



EMR 2021
XVII Escola de Modelos de Regressão

RESUMO – ST2 – SESSÃO JOVENS DOUTORES

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Robust Rayleigh Regression Method for SAR Image Processing in Presence of Outliers

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The presence of outliers (anomalous values) in synthetic aperture radar (SAR) data and the misspecification in statistical image models may result in inaccurate inferences. To avoid such issues, the Rayleigh regression model based on a robust estimation process is proposed as a more realistic approach to model this type of data. This paper aims at obtaining Rayleigh regression model parameter estimators robust to the presence of outliers. The proposed approach considered the weighted maximum likelihood method and was submitted to numerical experiments using simulated and measured SAR images. Monte Carlo simulations were employed for the numerical assessment of the proposed robust estimator performance in finite signal lengths, their sensitivity to outliers, and the breakdown point. For instance, the non-robust estimators show a relative bias value 65-fold larger than the results provided by the robust approach in corrupted signals. In terms of sensitivity analysis and break down point, the robust scheme resulted in a reduction of about 96% and 10%, respectively, in the mean absolute value of both measures, in comparison to the non-robust estimators. Moreover, two SAR data sets were used to compare the ground type and anomaly detection results of the proposed robust scheme with competing methods in the literature.

Moments of the doubly truncated selection elliptical distributions with emphasis on the unified multivariate skew-t distribution: recurrence, existence, and applications

Christian Galarza - Escuela Superior Politécnica del Litoral (ESPOL), Ecuador

We compute doubly truncated moments for the selection elliptical (SE) class of distributions, which includes some multivariate asymmetric versions of well-known elliptical distributions, such as, the normal, Student's t , among



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others. We address the moments for doubly truncated members of this family, establishing a neat formulation for high order moments as well as for its first two moments. We establish sufficient and necessary conditions for their existence. Simulation studies are presented in order to confirm our findings.

Using nonparametric regression models to analyze the dimensionality of curve time series

Rodney Vasconcelos Fonseca – IME-USP, Brasil

Functional data analysis is ubiquitous in most areas of sciences and engineering. Assuming the functional process lies in a finite-dimensional functional subspace can help us to observe interesting features of the curves observed. In this presentation we discuss how nonparametric regression models can be employed to estimate observations of time series of curves. Next, under the finite-dimensional assumption, we employ wavelet representation of these random functions to estimate the finite dimension and successfully model a time series of curves. The wavelet representation permits the use of different bootstrap procedures, and it results in faster computing algorithms. Application to real data illustrates the methods discussed.

Bayesian models for correcting underreporting in count data

Guilherme Lopes de Oliveira - CEFET-MG, Brasil

Count data are collected in many fields like criminology, epidemiology and demography to assess or monitor risks. In Brazil, this sort of data usually comes from official registration systems, such as SIM and SINAN, which are subject to under-registration: only a fraction of the true (but unobserved) counts is reported. In this talk, some statistical approaches for correcting underreporting in count data will be presented. The methods, in general, are based on the definition of a Poisson regression model for the observed data along with the specification of an auxiliary structure for modeling the reporting process. Inference is made under the Bayesian framework, being dependent on the type of prior information that is available. Applications on real data focus on the fields of epidemiology and demography, in which the correction of underreporting bias is quite important for accurate surveillance, intervention and control by the public authorities.



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