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Local asymptotics for quantile smoothing splines. (English) Zbl 0898.62044

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Summary: Quantile smoothing splines were introduced by *R. Koenker*, *P. T. Ng* and the author [*Biometrika* 81, No. 4, 673-680 (1994; [Zbl 0810.62040](#))] as natural and appealing estimates of conditional quantiles of response variables. The natural setting for the problem considers minimization of a weighted combination of a “fit” penalty and a “roughness” penalty over the space of functions whose derivatives have bounded variation. Although this space is not traditional, *X. Shen* [Tech. Rep., Dept. Stat., Ohio State Univ. (1994)] has shown recently that the quantile smoothing splines do indeed converge at the usual optimal rate ($n^{-2/5}$) in various norms.

Here, local asymptotic results are obtained by establishing Bahadur representations for local parameters of the splines. These are used to obtain local rates of convergence, to establish uniform convergence rates, to provide local distribution theory for quantile *B*-splines and to expand the “fit” measure in order to analyze an information criterion for determining the smoothing parameter. Examples of using derivatives of the smoothing splines for estimating jump functions are also presented.

MSC:

62G07 Density estimation

62G20 Asymptotic properties of nonparametric inference

62E20 Asymptotic distribution theory in statistics

Cited in 19 Documents

Keywords:

nonparametric regression; conditional quantiles; quantile smoothing splines; Bahadur representations; rates of convergence

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