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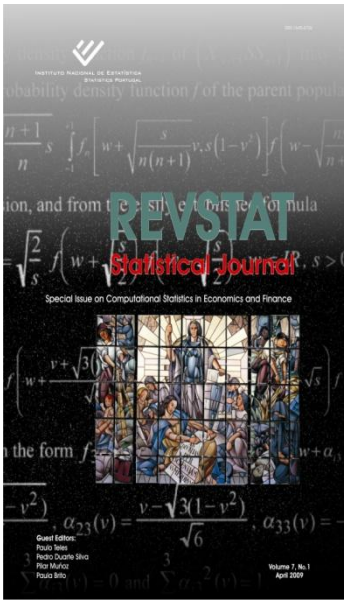

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This Volume of **REVSTAT: Volume 11, No. 1 - March 2013**, is about **"Business and Industrial Statistics"** and includes six articles. Their abstracts are presented below:

NONPARAMETRIC ESTIMATION OF THE TAIL-DEPENDENCE COEFFICIENT

Author: *Marta Ferreira*

A common measure of tail dependence is the so-called tail-dependence coefficient. We present a nonparametric estimator of the tail-dependence coefficient and prove its strong consistency and asymptotic normality in the case of known marginal distribution functions. The finite-sample behavior as well as robustness will be assessed through simulation. Although it has a good performance, it is sensitive to the extreme value dependence assumption. We shall see that a block maxima procedure might improve the estimation. This will be illustrated through simulation. An application to financial data shall be presented at the end.

NONCENTRAL GENERALIZED MULTIVARIATE BETA TYPE II DISTRIBUTION

Authors:. *K. Adamski, S.W. Human, A. Bekker* and *J.J.J. Roux*

The distribution of the variables that originates from monitoring the variance when the mean encountered a sustained shift is considered — specifically for the case when measurements from each sample are independent and identically distributed normal random variables. It is shown that the solution to this problem involves a sequence of dependent random variables that are constructed from independent noncentral chi-squared random variables. This sequence of dependent random variables are the key to understanding the performance of the process used to monitor the variance and are the focus of this article. For simplicity, the marginal (i.e. the univariate and bivariate) distributions and the joint (i.e. the trivariate) distribution of only the first three random variables following a change in the variance is considered. A multivariate generalization is proposed which can be used to calculate the entire run-length (i.e. the waiting time until the first signal) distribution.

USE OF SURVIVAL MODELS IN A REFINERY

Authors: *Silvia Madeira, Paulo Infante* and *Filipe Didelet*

Statistical methods are nowadays increasingly useful in industrial engineering. From plant design reliability to equipment analysis, there is much to cover with statistical models in order to improve the efficiency of systems. At Sines refinery we found it useful to apply a Cox model to a particular critical equipment trying to find process variables that cause its vibration as well as to apply well known distributions to baseline hazard rate.

ROBUST METHODS IN ACCEPTANCE SAMPLING

Authors. *Elisabete Carolino* and *Isabel Barão*

In the quality control of a production process (of goods or services), from a statistical point of view, the focus is either on the process itself with application of Statistical Process Control or on its frontiers, with application of Acceptance Sampling (AS) and Experimental Design. AS is used to inspect either the process output (final product) or the process input (raw material). The purpose of the design of a sampling plan is to determine a course of action that, if applied to a series of lots of a given quality, and based on sampling information, leads to a specified risk of accepting/rejecting them. Thus AS yields quality assurance. The classic AS by variables is based on the hypothesis that the observed quality characteristics follow the Gaussian distribution (treated in classical standards). This is sometimes an abusive assumption that leads to wrong decisions. AS for non-Gaussian variables, mainly for variables with asymmetric and/or heavy tailed distributions, is a relevant topic. When we have a known non-Gaussian distribution we can build specific AS plans associated with that distribution. Alternatively, we can use the Gaussian classical plans with robust estimators of location and scale — for example, the total median and the sample median as location estimates, and the full range, the sample range and the interquartile range, as scale estimates. In this work we will address the problem of determining AS plans by variables for Extreme Value distributions (Weibull and Fréchet) with known shape parameter. Classical plans, specific plans and plans using the robust estimates for location are determined and compared.

THE SKEW-NORMAL DISTRIBUTION IN SPC

Authors: *Fernanda Figueiredo and M. Ivette Gomes*

Modeling real data sets, even when we have some potential (as)symmetric models for the underlying data distribution, is always a very difficult task due to some uncontrollable perturbation factors. The analysis of different data sets from diverse areas of application, and in particular from statistical process control (SPC), leads us to notice that they usually exhibit moderate to strong asymmetry as well as light to heavy tails, which leads us to conclude that in most of the cases, fitting a normal distribution to the data is not the best option, despite of the simplicity and popularity of the Gaussian distribution. In this paper we consider a class of skew-normal models that include the normal distribution as a particular member. Some properties of the distributions belonging to this class are enhanced in order to motivate their use in applications. To monitor industrial processes some control charts for skew-normal and bivariate normal processes are developed, and their performance analyzed. An application with a real data set from a cork stopper's process production is presented.

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IMPROVING SSA PREDICTIONS BY INVERSE DISTANCE WEIGHTING

Authors: Richard O. Awichi and Werner G. Müller

This paper proposes a method of utilizing spatial information to improve predictions in one dimensional time series analysis using singular spectrum analysis (SSA). It employs inverse distance weighting for spatial averaging and subsequently multivariate singular spectrum analysis (MSSA) for enhanced forecasts. The technique is exemplified on a data set for rainfall recordings from Upper Austria.