Multiple changepoint detection on air pollution via genetic algorithms with bayesian-MDL on nonhomogeneous Poisson periods

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Abstract

Particulate matter is one of the most harmful air pollutants. Human exposure to high levels of this pollutant has long been known to have adverse health effects. One way to find out if a new environmental policy has a positive effect is to look for changes in the probabilistic behavior of the time series after the implementation of a new policy. In this contribution, we apply a genetic algorithm to find out the changepoints values of a nonhomogeneous Poisson process applied to model the number of particulate matter exceedances in Bogota, Colombia. Moreover, we present a computational algorithm to find out the maximum a posteriori estimation for some particular families of rates functions and prior parameter distributions.

Keywords: Changepoint detection; Genetic algorithms; Nonhomogeneous Poisson process; Minimum description length.