Consistency of Bayesian inference for survival analysis with or without censoring

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Abstract

We study the convergence of the posterior distribution to the true distribution in the context of survival analysis data. In the presence of censoring, when the prior is a Dirichlet process, we establish the consistency when the true distribution satisfies a bounded support assumption. We provide a sufficient condition for consistency for general priors. In the uncensored case we prove a similar result when the prior for the survival distribution arises through a Dirichlet Process prior for the hazard rate.

1   Introduction

Dirichlet process priors D_α for non-parametric Bayesian inference about an unknown distribution function F were introduced by Ferguson(1973,1974). For a recent review see Ferguson, Phadia and Tiwari(1993). Ferguson (1973) proved the consistency of the Bayes estimate for F. The approach of Sethuraman and Tiwari (1982) can be used to prove the consistency of the posterior, in the sense of Freedman, i.e., the posterior converges to δ_{F_0} a.s F_0, where F_0 is the true distribution and δ_{F_0} is the probability measure putting all its mass at F_0. A careful and detailed presentation of this notion of consistency, which can be traced back to the work of Laplace, is available in Freedman(1963) and in Diaconis and Freedman (1986).