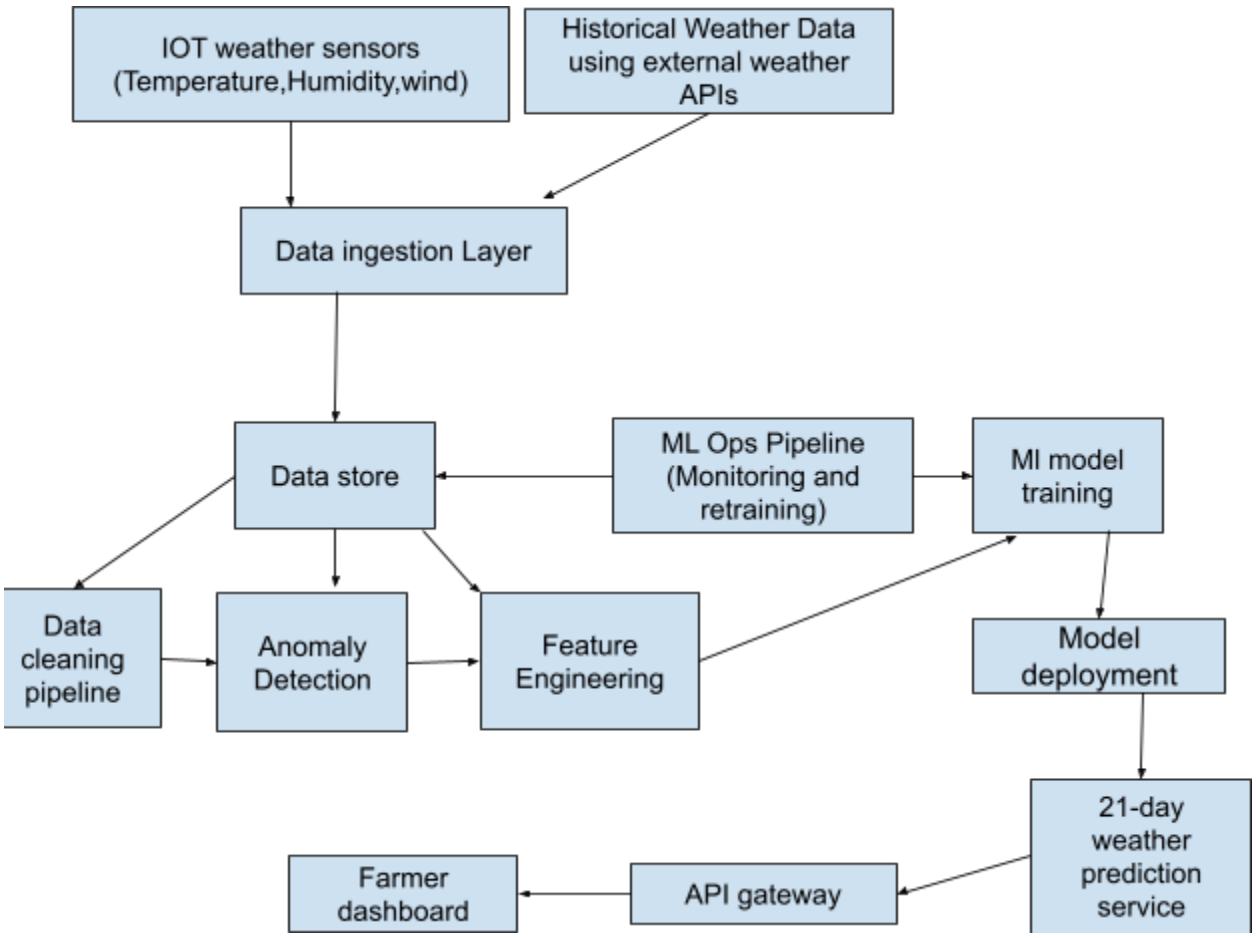
Task Number : 01

1. System to present for the project manager to predict the next 21 daily rain probability



2. Simple description of each component.

1. IoT Sensors and External APIs

Collect real-time data like temperature, humidity, and wind speed from the IoT sensors.Additionally, getting additional data from External weather APIs' data , like historical weather trends. In here, data is transmitted every 1 minute to the system.

2. Data Ingestion Layer.

Collects data and stores the data from IoT sensors for further processing. Data includes features like temperature, humidity, and wind speed.

3. Data Store

A cloud storage platform that stores raw and cleaned weather data.

4. Data Cleaning Pipeline

Fixes missing values, incorrect entries, and sensor malfunctions if there are any.Ensures data quality before model training.

5. Anomaly Detection

Identifies sensor errors and unrealistic values.Handles missing values and other outliers and process data.Prevents false data from affecting the accuracy of the model..

6. Feature Engineering

Converts raw data into useful features for model training.Summarizes data into daily average value.

7. ML Ops Pipeline (Monitoring and Retraining)

Regularly checks how well the model is performing and updates it when data patterns change.

8. ML Model Traning

Uses machine learning algorithms to predict rain.In this case , Extra Trees Classifier.
Trained on historical weather data.

9. Model Deployment

The trained model is deployed for predictions.Provide forecasts for users in real-time.

10. 21-Day Weather Prediction Service

Generates daily rainfall probability for the next 21 days.Uses real-time data for more accurate predictions.

11. API Gateway

Acts as a gate between users and the prediction service. Farmers and stakeholders can request weather forecasts from the model.

12. Farmer Dashboard

Displays weather forecasts in a user-friendly interface. Farmers can plan irrigation, planting, and harvesting according to the data.