



Weibull Approximation to a Competing Risks Model With Two Independent Weibull Distributed Failure Modes

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Abstract

In different applications areas, e.g., medicine, biological sciences, and engineering reliability, competing risks models are used to model life of systems with multiple failure modes. The observed failure is the minimum of the possible individual failure times. For a competing risks model it is of interest to identify when the inference is robust to ignoring the mode of failure information. Toward that objective here we discuss an evaluation study to explore the behavior of the maximum likelihood single Weibull distribution fit ignoring the mode of failure information to a competing risks model with two independent Weibull risks and complete data. The evaluation study is mainly based on: (i) the Kullback-Leibler information which allows to find a best Weibull approximation to the independent Weibull competing risks model, (ii) a relation, which is found here, between the Kullback-Leibler procedure and the maximum likelihood (ML) Weibull fit ignoring the mode of failure information, and (iii) the ratio between the largest and the smallest shape parameters as a criterion measure to assess a Weibull approximation to the independent Weibull competing risks model.

Keywords: Kullback-Leibler information; ignoring mode of failure; multiple failure modes; maximum likelihood.