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Inference of progressively censored competing risks data from Kumaraswamy distributions

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Abstract

A competing risks model based on Kumaraswamy distribution is discussed under progressive censoring. When the latent lifetime model of failure causes features different and common parameters, maximum likelihood estimates for unknown parameters are established where the existence and uniqueness of the estimates are provided, and the approximate confidence intervals are also constructed via the observed fisher information matrix. Moreover, Bayes estimates and associated highest posterior density credible intervals are also obtained based on monte-carlo markov chain sampling methods. In addition, to test the equivalence of parameters between the competing risks, likelihood ratio test is also proposed. Finally, simulation studies and real-life example are presented for illustration purpose.

Keywords: Kumaraswamy distribution, Competing risks, Progressive censoring, Maximum likelihood estimation, Bayesian estimation, Monte-Carlo simulation
2010 MSC: 62F10; 62F12

1. Introduction and notation

Due to the complexity of internal structure and external environment, the failure of units is commonly yielded by multiple causes of failure which in some sense compete with each other in practice. In literature, these failure causes are called as competing risks where the observed failure data consists of a failure time and an indicator denoting the cause of failure. Competing

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