CrossMark

Sobolev-Hermite versus Sobolev nonparametric density estimation on ℝ

Denis Belomestny[1,2] · **Fabienne Comte**[3] ·
Valentine Genon-Catalot[3]

Abstract In this paper, our aim is to revisit the nonparametric estimation of a square integrable density f on ℝ, by using projection estimators on a Hermite basis. These estimators are studied from the point of view of their mean integrated squared error on ℝ. A model selection method is described and proved to perform an automatic bias variance compromise. Then, we present another collection of estimators, of deconvolution type, for which we define another model selection strategy. Although the minimax asymptotic rates of these two types of estimators are mainly equivalent, the complexity of the Hermite estimators is usually much lower than the complexity of their deconvolution (or kernel) counterparts. These results are illustrated through a small simulation study.

✉ Fabienne Comte
  fabienne.comte@parisdescartes.fr

  Denis Belomestny
  denis.belomestny@uni-due.de

  Valentine Genon-Catalot
  valentine.genon-catalot@parisdescartes.fr

[1] Faculty of Mathematics, Duisburg-Essen University, Thea-Leymann-Str. 9, 45127 Essen, Germany

[2] National Research University Higher School of Economics, Shabolovka, 26, 119049 Moscow, Russia

[3] MAP5 UMR CNRS 8145, Université Paris Descartes, Sorbonne Paris Cité, 45 rue des Saints-Pères, 75 270 Paris Cedex 06, France