Bayesian Analysis (2013) **8**, Number 3, pp. 539–542

Comment on Article by Scutari

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We congratulate the author for a well-written article on a problem of clear and increasing scientific relevance. The approach taken here is not only relevant for prior specification and analysis of posterior distributions in graphical models, but has a much wider breadth as explained below.

In his work on Bayesian inference of graphical models, the author adopts a novel focus on prior formulations over binary or trinary indicators of edge inclusion in undirected or directed graphs, and examines relevant properties of these distributions including entropy and variability. The insights of this paper provide a valuable starting point for further exploration of the proposed priors both in terms of theoretical properties and practical application to real or simulated data.

Although we do not see how the proposed parametrization reduces the dimension of the parameter space, we consider the approach taken in this work a novel point of view both in terms of defining prior distributions over a set of dependent binary and trinary random variables and in terms of analyzing the posterior distributions of those variables.

1 Generalization beyond graphical models

Since multivariate Bernoulli and trinomial distributions can be applied to any setting where the parameters of interest are binary or trinary, the theoretical properties explored in this paper are not limited to the framework of graph inference and can be considered in more general settings. In the context of Bayesian variable selection, the latent indicators of variable inclusion are modeled as multivariate binary random variables. While binary variables are more common in statistical modeling, a number of recent papers on modeling gene and protein expression rely on trinary variables to capture states of underexpression, normal expression, and overexpression (Parmigiani et al. 2002; Telesca et al. 2012; Xu et al. 2012).

2 Choice of prior parameters

Treatment of the Bernoulli or trinomial prior parameters warrants further discussion. Although the author expresses a preference for priors favoring sparsity, he does not directly address the issue of multiple testing. Scott and Berger (2010) argue that fixing the prior probability of inclusion in the context of variable selection fails to account for multiplicity, and that it is preferable to place a prior distribution on the inclusion probabilities. Because the edge selection problem resembles the variable selection problem in

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 DOI:10.1214/13-BA842