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Doubly Robust Survival Trees

Survival trees use recursive partitioning to separate patients into distinct risk groups. This work extends the IPCW-loss-based recursive partitioning procedures of Molinaro et al. (2004), using semiparametric efficiency theory for missing data applied to right-censored outcomes to motivate “doubly robust” loss-based recursive partitioning procedures that make better use of available information. It is further shown how these computations lead to equivalent “full data” recursive partitioning procedures that utilize imputed survival times, allowing one to build survival trees using existing methods for uncensored data with minimal modification. The performance of the doubly robust survival trees, implemented as a generalization of CART through modification of the rpart package, is evaluated through simulation studies and through analyzing data on death from myocardial infraction.