Track 5: Climate AI & Predictive Futures

Case Study

Every year, Delhi finds itself in a reactive battle against predictable environmental crises. In November, as post-harvest crop burning combines with festive emissions and temperature inversions, the city is choked by a blanket of smog, forcing last-minute school closures and construction bans. During the monsoon, a few hours of intense rain can bring the city to a standstill, with authorities scrambling to deal with flash floods on unprepared roads. These events are not surprises, yet the response is almost always a scramble. The city possesses vast amounts of historical data on weather, pollution, traffic, and public health, but it lacks the sophisticated predictive tools to transform this data into foresight, leaving it perpetually one step behind the next climate-driven challenge.

Call for Innovation

This is the deep-tech track for the data scientists, the ML engineers, and the algorithm architects. Your challenge is not just to analyze the past, but to accurately forecast the future. We are calling on you to build the predictive engines that will serve as an early warning system for Delhi's biggest environmental threats. Move beyond dashboards that show what's happening now, and create robust models that tell us what will happen next—next week, next month, or next season. We need you to harness the power of machine learning to provide granular, actionable predictions that can empower policymakers, businesses, and citizens to prepare, adapt, and act proactively.

Problem Statements

1. The "SmogCast" 72-Hour AQI Prediction Engine

Build a machine learning model that predicts the Air Quality Index (AQI), specifically PM2.5 levels, for various zones across Delhi with a 72-hour lead time. Your model must ingest and process a diverse set of features, including historical pollution data, meteorological forecasts (wind speed, direction, humidity, temperature inversions), satellite imagery data to detect farm fires in neighboring states, and traffic congestion patterns. The output should be a granular, time-series forecast that can alert authorities to an impending "airpocalypse" days in advance.

2. The Hyperlocal Urban Flood Forecaster

Develop an AI-powered system to predict flash flood and waterlogging risks at a street-by-street level. Using a combination of topographical data (digital elevation models), the city's storm drain network layout, historical waterlogging hotspots, and real-time weather radar data for rainfall intensity, your model should generate a dynamic, high-resolution risk map. This map should

update every hour, highlighting specific roads and neighborhoods that are at high risk of inundation, allowing for targeted traffic diversions and emergency response deployment.

3. The Climate-Smart Agricultural Yield Forecaster

The food supply for a megacity like Delhi is highly vulnerable to climate shifts. Your task is to create a predictive model that forecasts the yield of essential crops (e.g., wheat, rice) in the surrounding agrarian belts. Your model should analyze satellite imagery (like NDVI to assess crop health), long-term climate data, and soil moisture levels to predict the end-of-season harvest volume. Furthermore, the model should project the potential impact of these yields on food supply and price volatility in Delhi's wholesale markets, giving policymakers an early warning of potential shortages.