

國家理論科學研究中心學術演講

NCTS Industrial Statistics Research Group Seminar

Date: 1:30pm~5:00pm, April 26 (Fri.), 2013

(1) 1:30pm-3:00pm

Speaker: Prof. Ming-Yung Lee 李名鏞教授

(Statistics and Informatics Department, Providence University)

Topic: A Two-Stage Estimation Procedure for Lifetime Distribution under Time-Censored Accelerated Degradation Test

Abstract:

As contemporary products become more reliable, it becomes rather difficult to estimate their lifetime distributions when products are tested at normal use conditions. Accelerated Degradation Test (ADT) is thus used to assess a product's reliability in a timely manner. Lee and Tang (2007) proposed a modified EM-algorithm to estimate the lifetime distribution when data is available from a constant stress, time constrained ADT. However, in practice, an ADT is usually conducted using several stress levels simultaneously until a pre-specified censoring time. We assume that the Wiener degradation path under each stress level can be transformed into a linear path and the transformed censoring time may be different for each stress level. Hence, the original ADT becomes a multi-censored degradation test after transformation. To analyze this type of data, we propose a two-stage procedure and use a latent variable to estimate the parameters of the Inverse Gaussian lifetime distribution. At the first stage, the decay acceleration value is estimated and the resulting estimated acceleration factors are used later to estimate the lifetime parameters. Advantages of using the proposed method include closed-form estimates at each stage and more precise estimates than the standard maximum likelihood estimates, as demonstrated in a simulation study. These outcomes satisfy Morton (1981) results that if a distribution depends on nuisance parameters then both maximum likelihood and least square estimation may be biased.

Keywords: latent variable; decay acceleration value; time-censored; modified maximum likelihood estimator, Wiener process; inverse Gaussian distribution.

(2) 3:00pm-3:30pm Tea Break

(3) 3:30pm-5:00pm

Speaker: Dr. Pin Kung 龔彬博士

(Department of Statistics, National Cheng-Kung University)

Topic: Developing a Multiple Stage, Multiple Objective (MSMO) Green Building Framework

Abstract:

Green building is a sustainable concept to reduce environmental impact. In the past, buildings were designed by architects only; however, the concept of environmental protection now is promoted to construct “green” buildings. A team which has various experts, such as architects, engineers, contractors, designers and consultants, is necessary to complete a large green building project together. A multi-stage green building framework will guide future development of a comprehensive multiple stage, multiple objective (MSMO) decision-making framework. For the current study, only software the QUick Energy Simulation Tool (eQUEST) is used in the research. The design and analysis of computer experiments (DACE) approach uses design of experiment and statistical analysis to uncover multivariate patterns that will provide guidance for green building decisions. The experiment uses a Latin hypercube design to combine a mixed-level orthogonal array for discrete variables with a number-theoretic method for continuous variables. To accommodate the mix of continuous and discrete variables, the statistical analysis method fits treed regression (TreeReg), treed multivariate adaptive regression splines (TreeMARS), categorical TreeReg (CATreeReg) and categorical TreeMARS (CATreeMARS) models, and uses the method of seemingly unrelated regressions (SUR) to estimate the coefficients for a multiple response linear statistical model. Overall, TreeMARS with SUR has the smallest means of absolute relative errors.

Place:

***Lecture Room A of National Center for Theoretical Sciences (NCTS),
4th Floor, The 3rd General Building, National Tsing Hua University***

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102 年 4 月 15 日