“Bayesian inferences on latent class regression with an unknown number of components via reversible jump Markov chain Monte Carlo”

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Many concepts in medical research are unobservable, hence valid surrogates must be measured in place of these concepts. Models that permit exploration of relationships between unobservable concepts and their surrogates are referred to as latent class models. My research is focused on analyzing data collected in situations where investigators use multiple discrete indicators as surrogates, for example, a set of questionnaires and assume an underlying categorical latent variable with, say, *J* “classes”.

Most previous latent class estimation considers models for different numbers of classes separately and use significance tests or information criteria (such as AIC or BIC) to infer the number of classes. This two-stage approach is inefficient and may create misleading results. Joint inferences on the number of classes and model parameters are preferable on the ground of convenience, accuracy and flexibility. Traditional frequentist likelihood-based approaches do not allow this joint analysis, but recent advances in Bayesian inferences provide possible solutions. Green (1995) proposed the reversible jump Markov chain Monte Carlo (RJMCMC) method, which offers a general framework for construction of reversible Markov chain samplers that jump between parameter subspaces of different dimensionality. In this project, we propose to implement the RJMCMC method to perform the joint estimation of the number of classes and model parameters.

Keywords: Bayesian analysis, latent variable model, reversible jump Markov chain Monte Carlo, surrogate endpoint.