Inference for the Competing Risks Model under Progressive Censoring

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Abstract

There are several examples in the medical and engineering literature where the cause of failure of an individual or item may be attributable to one or more risk factors. These K factors in some sense compete for the failure of the item, hence the use of the term "Competing Risks Model". Data for the competing risks model includes information on failure time and an indicator variable denoting the cause of failure. The monograph by David and Moeschberger (1978) and the recent book by Crowder (2001) provide an excellent review of the literature in this area.

Inference for competing risk models under Type I and Type II censoring have been developed for various distributions such as the Exponential, Weibull and Normal when the risks are assumed to act independently. In this article, we consider inference for the Competing Risks model when the data are progressively censored. Progressive censoring is a more general form of censoring that allows for removal of items at specified times during the experiment. This scheme is more flexible than the traditional censoring schemes, and is attractive because of the potential savings in terms of time and cost associated with testing. The recent book by Balakrishnan and Aggarwala (2000) contains an exhaustive list of references and additional details on inference under progressive censoring for different parametric families of distributions.

In this talk, we consider data from a competing risks model, when the lifetimes under the different risks are independent exponentials. We also assume the data are progressively Type-II censored. We derive estimators based on maximum likelihood and derive their exact distributions. Based on the distribution of the MLE's, we construct confidence intervals of the parameters and evaluate their performance. Results of a numerical study are presented for different censoring schemes and sample sizes.

References

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