

Conditional quantiles when the covariates are curves : an application to Ozone pollution forecasting

Summary

This work deals with the study of pollution data with the aim of forecasting the Ozone pollution in the city of Toulouse. The ORAMIP (“Observatoire Régional de l’Air en Midi-Pyrénées”) provided data which are hourly measures of pollutants as well as hourly measurements of meteorological covariates. The nature of these data allows us to deal with them as curves, known in some discretization points, which are called *functional data* in the literature.

Our goal is then to give a prediction of the maximum of Ozone one day knowing one or several of these functional variables the day before. To do this, we consider two models. The first one bases the prediction on the conditional mean, and the second one on the conditional median. In each case, we have functional covariates and we introduce a spline estimator of the functional coefficient which minimizes a least square type (in the first model) or a least absolute value type (in the second model) penalized criterion. The minimization criterion corresponding to the first model has an explicit solution, contrary to the second one which is solved by an iterative weighted least square algorithm. These two approaches are illustrated with the ORAMIP data and we make a comparison of the prediction of these models with different covariates.