A Mixed-Effect Model for Positive Responses Augmented by Zeros

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Abstract

In this work we propose a model for positive and zero responses by means of a zero augmented mixed regression model. Under this class, we are particularly interested in studying positive responses whose distribution accommodates skewness. At the same time, responses can be zero and therefore we justify the use of a zero-augmented mixture model. We model the mean of the positive response in a logarithm scale and the mixture probability in a logit scale, both as a function of fixed and random effects. Here, the random effects link the two random components through their joint distribution and incorporate within subject correlation due to repeated measurements and between-subject heterogeneity. An MCMC algorithm is tailored to obtain Bayesian posterior distributions of the unknown quantities of interest and Bayesian case-deletion influence diagnostics based on the q-divergence measure is performed. We motivate and illustrate the proposed methodology by means of a data set from a 24 hours dietary recall study obtained in the city of São Paulo, Brazil, and present a simulation study to evaluate the performance of the proposed methods.

Bayesian inference, gamma distribution, log-normal distribution, mixed models, random effects, usual intake, zero-augmented data.

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