On Estimating Survival Functions Under Stochastic Order

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Abstract

Let $\hat{H}$, $\tilde{G}$, and $\hat{H}$ be survival functions satisfying the constraint $\hat{F} \leq \hat{H} \leq \tilde{G}$. Lee, Yan, and Shi (1999) had developed an algorithm to estimate the survival function $\hat{H}$ when $\hat{F}$ and $\tilde{G}$ are known. However, lacking a closed form of the estimator makes the investigations of the properties of the estimators difficult. In this paper, we propose alternative estimators for $\hat{H}$ in the case where $\hat{F}$ and $\tilde{G}$ are known. However, lacking a closed form of the estimator makes the investigations of the properties of the estimator difficult. In this paper we propose alternative estimators for $\hat{H}$ in the case where $\hat{F}$ and $\tilde{G}$ are known and in the case where they are unknown. The estimators are proved to be strongly uniformly consistent in both cases: the formulas for the bias and the mean squared error (MSE) are also derived. In the simulations the MSE of our estimators, when $\hat{F}$ and $\tilde{G}$ are known, are uniformly better than that of Lee, Yan, and Shi when the sample size is small (30): when the sample size is large, further investigation is needed.