# Efficient Data-augmented MCMC Methods for Binomial Logit Models

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Our work considers efficient Bayesian methods for data originating from experiments where binary outcome variables are aggregated in terms of binomial outcome variables and the data are modeled by a binomial regression model. To perform MCMC sampling, we rewrite the binomial logit model as an augmented model which involves some latent variables called random utilities. It is straightforward, but inefficient, to use the individual random utility model (RUM) representation based on the binary observations reconstructed from each binomial observation. Alternatively, we suggest a new aggregated difference random utility model (dRUM) representation of the binomial logit model. The parameters are estimated by using three different MCMC algorithms: a data-augmented MH-sampler, an auxiliary mixture sampler and a novel hybrid auxiliary mixture sampler. A comparison of their performances within a comparative case study on various data sets shows that the modifications lead to a considerable reduction of computing time and a noticeable gain in efficiency.

**Keywords:** Binomial Logit Model; Repeated Measurements; Data Augmentation; Random Utility Model; Aggregated dRUM; Markov Chain Monte Carlo; HAM Sampler.