

A Wald-type variance estimation for the nonparametric distribution estimators for doubly censored data

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Abstract We discuss the variance estimation for the nonparametric distribution estimator for doubly censored data. We first provide another view of Kuhn–Tucker’s conditions to construct the profile likelihood, and lead a Newton–Raphson algorithm as an optimization technique unlike the EM algorithm. The main proposal is an iteration-free Wald-type variance estimate based on the chain rule of differentiating conditions to construct the profile likelihood, which generalizes the variance formula in only right- or left-censored data. In this estimation procedure, we overcome some difficulties caused in directly applying Turnbull’s formula to large samples and avoid a load with computationally heavy iterations, such as solving the Fredholm equations, computing the profile likelihood ratio or using the bootstrap. Also, we establish the consistency of the formulated Wald-type variance estimator. In addition, simulation studies are performed to investigate the properties of the Wald-type variance estimates in finite samples in comparison with those from the profile likelihood ratio.

Keywords Double censoring · Efficient Fisher information · Empirical likelihood · Integral equations · Profile likelihood · Self-consistent equations · Variance formula