

Bayesian Analysis of Topp-Leone Generalized Exponential Distribution

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Abstract : The Topp-Leone distribution was introduced by Topp- Leone in 1955. In this paper, an attempt has been made to fit Topp-Leone Generalized exponential (TPGE) distribution. A real survival data set is used for illustrations. Implementation is done using R and JAGS and appropriate illustrations are made. R and JAGS codes have been provided to implement censoring mechanism using both optimization and simulation tools. The main aim of this paper is to describe and illustrate the Bayesian modelling approach to the analysis of survival data. Emphasis is placed on the modeling of data and the interpretation of the results. Crucial to this is an understanding of the nature of the incomplete or 'censored' data encountered. Analytic approximation and simulation tools are covered here, but most of the emphasis is on Markov chain based Monte Carlo method including independent Metropolis algorithm, which is currently the most popular technique. For analytic approximation, among various optimization algorithms and trust region method is found to be the best. In this paper, TPGE model is also used to analyze the lifetime data in Bayesian paradigm. Results are evaluated from the above mentioned real survival data set. The analytic approximation and simulation methods are implemented using some software packages. It is clear from our findings that simulation tools provide better results as compared to those obtained by asymptotic approximation.

Keywords : Bayesian Inference, JAGS, Laplace Approximation, LaplacesDemon, posterior, R Software, simulation

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