

**Inverse probability of censoring weighted U-statistics for right censored data with applications**

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**Abstract:** A right-censored version of a U-statistic with a general kernel of size  $n$  is introduced by the principle of a mean preserving reweighting scheme which is also applicable when the dependence between failure times and the censoring variable is explainable through observable covariates. Its asymptotic normality and an expression of its standard error are obtained through a martingale argument. Using two different kernels, we study the performance of our U-statistic by simulation and compare them with theoretical results. A doubly-robust version of this reweighted U-statistic is also introduced to preserve consistency in the face of model misspecifications. Using a Kendall's kernel, we obtain a test statistic for testing homogeneity of failure times for multiple failure causes in a multiple decrement model. The performance of the proposed test is studied through simulations. Its utility is also illustrated by applying it on a real data set.