



The University of Chicago  
Department of Statistics

Master's Seminar

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**Inference of Hidden Markov Chain  
in a False Discovery Control Paradigm**

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**110 Eckhart Hall, 5734 S. University Avenue**

**ABSTRACT**

False discovery rate (FDR) has been popular in multiple hypotheses testing since the work of Benjamini and Hochberg in 1995. Previous literature considered FDR control in two component mixture models, in which the null hypotheses are independent Bernoulli random variables and the distribution of the corresponding p-value depends on the null hypothesis' state. In some applications, it is reasonable to incorporate spatial dependence in the null hypotheses. This paper deals with a simple case of this dependency. Suppose the null hypotheses is a 0/1-valued Markov chain with specified transitional probabilities. Since we observe not the null hypotheses but the p-values only, this is a Hidden Markov Model (HMM). We establish that the FDR control procedure, suggested by Benjamini and Hochberg, is valid for the HMM. We introduce an independence test for testing existence of the HMM and methods for estimating the transitional probabilities and the distribution of the p-values.