
SEMINAR

Estimating Networks from Big Neuroimaging Data

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ABSTRACT

Brain connectivity is becoming an important concept for understanding the development and functioning of the brain. It also becomes popular to estimate brain connectivity from neuroimaging data, especially from functional MRI. In this talk, I will present a few attempts based on Gaussian graphical models to address this big data estimation problem. The main idea of these approaches involves developing new convex optimization criteria that enable accurate estimation and fast computation, which are also motivated by the underlying biological processes. Interestingly, these criteria deviate from the popular penalized likelihood framework, and we establish faster theoretical convergence rates and develop large-scale algorithms. Finally, I will also illustrate this framework using a few exemplar problems: inferring large networks from millions of nodes; simultaneous network estimation and disease classification; and quantifying the effects passed through the network. Numerical performance will be illustrated using both simulations and data from functional MRI experiments.

4:15 p.m. Tuesday, February 18, 2014

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