Simple heterogeneous step-stress accelerated life testing model

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ORAL PRESENTATION (20 minutes)

Abstract:

Accelerated life testing (ALT) is widely implemented to investigate lifetime performance within a comparatively short time period, inducing failures much earlier than under the user level. Step-stress ALT (SSALT) is a special case of ALT, where the stress level imposed on a unit changes gradually at pre-specified time points during the experiment. Statistical models for SSALT experiments assuming a homogeneous population and a variety of lifetime distributions, under different censoring schemes, have been extensively discussed in literature (see, e.g., Balakrishnan, N. et al. 2007, 2009). However, SSALT for a heterogeneous population received little attention, especially in the case of unknown group membership. In this talk, we introduce a simple heterogeneous SSALT (hSSALT) model with lifetimes being exponentially distributed under Type-II censoring. Heterogeneity is captured through a mixture model approach. The EM algorithm is adapted to derive the maximum likelihood estimates of the model's parameters. The validity of the proposed model and its advantage over the classical SSALT model in case of heterogeneity, are demonstrated via simulation studies.

References:

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