

Estimation of the Error Distribution in a Semiparametric Transformation Model

Cédric HEUCHENNE

University of Liège and Université catholique de Louvain

Rawane SAMB

Ingrid VAN KEILEGOM

Université catholique de Louvain

Université catholique de Louvain

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Abstract

In this paper, we consider the semiparametric transformation model $\Lambda_{\theta_o}(Y) = m(X) + \varepsilon$, where θ_o is an unknown finite dimensional parameter, the function $m(\cdot) = E[\Lambda_{\theta_o}(Y)|X = \cdot]$ is smooth but otherwise unknown, and the covariate X is independent of the error ε . Estimators for the density and the cumulative distribution functions of ε are investigated and their convergence properties are proved. The proposed estimators depend on a profile likelihood estimator of θ_o and a nonparametric kernel estimator of m . We also evaluate the practical performance of our estimators in a simulation study for several models and sample sizes.

Keywords: Empirical distribution function; Kernel smoothing; Nonparametric regression; Profile likelihood estimator; Semiparametric regression; Transformation model.