RESUMOS – CO4 – SESSÃO DE COMUNICAÇÃO ORAL 4

Coordenador: Filidor Vilca, Unicamp

Trabalho 1: Smoothing quantile regressions with time series data

Miguel Natal[1]
Eduardo Horta[1]

[1]*Programa de Pós-Graduação em Estatística (UFRGS)*

Palavras-chave: quantile regression; conditional quantile; Monte Carlo Simulation; quantile autogressive distributed lag; time series.

Resumo:
Quantile regression fits quantiles of the response variable and bringsthe concept of a quantile into the framework of general linear models. Although quantile regression was first introduced more than fourtyyears ago, only recently it became practible for large data, due to computational advances. As the objective function that the standard quantile regression estimator aims to minimize is not smooth, statistical inference is not straightforward. Fernandes et al. (2021) propose to smooth its objective function, thus presenting an alternative estimator: the convolution-type kernel smoothed quantile regression estimator. Based on this alternative approach for quantile regression modeling, this work aims to implement the convolution-type kernel quantile regression estimator in a time series data context. Since the authors have formalized the theory of the estimator considering cross-sectional data, the goal here is to try a new step by expanding their study into a time series framework. Through Monte Carlo simulations, we evaluate the estimator performance in a class of time series quantile regression models. We use the R package "conquer" by He et al. (2020) to perform the computational implementations.

Trabalho 2: Conditional mode: An approach via smoothed quantile regression

ARTUR ONGARATTO[1]
Eduardo Horta[1]

[1]*Universidade Federal do Rio Grande do Sul*

Palavras-chave: Mode regression; quantile regression; Data-driven bandwidth; Monte Carlo study.

Resumo:
Recently, Ota, Kato, and Hara (2019) proposed to estimate the conditional mode of a response, given a vector of covariates, using a computationally scalable estimator derived from the linear quantile regression model proposed by Koenker and Bassett (1978). Alternatively, we propose to estimate the conditional mode by maximizing the conditional density estimator of Fernandes, Guerre, and Horta (2021). This approach offers at least two benefits: computational efficiency and good asymptotic behavior which, in particular, “bypasses” the curse of dimensionality.

Trabalho 3: A robust multivariate Birnbaum-Saunders regression model

Renata Romeiro[1]
Filidor Vilca[1]
N. Balakrishnan[2]
Camila Borelli Zeller[3]

[1]*Universidade Estadual de Campinas*
[2]*Department of Mathematics and Statistics McMaster University*
[3]*Estatística / Instituto de Ciências Exatas / Universidade Federal de Juiz de Fora*

Palavras-chave: Asymptotic normality; multivariate regression model; Maximum likelihood method; EM algorithm; Robust estimation.

Resumo:
This work presents a log-linear model for multivariate Birnbaum-Saunders distribution that { can be used} in survival analysis to investigate correlated log-lifetimes of two or more units. This model is studied through the use of a generalized multivariate sinh-normal distribution, which is built from
the multivariate mixture scale of normal distributions. The marginal and conditional linear regression models of the proposed multivariate Birnbaum-Saunders linear regression model are generalizations of the Birnbaum-Saunders linear regression models of Rieck and Nedelman (1991), which have been used effectively to model lifetime and reliability data. We exploit a nice hierarchical representation of the regression model to propose a fast and accurate EM algorithm to compute the maximum likelihood estimates of the model parameters. Hypothesis testing is also performed by the use of the asymptotic normality of the maximum likelihood estimators. Finally, the results of simulation studies as well as an application to a real dataset are displayed, where we also is include a robustness feature of the estimation procedure developed here.

Trabalho 4: Identifiability analysis using data cloning

José Augusto Sartori Junior[1]
Márcia Branco[1]

[1]*Instituto de Matemática e Estatística / Universidade de São Paulo*

Palavras-chave: Identifiability; Data Cloning; dynamic models; MCMC algorithms.

Resumo:
Assessing the identifiability of a statistical model is often a difficult task. Purely mathematical tools for identifiability analysis are of limited applicability and empirical approaches may be computationally infeasible. Nonetheless, whether the objective is inference or prediction, lack of identifiability can render the statistical enterprise useless. There is much research to be made on methods for identifiability analysis that are both general and easy to use. In this work, we explore the capabilities of the data cloning algorithm as one such tool. Data cloning makes use of robust Bayesian software such as JAGS and Stan to find maximum likelihood estimates of the model parameters. Identifiability lies at the heart of its regularity conditions and plenty of diagnostic measures for assessing convergence of the estimates have been proposed, all of which should fail when attempting to use data cloning with an unidentifiable model. The interesting interplay between Bayesian and classical ideas makes data cloning an ideal candidate for studying identifiability in either statistical paradigm. Through a simulation study

with the Gaussian dynamic linear model, we show data cloning can reliably detect lack of identifiability, although some proposed diagnostic measures are considerably better than others. We also show that the algorithm performs incredibly well when we induce identifiability by using well-known parametric restrictions, which reinforces its use for likelihood-based inference.