setting this subset as observed and select the fixed effects predictors. To improve the method for selecting variable in LME, a lasso-type joint procedure is used, in which one can select predictors for both fixed and random effects at the same time. By analyzing a data set of total concentration of nitrate in the atmosphere, we notice that there is residual autocorrelation. We then propose to include this autocorrelation in the procedure, using an autoregressive (AR) process in order to improve the variable selection method. We propose a constrained EM algorithm in which we incorporate the AR process in the estimation procedure.

Ricardo Potozky de Oliveira (UFPR, Brazil)
Hidden Markov Models in Linguistic Typology

Abstract: Markov stochastic models are used in a wide variety of fields - from economics to genetics - and a Markov model for an autonomous system with partially observable system states is called Hidden Markov Model (HMM). Linguistic Typology, as a branch of comparative linguistics, aims at the description of the structural diversity of natural languages. This field, still giving its first steps among brazilian researchers, can provide insights on the better understanding of the unique status of human language. The main objective of this work is to present applications of HMMs in the research horizon of the linguistic typology. This work is an indirect result of the author's participation at the Linguistic Typology Laboratory (LATIP/UFBA), under the guidance of Prof. Dr. João Paulo Lazzarini Cyrino, and his collaboration with an online platform of statistical analysis of linguistic data.

Richardson Costa de Carvalho, José Gracildo de Carvalho Júnior (Universidade Federal do Pará, Brazil)
Statistical Methods Applied to Public Security, A Fuzzy Approach

Abstract: The public security is a duty of the state that aims among another activities, the achievement of acts to nullify or contain the criminality. Technical-scientific procedures from the probability theory and statistics are of utmost importance to help with public security issues. Due to the need to collect, analyze, interpret and present results related to public security, this study is fully justified by the use of time series analysis combined to fuzzy set theory, given to improving of the accuracy of forecasting models of crimical occurrences, among another numerical characteristics. The results of this study indicated that the crime of robbery was the offense most registered in the Metropolitan Region of Belém (32.28%), besides that the identified model got capture with great statistical significance the inherent variability to the data evaluated in this study. The goal of stabilish a forecasting model by fuzzy time series