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Random-Effect Modeling for Longitudinally Observed Skewed Heteroscedastic Response: A Bayesian Wavelet Based Approach

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In this paper we propose a random effects based model for partial linear median regression function of a skewed longitudinal response using a wavelet based tool for the nonparametric part of the regression function. Parameters are estimated via a semiparametric Bayesian estimation procedure using an appropriate Dirichlet process mixture prior for the skewed error distribution. Unlike common practices for wavelet based regression for equally spaced data, we use a hierarchical mixture model as the prior for the wavelet coefficients. For the ''vanishing'' coefficients the model includes a level dependent prior probability mass at zero. This practice implements wavelet coefficient thresholding as a Bayes Rule. Consistency results have been obtained with only minor regularity conditions on the tail of the skewed and unimodal residual density. Practical advantages of our method are illustrated through a simulation study and via analysis of a cardiotoxicity study of children of HIV infected mother.