International Society for Bayesian Analysis, 9^{th} World Meeting,
Hamilton Island, Australia, 2008.

Explorations in and with sparse latent factor analysis

Peter J. Green[1⋆] and Sylvia Richardson[2]

[1] University of Bristol, UK
[2] Imperial College London, UK
⋆ P.J.Green@bristol.ac.uk

Classical latent factor analysis seeks to discover patterns of dependence in multivariate data that allow dimension reduction through the representation of the observed variables as linear combinations of a smaller number of unobserved 'factors'. We are interested in finding sparse representations, in which there are many zero coefficients among the linear coefficients, in the interests of parsimony, interpretability, and statistical stability; we use a Bayesian hierarchical modelling approach.

Specifically, we examine the situation where there are two or more groups of variables, neither low in dimension, and the main interest is in discovering sparse representations of the dependence between them. We develop a strategy that structures the patterns of dependence, and explores the model space allowing the numbers of common and specific factors to vary.

We are motivated by a study relating profiling of metabolites with transcript and enzyme activity, and illustrate the statistical and computational performance of our methodology, and its sensitivity to prior assumptions, on both these data and a variety of simulated set-ups.