Title: Doubly Robust Survival Trees and Forests

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Abstract:

Survival trees use recursive partitioning to separate patients into distinct risk groups when some observations are right-censored. Survival forests average multiple survival trees, leading to more flexible (and often more accurate) prediction models. Existing algorithms for trees and forests in the case of uncensored outcomes rely heavily on the specification of a loss function (e.g., squared error loss) that governs all aspects of the decision-making process. Existing algorithms for censored outcomes typically bear little resemblance to what is used when censoring is absent. Motivated by semiparametric efficiency theory, we show how to unify the treatment of these algorithms through the development of a class of doubly robust loss functions. We discuss some of the properties of these loss functions and associated practical issues related to implementation. We further show how both the doubly robust survival trees and forest algorithms can be implemented using existing software. The performance of the resulting survival trees and forests is evaluated through simulation studies and illustrated using some data on death from myocardial infarction.