

Estimation in nonparametric location-scale regression models with censored data

Cédric Heuchenne · Ingrid Van Keilegom

Received: 14 August 2006 / Revised: 19 March 2008 / Published online: 19 March 2009
© The Institute of Statistical Mathematics, Tokyo 2009

Abstract Consider the random vector (X, Y) , where X is completely observed and Y is subject to random right censoring. It is well known that the completely nonparametric kernel estimator of the conditional distribution $F(\cdot|x)$ of Y given $X = x$ suffers from inconsistency problems in the right tail (Beran 1981, Technical Report, University of California, Berkeley), and hence any location function $m(x)$ that involves the right tail of $F(\cdot|x)$ (like the conditional mean) cannot be estimated consistently in a completely nonparametric way. In this paper, we propose an alternative estimator of $m(x)$, that, under certain conditions, does not share the above inconsistency problems. The estimator is constructed under the model $Y = m(X) + \sigma(X)\varepsilon$, where $\sigma(\cdot)$ is an unknown scale function and ε (with location zero and scale one) is independent of X . We obtain the asymptotic properties of the proposed estimator of $m(x)$, we compare it with the completely nonparametric estimator via simulations and apply it to a study of quasars in astronomy.

Keywords Bandwidth · Bootstrap · Kernel estimation · Nonparametric regression · Right censoring · Survival analysis