Abstract

“A data-dependent multiplier bootstrap applied to transition probability matrices of inhomogeneous Markov processes”

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The analysis of transition probability matrices of non-homogeneous Markov processes is of great importance (especially in medical applications) and it constantly gives rise to new statistical developments. While observations may be incomplete, e.g. due to random left-truncation and right-censoring, estimation of these matrices is conducted by employing the Aalen-Johansen estimator which is based on counting processes. However, results of weak convergence towards a Gaussian process cannot be utilized straightforwardly since the complicated limiting covariance structure depends on unknown quantities.

In order to construct asymptotically valid inference procedures, we insert a set of bootstrap multipliers (from a large class of possible distributions) into a martingale representation of this estimator. A new aspect to this approach is given by the possibility to choose these multipliers dependent on the data, covering, for instance, the Wild bootstrap as well as the Weird bootstrap. In doing so, we gain conditional weak convergence towards a Gaussian process with correct covariance functions resulting in consistent tests and confidence bands.

For small samples the performance in the simple competing risks set-up is assessed via simulation studies illustrating the type I error control and analyzing the power of the developed tests and confidence bands for several bootstrap multipliers.