THE UNIVERSITY OF CHICAGO | DEPARTMENT OF STATISTICS

Statistics Colloquium

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"Inference for Dynamic Networks and Trees"

Monday April 22, 2024, at 11:30 AM
Jones 303, 5747 S. Ellis Avenue
Pre-Seminar refreshments will be served at 11:00 AM in Jones 303

Abstract

Many networks are the result of a growth process whose dynamics have a strong influence on properties of practical interest. Conventional approaches to network analysis (such as graphons, ERGMs and SBMs) overlook these growth dynamics, thereby limiting their usefulness in most practical settings. I present an approach to leveraging network growth for inference in a general class of tree and network problems.

I illustrate the method on the problem of root inference, a widely studied problem in the applied probability literature. Based on joint work with Min Xu (Rutgers), I develop an approach for inferring the initial (root) node in a network growing according to the PAPER (Preferential Attachment Plus Erdos Renyi) model. By exploiting a little known shape exchangeability property of the affine preferential attachment model, we first establish exact methods for root inference in preferential attachment trees. We then extend this approach to a general class of problems on networks, including community detection, for which we also develop computationally efficient and valid methods. We validate the method with examples from the London flu outbreak data and statistician co-authorship network.