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The reproducing kernel Hilbert space approach in nonparametric regression problems with correlated observations

D. Benelmadani[1] · K. Benhenni[1] · S. Louhichi[1]

Abstract

In this paper, we investigate the problem of estimating the regression function in models with correlated observations. The data are obtained from several experimental units, each of them forms a time series. Using the properties of the reproducing kernel Hilbert spaces, we construct a new estimator based on the inverse of the autocovariance matrix of the observations. We give the asymptotic expressions of its bias and its variance. In addition, we give a theoretical comparison between this new estimator and the popular one proposed by Gasser and Müller, we show that the proposed estimator has an asymptotically smaller variance than the classical one. Finally, we conduct a simulation study to investigate the performance and the robustness of the proposed estimator and to compare it to the Gasser and Müller's estimator in a finite sample set.

Keywords Nonparametric regression · Correlated observations · Growth curve · Reproducing kernel Hilbert space · Projection estimator · Asymptotic normality

✉ K. Benhenni
  karim.benhenni@univ-grenoble-alpes.fr

  D. Benelmadani
  djihad.benelmadani@univ-grenoble-alpes.fr

  S. Louhichi
  sana.louhichi@univ-grenoble-alpes.fr

[1] Laboratoire Jean Kuntzmann (CNRS 5224), Université Grenoble Alpes, 700 Avenue Centrale, 38401 Saint-Martin-d'Hères, France