

Robust function-on-function interaction regression

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Abstract

We consider a function-valued response variable and multiple functional-valued predictor variables in a function-on-function regression. We assume the response and predictors reside in square-integrable Hilbert space with finite second-order moments. The function-on-function regression encompasses quadratic and interaction effects of the functional predictors; this model provides a more flexible form compared with the standard function-on-function regression. Despite the flexibility, the quadratic and interaction effects may be erroneous in the presence of outliers and affect the estimation accuracy in them and the main effect. We propose a robust method to effectively estimate the coefficient of the function-on-function quadratic and interaction regression. Some of its theoretical properties, such as consistency and influence function, are investigated. The finite-sample performance of the proposed method is also evaluated through a series of Monte Carlo studies and an empirical data analysis. The estimation and forecast accuracies of the proposal are compared favourably with several existing methods.

Keywords τ -estimator; Quadratic term; Robust estimatio

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