MICHIGAN STATE UNIVERSITY
Department of Statistics and Probability

COLLOQUIUM

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High Dimensional Variable Selection with Shrinking and Diffusing Priors

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10:20 a.m. - 11:10 am
Refreshments 10:00 am
C405 Wells Hall

Abstract

We consider a Bayesian approach to variable selection in the presence of high dimensional covariates based on a hierarchical model that places prior distributions on the regression coefficients as well as on the model space. We adopt the well-known spike and slab Gaussian priors with a distinct feature, that is, the prior variances depend on the sample size through which appropriate shrinkage can be achieved. We show the strong selection consistency of the proposed method in the sense that the posterior probability of the true model converges to one even when p >> n. This is arguably the strongest selection consistency result that has been available in the Bayesian variable selection literature; yet our method can be carried out through posterior sampling with a standard Gibbs sampler. We also argue that the proposed method is asymptotically similar to model selection with the L_0 penalty. Furthermore, we propose a modified Gibbs sampler whose computational complexity grows only linearly in p, but retains the property of strong model selection consistency. In contrast with the standard Gibbs sampler, our new algorithm is much more scalable to high dimensional problems.

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