



The University of Chicago  
Department of Statistics  
Seminar Series

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### **Statistical Modeling over Graphs via Convex Optimization**

**WEDNESDAY, February 9, 2011, at 12:00 PM**  
110 Eckhart Hall, 5734 S. University Avenue

#### **ABSTRACT**

An outstanding challenge in many problems throughout science and engineering is to succinctly characterize the relationships among a large number of interacting entities. Models based on graphs offer a fruitful framework to solve such problems, as graphs often provide a concise representation of the interactions among a large set of variables. In this talk we will discuss two settings in which graph-structured models play a prominent role in applications.

The first part of the talk is motivated by the following question: Suppose we have sample statistics of only a subset of a collection of random variables. Without any additional information about the unobserved variables, is it possible to discover the effects of such hidden phenomena? We present an answer to this question in the framework of Gaussian statistical graphical models. We describe a convex optimization method for graphical model selection with hidden variables, and provide theoretical guarantees of its consistency in the high-dimensional scaling regime. In the second part of the talk we introduce convex graph invariants, which are invariants of a graph that are convex functions of the underlying adjacency matrix. Graph invariants characterize structural properties of a graph that do not depend on the labeling of the nodes; convex graph invariants constitute an important subclass, and they provide a systematic and unified computational framework based on convex optimization for solving a number of interesting graph problems.

We describe applications of both these methods to problems in financial modeling and network analysis, and conclude with a discussion of directions for future research.

Bio: Venkat Chandrasekaran is a Ph.D. candidate working with Prof. Alan Willsky and Prof. Pablo Parrilo in the Department of Electrical Engineering and Computer Science at the Massachusetts Institute of Technology, where he received the S.M. degree in 2007. He also received the B.S. degree in Electrical and Computer Engineering and the B.A. degree in Mathematics from Rice University in 2005. His research interests include optimization, statistics, and signal processing.

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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](mailto: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>.