Antedependence Skew-Normal Linear Models for Longitudinal Data

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In longitudinal data analysis, the assumption of multivariate normality may be questionable, especially when there are atypical data, when the data exhibit past tails or when there is asymmetric behavior of the data (Lin & Wang 2009). In these cases, the multivariate normal skewed distributions have shown to be efficient in the data analysis (Azzalini & Dalla Valle 1996, Azzalini & Capitanio 1999, Sahu, Dey & Branco 2003).

Thus, considering triangular decomposition of variance - covariance matrix (Macchiavelli & Moser 1997, Cepeda 2001, Cepeda & Gamerman 2005), we propose joint modeling of the localization, scale, autoregressive and skewness parameters, assuming multivariate skew-normal distributions of Azzalini and Sahu.

We present results of the analysis of Chronic Kidney Disease Progression and Transition Probabilities in a Large Preventive Cohort in Colombia to illustrate the use of the proposed models and the performance of the Bayesian method to fit these models. Variability in chronic kidney disease (CKD) progression is a well-known phenomenon that underlines the importance of characterizing the said outcome in specific populations. Our objectives were to evaluate changes in the estimated glomerular filtration rate (eGFR) over time and determine the frequency of dialysis admission and factors associated with this outcome.

Keywords: longitudinal data, skew normal distribution, antedependence models