Bayesian Variable Selection Methods

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BVS

As data collection methods improve large datasets are becoming routinely collected and drawing interest to methods that facilitate variable selection over a large number of predictors. Bayesian variable selection methods apply sparsity inducing priors to model subsets of predictors, and can be used for inference of which covariates are important and adjusted effect estimates.

BVS methods.

1. Kuo & Mallick
2. Gibbs Variable Selection (GVS)
3. STochastic Search Variable Selection (SSVS)
4. Adaptive shrinkage (global-local)
5. Reversible jump MCMC

Survey (O'Hara and Sillanpaa)

A review of BVS methods; What, How & Which

1. Groups

Choose one approach for the duration of the conference - three are suggested other ideas or dataset are encouraged.

- ➔ **Coding**
  Converting existing BUGS approach to STAN or nimble
- ➔ **Visualisation**
  Visualisation of posterior summaries
- ➔ **Methodological**
  Combining methods, extensions of the modelling

Data Model

$$y_i \sim Poisson(\lambda_i)$$

$$\log(\lambda_i) = \mu_i$$

$$\mu_i = \alpha + \sum_{j=1}^{p} \theta_j x_{i,j} + e_i$$

$$\sigma_e^2 \sim IGamma(10^{-4}, 10^{-4})$$

$$\beta_j | (I_j = 1) \sim N(0, 1)$$

$$\alpha \sim N(\log(10), 1)$$

$$e_i \sim N(0, \sigma_e^2)$$