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Some Aspects of Reparametrization for inferences of K-OUT-M System Reliability in the Independent Exponential Case

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ABSTRACT

In this paper, we explore the use of appropriate reparametrizations to get accurate inferences for system reliability at time t considering K-out-of-m systems in the independent exponential case. In this reparametrization, we obtain good “normality” for the likelihood function or for the posterior density of the system reliability at time t , even considering small or moderate sample sizes. We illustrate the proposed method with two examples.

Robust Test in Time Series Modeling

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ABSTRACT

The problem of testing the adequacy of a time series in the presence of outliers is considered. Robust analogues of the Wald and Rao score statistics are presented for testing composite hypotheses in autoregressive and moving average models. Robust Wald-type tests based on RA-estimates (denoted by RAW) are studied for AR-models and robust Wald-type and the robust Rao score statistics based on GM estimates are studied for ARMA-models. It is shown that the asymptotic null distribution of RAW and that of the usual Wald-type statistic based on the least-squares estimates (denoted by W) are the same. Large sample properties of the robust procedures are given for these models.

Considerations upon the Bayesian Model for Electoral Polls with Applications to the Elections in Brazil and a Comparison with the Classical Model

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ABSTRACT

The Bayesian model to forecast electoral results uses a sampling design different from those commonly used. Through the Kullback-Laibler divergence measure. One selects the most representative polling stations (counties, electoral zones, suburbs, etc.) according to the population's political behavior, in the sense that some of those stations may have originated a result similar to that of the whole region. In those stations having the most similar behavior to that of whole region under study, it is select a sample of the same size. In the last few years, we have developed a heuristic procedure for the selection of the number of stations to be analysed, as well as some real applications to state or county elections in the State of Espírito Santo (ES) – Brazil. Two applications of that methodology are described here: (i) the forecasting of the final outcome of the 1990 elections for governor/senator in the State of Espírito Santo, and the verification of the selected stations permanence in the 1982-1990 period; and (ii) a comparison between the classical and Bayesian models in the 1992 county elections in Guarapari-ES. Some conclusions which were drawn from those experiences are discussed here.

A Simulation Study of Ridge Regression in an Incorrectly Specified Model

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ABSTRACT

By means of simulation experiments, the properties of Ridge Regression and Principal Components Regression estimators are studied in a model with incorrectly omitted explanatory variables. It is found that the biased estimators can outperform the Ordinary Least Squares estimator.

Power Comparisons of Nonparametric Tests for Location

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ABSTRACT

The asymptotic power of the Wilcoxon, Savage, Normal Score and Maximum Efficiency Robust tests is compared numerically for the two-sample location problem when the underlying distribution is a normal distribution. In addition, Normal Score test is shown preferable in comparison to Wilcoxon, Savage and Maximum Efficiency Robust tests.

On the Construction of Hierarchical Polynomial Regression Models

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ABSTRACT

The terms of a polynomial regression model are partially ordered by the divisibility relation. For example, the term 1 (representing the intercept) is a divisor of any other term, $x_1^2 x_2^1$ is a divisor of $x_1^2 x_2^3$ and $x_1^2 x_2$ and x_3 are divisibly incomparable. A polynomial model is hierarchical if it includes all the divisors of each of its terms. Nonhierarchical models have undesirable properties and their use is not recommended in most applications. Unfortunately, standard model-building procedures do not take into account the divisibility relation and seldom generate hierarchical models. We give in this article very general methods that can be used for the construction of any type of linear model, including polynomial regression, standard regression, and analysis of variance. These methods can also be applied to the construction of hierarchical log-linear models. An isomorphism between natural numbers and polynomial terms, based on prime number

factorizations, allows us to work arithmetically as opposed to algebraically. This arithmetic approach is extremely useful when writing computer programs, as we illustrate with some numerical algorithms.

Nonlinear Time Series Analysis in Emerging Stock Markets

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ABSTRACT

In this paper we present evidence of non linearity and fractality from a small European equity market, the Athens Stock Exchange (ASE), in the manner that is orientated towards statistical application. Our results give reliable evidence for the existence of an underlying dynamic system with a limited number of degrees of freedom.