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CPS Paper

A non-homogeneous Poisson model and a reversible jump MCMC algorithm to estimate the probability of occurrences of air pollution exceedances

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Brief Description

High levels of air pollution may have serious harmful effects in human health.

Hence, in order to reduce population exposure and, consequently, the health hazard associated to it, preventive measures have been implemented in several cities around the world.

In Mexico City environmental emergency alerts are declared whenever high levels of ozone and/or PM10 occur.

They are triggered when these pollutants concentrations exceed their corresponding assigned thresholds.

When emergency alerts are declared, several measures are taken in order to prevent population exposure and reduce pollution levels.

In the present talk, we study the problem of estimating the probability of occurrences of pollutants concentrations exceedances using a non-homogeneous Poisson model in the presence of change-points.

The exceedances considered here are based on thresholds set by the Mexican air quality standard.

In order to estimate the number of possible change-points, their locations as well as the parameters of the non-homogeneous Poisson rate function, we use the Bayesian point of view and a reversible jump Markov chain Monte Carlo algorithm.

We apply the model and the algorithm to the daily maximum ozone and PM10 measurements provided by the Mexico City monitoring network.

This is a joint work with Mario H.

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Abstract

High levels of air pollution may have serious harmful effects in human health. Hence, in order to reduce population exposure and, consequently, the health hazard associated to it, preventive measures have been implemented in several cities around the world. In Mexico City environmental emergency alerts are declared whenever high levels of ozone and/or PM10 occur. They are triggered when these pollutants concentrations exceed their corresponding assigned thresholds. When emergency alerts are declared, several measures are taken in order to prevent population exposure and reduce pollution levels. In the present talk, we study the problem of estimating the probability of occurrences of pollutants concentrations exceedances using a non-homogeneous Poisson model in the presence of change-points. The exceedances considered here are based on thresholds set by the Mexican air quality standard. In order to estimate the number of possible change-points, their locations as well as the parameters of the non-homogeneous Poisson rate function, we use the Bayesian point of view and a reversible jump Markov chain Monte Carlo algorithm. We apply the model and the algorithm to the daily maximum ozone and PM10 measurements provided by the Mexico City monitoring network. This is a joint work with Mario H. Tarumoto, Juan A. Cruz-Juarez, Hortensia J. Reyes-Cervantes and Guadalupe Tzintzun.