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Locatelli, Isabella; Marazzi, Alfio; Yohai, Victor J.

Robust accelerated failure time regression.

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Summary: Robust estimators for accelerated failure time models with asymmetric (or symmetric) error distribution and censored observations are proposed. It is assumed that the error model belongs to a log-location-scale family of distributions and that the mean response is the parameter of interest. Since the scale is a main component of the mean, it is not treated as a nuisance parameter. A three steps procedure is proposed. In the first step, an initial high breakdown point S estimate is computed. In the second step, observations that are unlikely under the estimated model are rejected or down weighted. Finally, a weighted maximum likelihood estimate is computed. To define the estimates, functions of censored residuals are replaced by their estimated conditional expectation given that the response is larger than the observed censored value. The rejection rule in the second step is based on an adaptive cut-off that, asymptotically, does not reject any observation when the data are generated according to the model. Therefore, the final estimate attains full efficiency at the model, with respect to the maximum likelihood estimate, while maintaining the breakdown point of the initial estimator. Asymptotic results are provided. The new procedure is evaluated with the help of Monte Carlo simulations. Two examples with real data are discussed.

Keywords: accelerated failure time models; robust regression; censoring
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