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Normal Scale Mixture Copula Marginal Regression with Box-Cox Symmetric Distributions

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The class of the Box-Cox symmetric distributions was recently introduced in the statistical literature. The class provides a flexible modeling framework for univariate independent positive continuous data with different levels of skewness and tail-heaviness. Additionally, the relatively easy parameter interpretation makes it attractive for regression purposes. However, more general applications may involve correlated data, such as when observations have a temporal or spatial dependence. Based on Sklar's Theorem, the copula theory provides an approach to modeling dependence through a function (named copula) which describes how the elements of a random vector are associated. Particularly, copulas generated by scale mixtures of normal distributions allow the bivariate associations to determine the dependence structure of the random vector entirely. Moreover, they also achieve positive and negative associations without restrictions on the data dimension. This work introduces a broad class of marginal regression models to analyze correlated positive continuous data with Box-Cox symmetric marginal distributions, where a normal scale mixture copula describes the dependence. Our approach resembles the joint modeling of univariate observations of the classical generalized estimating equations model. It is possible to select one of several association structures specified in terms of nonlinear response transformations, which provides flexibility in modeling independent observations, time series, longitudinal, clustered, or spatially correlated data.

Palavras-chave: Clustered Data; Dependence Structures; Log-Symmetric Distributions; Time Series; Working Correlation Matrix.

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