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AIR POLLUTION IN NEW DELHI, INDIA : SOURCE DETECTION AND PREDICTION OF
SEASONAL VARIATIONS IN POLLUTANT CONCENTRATIONS USING MACHINE LEARNING

Abstract

Today, air pollution is a major global environmental risk to our health and food security. The drastic degradation of air quality in leading metropolitan cities is a matter of serious concern. An astounding twenty one of the world's top 30 worst AQI (Air Quality Index) ranked cities are in India and New Delhi is the world's most polluted capital city.

This paper aims to identify the causes of air pollution in New Delhi, India by tracing the trajectories of air pollutants such as sulphur dioxide, carbon monoxide and nitrogen dioxide. The pollution in New Delhi reaches an annual high during the month of October. This has been attributed to crop residue burning (stubble burning) in the neighbouring states of Punjab and Haryana. The time of commencement of stubble burning is recognised by remote-sensing an abrupt decrease in wheat and paddy land cover in Punjab and Haryana.

Beginning from this time, the concentrations of aforementioned pollutants are observed and the trajectories of the same are predicted using supervised classification and regression trees (CART). The model will be trained and tested on the datasets obtained from Sentinel-5P (Pollutant Concentration), GFSAD (Agricultural Produce), NCEP/NCAR Reanalysis data (Surface Temperature), RTMA (Near surface weather conditions) and TRMM Data (Precipitation).

The approximate time of the year during which the pollutant concentration in the region breaches the WHO AQG (Air Quality Guidelines) threshold is predicted by the model. This shall help regulatory authorities to take the necessary precautionary measures for combating air pollution. The correlation between the pollutant trajectories and the weather parameters such as temperature and rainfall, is also validated by the model.