SPECIAL SESSION: SURVIVAL ANALYSIS

VI WORKSHOP ON PROBABILISTIC AND STATISTICAL METHODS

This session will be held on will be held on Wednesday, February 7, at the Auditório 1, Biblioteca Comunitária - UFSCar

14:30 - 15:00

Efficient Closed-Form MAP Estimator for Nakagami Fading Parameter

Francisco Louzada - ICMC/USP

The Nakagami distribution plays an important role in communication engineering problems, particularly to model fading of radio signals. Moreover, the Nakagami distribution has been used successfully in other fields such as medical imaging processing, hydrologic engineering, seismological analysis and traffic modeling of multimedia data. Important probability distributions can be obtained from the Nakagami distribution such as the Rayleigh and the half-normal distributions. Here, we present the reliability properties for this distribution and prove that its hazard rate (mean residual life) function presents increasing (decreasing) or bathtub (unimodal) shapes. A maximum a posteriori (MAP) estimator for the Nakagami fading parameter is proposed. The MAP estimator has a simple closed-form expression and can be rewritten as a bias corrected generalized moment estimator. Numerical results demonstrate that the MAP estimation scheme outperforms the existing estimation procedures and produces almost unbiased estimates for the fading parameter even for small sample size. The potentiality of our proposed methodology is illustrated in a real reliability data set. This is joint research with Pedro Luiz Ramos and Eduardo Ramos.

15:00 - 15:30

Defective Models for Cure Rate Modeling with Interval-Censored Data

Vinicius Fernando Calsavara - Centro Internacional de Pesquisa do A.C.Camargo Cancer Center

The regression models in survival analysis are most commonly applied for right-censored survival data. However, in some situations the time to the event is not exactly observed but it is known that the event occurred between two observed times. In practical problems, it is common to assume the moment of observation as the event occurrence time, ignoring the interval-censored mechanism. We present a cure rate defective model for interval-censored event-time data. Defective distribution is characterized by density function whose integration assumes values less than one when the domain of their parameters is different from the usual one. We consider the Gompertz and inverse Gaussian defective distributions which allow to model data containing cured elements. The parameter estimation is reached by maximum likelihood estimation procedure and Monte Carlo simulation studies are considered in order to evaluate the proposed models performance. The practice relevance of the models is illustrated through the ovarian cancer recurrence and oral lesion in children after liver transplantation datasets. Both studies were performed at A.C.Camargo Cancer Center, São Paulo, Brazil.

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A general class of Birnbaum-Saunders regression models for data containing zeros

Manoel dos Santos Neto - UFSCar and UFCG

In this paper, we present a general class of zero-adjusted Birnbaum-Saunders regression model. This new model generalizes at least seven existing regression models in the literature. Estimation of model parameters, residual analysis and influence diagnostic tools are also discussed. Finally, we apply it to two real-world case-studies to show its potential.

16:00 - 16:30

Some tests for Reliability models with different types of maintenance through a competing risks approach

Jean-Yves Dauxois - Université de Toulouse

Let us consider an industrial system subjects to different causes of failure and different types of maintenance: a corrective maintenance is performed after a critical failure and a preventive maintenance can be performed in order to decrease the risk of critical failure. The recurrence of these types of maintenance has been often modeled in a competing risks framework. However rather few statistical inference has been carried out in these models. In this presentation we will introduce statistical tests in order to help the engineers to select the model which better fits their data. We prove the asymptotic normality of our test statistics and we carry out Monte Carlo simulations to learn how work our tests on finite size samples. Applications on a real dataset is also given.