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Regularization parameter selection in indirect regression by residual based bootstrap

Abstract:

We consider a nonparametric indirect regression model, where the underlying regression function is distorted through a convolution. We investigate a smooth bootstrapping of the resulting model residuals and propose a straightforward selection technique to choose the regularizing parameter (essentially a bandwidth) required for the indirect regression function estimator. In addition, we provide new results for the indirect regression estimator that lead to a uniform expansion of the residual based empirical distribution function, which indicates the smooth bootstrapping technique can be used analogously to Neumeyer (2009), who considered smooth bootstrapping of nonparametric regression residuals for residual based test statistics. Our results highlight additional smoothness requirements on the indirect regression function must be met in order for the residual based empirical distribution function to be consistent (and therefore useful). Finally, the residual based empirical distribution function is asymptotically most precise in this case.

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