Analysis of Censored Data
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REMARKS ON CRAMER-RAO TYPE INTEGRAL INEQUALITIES FOR RANDOMLY CENSORED DATA

B.L.S. PRAKASA RAO
Indian Statistical Institute
7, S.J.S. Sansanwal Marg,
New Delhi - 110016, India

Abstract

Cramer-Rao type integral inequalities for the integrated risk, for estimators for parameters based on ramdomly censored data, are derived. As applications, lower bounds for the locally asymptotic minimax risk for estimators of parameters in the exponential and Weibull case for the proportional hazard model, are obtained and locally minimax estimators of the relevant parameters are identified.

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1 Introduction

Suppose that on a certain probability space, ξ and η are random variables with distribution functions $F(x,\theta)$ and $G(x,\theta)$ respectiveldy where $\theta \in \Theta \subset R^1$. Further suppose that $\xi_1, \xi_2, ..., \xi_n$ are independent and identically distributed (i.i.d.) as ξ and $\eta_1, \eta_2, \cdots, \eta_n$ are i.i.d. as η. Define $\zeta_i = \min(\xi_i, \eta_i)$ and $\delta_i = I(\xi_i \leq \eta_i)$, $1 \leq i \leq n$, where $I(A)$ denotes the indicator function of the set A. It is easy to see that ζ_i, $1 \leq i \leq n$ are independent and δ_i, $1 \leq i \leq n$ are also independent random variables. We assume that ξ_i and η_i are not observable but (ζ_i, δ_i) is observable for $1 \leq i \leq n$. As is well known, the set of data (ζ_i, δ_i), $1 \leq i \leq n$ so obtained is termed in the literature as randomly censored data and is common in studies in survival analysis and reliability. It is assumed that ξ_i's are independent of censoring random variables η_i's.