A New Bayesian Lasso

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Abstract
Park and Casella (2008) provided the Bayesian lasso for linear regression by assigning scale mixtures of normal priors on the parameters and independent exponential priors on their variances. In this paper, we propose an alternative Bayesian analysis of the lasso problem. We provide a different hierarchical representation of Bayesian lasso using scale mixtures of uniform priors on the parameters and independent gamma priors on their standard deviations. We consider a fully Bayesian treatment which leads to a new Gibbs sampler with tractable full conditional distributions. Empirical results and real data analyses show that the new algorithm has good mixing property and performs comparably to the existing methods. An ECM algorithm is provided to find the MAP estimates of the parameters. Easy extension to GLM is also briefly discussed.

Keywords: lasso, Bayesian lasso, Scale mixture of uniform, Gibbs sampler, MCMC