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Kernel quantile estimators. (English) Zbl 0705.62042
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Summary: For an estimator of quantiles, the efficiency of the sample quantile can be improved by considering linear combinations of order statistics, that is, L estimators. A variety of such methods have appeared in the literature; an important aspect of this article is that asymptotically several of these are shown to be kernel estimators with a Gaussian kernel, and the bandwidths are identified. It is seen that some implicit choices of the smoothing parameter are asymptotically suboptimal.

In addition, the theory of this article suggests a method for choosing the smoothing parameter. How much reliance should be placed on the theoretical results is investigated through a simulation study. Over a variety of distributions little consistent difference is found between various estimators. An important conclusion, made during the theoretical analysis, is that all of these estimators usually provide only modest improvement over the sample quantile. The results indicate that even if one knew the best estimator for each situation, one can expect an average improvement in efficiency of only 15 %. Given the well-known distribution-free inference procedures (e.g., easily constructed confidence intervals) associated with the sample quantile, as well as the ease with which it can be calculated, it will often be a reasonable choice as a quantile estimator.

MSC:

62G05 Nonparametric estimation

62G15 Nonparametric tolerance and confidence regions

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Keywords:

estimator of quantiles; efficiency of the sample quantile; linear combinations of order statistics; L estimators; kernel estimators; Gaussian kernel; bandwidths; smoothing parameter; simulation study; distribution-free inference procedures; confidence intervals

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