



The University of Chicago  
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Seminar Series

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## **Coupling Optional Polya Trees—A Bayesian Nonparametric Approach to Case-Control Studies**

**FRIDAY, February 18, 2011, at 12:00 PM**

110 Eckhart Hall, 5734 S. University Avenue

### **ABSTRACT**

Testing and characterizing the difference between two data samples (case vs control) is of fundamental interest in statistics. Parametric methods such as (logistic) regression-based approaches are often too restrictive in complex problems, while existing nonparametric methods do not scale well as the dimensionality increases and often provide no easy way to characterize the difference should it exist. In this talk, we introduce an inferential framework that addresses these challenges in the form of a prior for Bayesian nonparametric analysis. This prior, called the “coupling optional Polya tree” (co-OPT) distribution, is constructed based on a procedure of random recursive partitioning and probability assignment on the sample space. It has the ability to jointly generate multiple random distributions. These probability distributions are allowed to randomly “couple,” that is to have the same conditional distribution, on subsets of the sample space. We show that posterior inference on the coupling state of the distributions provides an effective way both for testing the existence and for learning the structure of two sample difference, even in the presence of data sparsity. Several simulated and real data analytical examples in genetic epidemiology and flow cytometry will be provided to illustrate the application of this method.

(While the prior bears the same name as what I presented last year, it has been redesigned. I have updated the content of the talk to reflect some development of this work.)

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For further information and about building access for persons with disabilities, please contact Laura Rigazzi at 773.702.8333 or send email (lrigazzi@galton.uchicago.edu). If you wish to subscribe to our email list, please visit the following web site: <https://lists.uchicago.edu/web/info/statseminars>.