COLLOQUIUM SERIES: FALL 2015

COMBINING MULTIPLE MONTE CARLO SAMPLES: NEW DEVELOPMENT IN METHODOLOGY AND APPLICATION

PRESENTER

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PROFESSIONAL INTERESTS:

MARKOV CHAIN MONTE CARLO, BAYESIAN VARIABLE SELECTION, BAYESIAN MIXTURE MODELING

WHEN

December 3, 2015
3:30 p.m.

WHERE

61 Schaeffer Hall

RECEPTION

241 Schaeffer Hall
3:00 p.m.

Abstract:

In Bayesian data analysis, analysts often face more than one Bayesian model that looks reasonable. Hence, they may want to compare posterior inferences under different choices of prior distributions (and probability models). If the data are highly informative for the model parameters, different choices of prior will have small effects on the posterior. Otherwise, if the data only provide indirect information of the parameters of interest, priors have to be chosen carefully according to certain criteria, say, based on the Bayes Factor.

It is a challenging computing problem to calculate various posterior quantities and Bayes Factors among the different Bayesian models. In this talk, we consider the importance sampling (IS) technique that efficiently combines Markov chain Monte Carlo (MCMC) samples from multiple posterior distributions. Our new contribution is in developing the batch means method to evaluate the standard error of the multiple IS estimators. Compared to the existing method, namely the regenerative simulation method, our new method requires less stringent conditions, and is much easier to implement in practice.
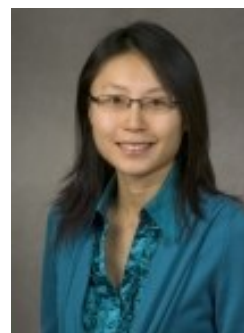
The multiple IS technique will be used to perform computing for two data analysis problems. The first problem concerns predicting the amount of water in cookie doughs based on a large number of predictors, for which we compare a pool of Bayesian linear regression models with variable selection features. In the second problem, the goal is to map the severity of a "root rot" disease in a farm, based on data collected at a few locations. Bayesian spatial models for non-Gaussian responses are considered.

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