

Bayesian Non-linear Regression Models with Skew-Elliptical Distributions: Applications to Classification of Longitudinal Profiles

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Abstract Typically, the fundamental assumption in non-linear regression models is the normality of the errors. Even though this model offers great flexibility for modeling these effects, it suffers from the same lack of robustness against departures from distributional assumptions as other statistical models based on the Gaussian distribution. It is of practical interest, therefore, to study non-linear models that are less sensitive to departures from normality and related assumptions. Thus, the current methods proposed for the linear regression models needs to be extended to the non-linear regression models. This talk discusses non-linear regression models for longitudinal data with errors that follow a skew-elliptical distribution. Additionally, in this talk we discuss Bayesian statistical methods for the classification of observations into two or more groups based on skew-models for nonlinear longitudinal profiles. Parameter estimation for a discriminant model that classifies individuals into distinct predefined groups or populations uses appropriate posterior simulation schemes. The methods are illustrated with data from a study involving 173 pregnant women. The main objective in this study is to predict normal versus abnormal pregnancy outcomes from beta human chorionic gonadotropin data available at early stages of pregnancy.

Key words: Bayesian inference; Discriminant analysis; Heavy tailed error distribution; Markov chain Monte Carlo methods; Longitudinal data; Skew-elliptical distributions.

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