THE KAPLAN-MEIER ESTIMATOR: CONSIDERING BIAS AND MSE UNDER MONOTONIC TRANSFORMATIONS AND ORDERING

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Abstract

Influential studies of the Kaplan-Meier Estimator have come from Efron, Tableman, and Gillespie, among others. This estimator is used to approximate survival functions in missing data problems. Survival times, Xi, and censored times, Ci, where i = 1,...,n, are generated from random continuous distributions, and the minimum of Xi and Ci is recorded as an observation, Yi. Continuous distributions include the exponential, gamma, Pareto, uniform, and Weibull. After monotonically transforming Xi and Ci, the bias and mean squared error (MSE) between the Yi and Xi have the potential to change. Monotonic transformations include exponential, logarithmic, squaring, and square root. The goal is to measure such changes in order to comment on how well monotonic transformations preserve the original data. The monotonic transformations are then applied only to Ci by changing the censoring rate and order, and the bias and MSE are observed using the software package R. Under monotonic transformations, bias and MSE are not changed, however the same is not true with ordering. The changes seen through ordering lead to further questions about the consistency of monotonic transformation of data in other areas.