STUDENT SESSION

ORGANIZER: VERA TOMAZELLA, FEDERAL UNIVERSITY OF SÃO CARLOS, BRAZIL

TALK 1: BIVARIATE ROTATED CLAYTON COPULA SUR TOBIT MODEL: A MODIFIED INFERENCE FUNCTION FOR MARGINS, INTERVAL ESTIMATION AND A FINANCIAL APPLICATION

SPEAKER: PAULO H. FERREIRA, FEDERAL UNIVERSITY OF SÃO CARLOS, BRAZIL

This work extends the analysis of the Seemingly Unrelated Regression (SUR) Tobit model for two right-censored dependent variables by modeling its nonlinear dependence structure through the rotated by 180 degrees version of the Clayton copula. The ability to capture/model the upper tail dependence of this SUR Tobit model where some data are censored is an useful feature of the rotated Clayton copula. We propose a modified version of the classical Inference Function for Margins (IFM) method by Joe and Xu (1996), which we refer to as Modified Inference Function for Margins (MIFM) method, to obtain the point estimates of the marginal and copula parameters. More specifically, we employ a frequentist data augmentation technique at the second stage of the IFM method (the first stage of the MIFM method is equivalent to the first stage of the IFM method) to generate the censored observations and then estimate the copula association parameter. This procedure (data augmentation and copula parameter estimation) is repeated until convergence. Such modification at the second stage of the usual estimation method is justified in order to obtain continuous marginal distributions, which ensures the uniqueness of the resulting copula, as stated by Sklar (1958)'s theorem; and also to provide an unbiased estimate of the copula association parameter (the IFM method provides a biased estimate of the copula parameter in the presence of censored observations in both margins). Since the usual asymptotic approach, that is the computation of the asymptotic covariance matrix of the parameter estimates, is troublesome in this case, we also propose the use of resampling procedures (bootstrap methods) to obtain confidence intervals for the model parameters. The satisfactory results from the simulation study indicate the adequate performance of our proposed model and methods. We illustrate our procedure using bivariate customer churn data from a Brazilian commercial bank. This is a joint work with Francisco Louzada (University of São Paulo, Brazil).

TALK 2: A GEOMETRIC PROBLEM IN BAYESIAN MODEL SELECTION

SPEAKER: FERNANDO CORRÊA, UNIVERSITY OF SÃO PAULO, BRAZIL

With a sample of points chosen randomly in some bounded convex subset of $\mathbb{R}^2$, one would like to guess the figure from which the points were sampled. This problem may be related to pattern recognition, computational graphics and geostatistics. Method: Let $\mathbf{x} = (x_1, \dots, x_n)$ be a sample of size n and a model set of possible choices $\{M_1, \dots, M_k\}$. We compute the posterior probability of each model and derive appropriate decision rules. Other important questions as the choice of priors and posterior inference with the selected model are discussed as well. This is a joint work with Adilson Simonis and Carlos A. B. Pereira (University of São Paulo, Brazil).

TALK 3: CASE-DELETION DIAGNOSTICS FOR QUANTILE REGRESSION USING THE ASYMMETRIC LAPLACE DISTRIBUTION

SPEAKER: LUIS E. BENITES, UNIVERSITY OF SÃO PAULO, BRAZIL

To make inferences about the shape of a population distribution, the widely popular mean regression model, for example, is inadequate if the distribution is not approximately Gaussian (or symmetric). Compared to conventional mean regression (MR), quantile regression (QR) can characterize the entire conditional distribution of the outcome variable, and is more robust to outliers and misspecification of the error distribution. We present a likelihood-based approach to the estimation of the regression quantiles based on the asymmetric Laplace distribution (ALD), which has a hierarchical representation that facilitates the implementation of the EM algorithm for the maximum-likelihood estimation. We develop a case-deletion diagnostic analysis for QR models based on the conditional expectation of the complete-data log-likelihood function related to the EM algorithm. The techniques are illustrated with both simulated and real data sets, showing that our approach out-performed other common classic estimators. The proposed algorithm and methods are implemented in the R package ALDqr().This is a joint work with Victor H. Lachos and Filidor E. Vilca (University of Campinas).

TALK 4: UNIFIED KUMARASWAMY-G CURE RATE MODELS

SPEAKER: RICARDO ROCHA, FEDERAL UNIVERSITY OF SÃO CARLOS, BRAZIL

In survival analysis is very common the presence of elements not susceptible to the event of interest. These elements generate what is called a cure fraction, or cure rate, or even long-term survivors. In this work we propose an unified approach for cure rate modeling under the Kumaraswamy family of distributions. The estimation is done by maximum likelihood and its properties are verified through simulation studies. An approach for the unified Kumaraswamy-G regression model is also proposed. To finalize we illustrate the proposed distributions using some real data sets. This is a joint work with Amanda Morales Eudes and Vera Tomazella (Federal University of São Carlos, Brazil).

TALK 5: APPLICATION OF BLIND SOURCE SEPARATION METHODS TO PROCESS MONITORING USING CONTROL CHARTS

SPEAKER: GUILHERME DEAN PELEGRINA, UNIVERSITY OF CAMPINAS, BRAZIL

An important tool in statistical process control (SPC) used for monitoring industrial processes is the control chart. Usually, the industries consider the univariate control charts in order to analyze a parameter individually. However, there is an interest in the multivariate control charts, which provides an analysis of two or more parameters together, identifying abnormalities that are not detected in a univariate view. The problem in the last case is that the single charts may be mixed, hindering the identification of a non-random pattern acting in the process. In this context, our goal is to verify the efficiency of several Blind Source Separation (BSS) methods in the separation of mixed patterns and to combined them with shape and statistical features in order to verify the robustness of each one in pattern classification. The results obtained have shown that the selection of efficient separation methods and shape and statistical features is fundamental to achieve high classification rates.