

STATISTICS COLLOQUIUM

MONDAY, SEPTEMBER 13, 2010

TALK: 4:00 PM — SCIENCE CENTER RM. 309

RECEPTION: 5:15 PM — SCIENCE CENTER, 7TH FLOOR

“Bayesian Partition Models for Detecting Interactions”

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ABSTRACT

Suppose we have N individuals and for each individual we observed its response vector variable $(Y_{i1}, \dots, Y_{iq})$ and its p -dimensional categorical-valued covariates $(X_{i1}, \dots, X_{ip})$. Our goal is to discover which subset of the response variables is influenced by which subset of the covariates. Although the problem is similar to the multiple-response regression, our goal is more ambitious than just finding certain linear relationships. I will present a novel Bayesian partition model through the use of a set of latent indicator vectors, together with a Markov chain Monte Carlo algorithm, to tackle the problem. I will illustrate the power of the method mainly using examples in genome-wide genetic association studies and in studies of expression quantitative trait loci (eQTL). Our extensive simulation studies demonstrated that this Bayesian approach is much more powerful than the standard two-stage step-wise approach as practiced by statisticians and geneticists in solving “e-QTL” problems.