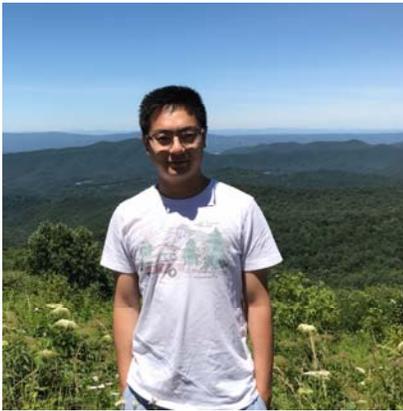


DEPARTMENT OF STATISTICS

Tianxi LiDepartment of Statistics
University of Virginia*Flexible network modeling: model selection and hierarchical communities***October 2, 2019****11:45am – 12:45pm**

Light refreshments will be served

**110 Frelinghuysen Road
Hill Center, Room 552**

Abstract: The intensive research on network modeling in recent years has rendered a large body of models and techniques. This provides researchers with more flexible strategies to learn network structures. In this talk, we will discuss two related problems for flexible network modeling. First, we consider the general question of how to perform cross-validation on networks, which is crucial for automatic model selection and tuning. Splitting network data is non-trivial, since removing links leads to a potential change in network structure. We propose a new general cross-validation strategy for networks, based on repeatedly removing edge values at random and then applying matrix completion to reconstruct the full network. We obtain theoretical guarantees for this method under a low rank assumption on the underlying model, and show that the method performs well for a wide range of network tasks. The second problem is about flexible community detection in networks. The community detection problem is usually formulated as finding a single partition of the network into some “correct” number of communities. We argue that it is more interpretable and in some regimes more flexible and accurate to construct a hierarchical tree of communities instead. We study the hierarchical community detection by an old strategy - recursive partitioning - combined with recent results of clustering and model selection for network data. This class of algorithms is model-free, computationally efficient with automatic model selection. We show that there are regimes where this approach outperforms K-way spectral clustering. Under a natural model for hierarchical communities, we prove that the algorithm correctly recovers the entire community tree under relatively mild assumptions. The two proposed methods will be combined and demonstrated by an example of constructing hierarchical research communities in statistics.

Bio: Tianxi Li is currently an assistant professor in the Department of Statistics at the University of Virginia. He obtained his Ph.D. from the University of Michigan in 2018, under the supervision of Prof. Liza Levina and Prof. Ji Zhu. Currently, his main research interests are network analysis and statistical learning.

