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Title:

Method of moments approach to nuisance scale estimation for Huber M-quantiles

Abstract:

M-quantiles are a quantile-type generalization of M-estimation using influence functions. M-quantile regression using a Huber influence function provides an adjustable middle ground between quantile and expectile regression through the use of a tuning constant. This adjustability determines the level of robustness of the regression model. Such M-quantile regression models have been used as robust alternatives to random effects models especially in small area estimation. To ensure that these Huber M-quantiles are scale invariant a nuisance scale parameter is required. This scale parameter must also be robust to avoid compromising the robustness of the location parameter. The most commonly used robust scale estimator is the median absolute deviation (MAD), which was originally proposed when Huber M-quantile regression was introduced. Another scale estimator using maximum likelihood was also suggested recently which uses an Asymmetric Least Informative (ALI) distribution which is derived from the M-quantile loss function. This talk introduces a third scale estimator approach to Huber M-quantile regression using the method of moments based on the ALI distribution, and shows why it is better than the other two approaches. The appropriateness of each approach is assessed in a range of different contexts using simulations and real data.