



On the characteristics of a Geographically Weighted Functional Regression model for spatially dependent functional data

Elvira Romano*

Department of Political Science "Jean Monnet", Second University of Naples, Caserta, Italy,
elvira.romano@unina2.it

Jorge Mateu

Department of Mathematics, Campus Riu Sec, University Jaume I, Castellon, Spain,
mateu@mat.uji.es

Maria Dolores Ruiz Medina

Department of Statistics and Operation Research, University of Granada Campus Fuente Nueva, Spain,
mruiz@ugr.es

A Geographically Weighted Regression Model (GWR) model for spatially dependent functional data extending the traditional functional regression framework is proposed. The method allows to search for local (depending on the spatial location) rather than global parameters. Thus a calibration of the spatial dependence among functional data is proposed. A different emphasis to the classic functional regression model is given by considering the spatial dependence, especially a new spatial-functional weighting scheme is defined. Let us think, for instance, on the problem of predicting precipitation profile from temperature profile in a wide area. The questions to be answered could be: can we provide a model to describe the local spatial variation of the functional covariates over the space?; how can we investigate the sensitivity of the spatial relation in the space?; can we use the information obtained for predicting some changes? Our method enables to answer such questions, it can be applied to a wide range of domains where given two functional variables, the aim is to predict changes of a functional variable with a functional covariate by accounting for spatial dependence. Performances of the method are evaluated on real and simulated data.

Keywords: spatially dependent functional data; functional regression; geographical weighted regression.