Statistics and Data Science Seminar

*Likelihood inference for a large causal network*

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**Abstract:** Inference of causal relations between interacting units in a directed acyclic graph (DAG), such as a regulatory gene network, is common in practice, imposing challenges because of a lack of inferential tools. In this talk, I will present constrained likelihood ratio tests for inference of the connectivity as well as directionality subject to nonconvex acyclicity constraints in a Gaussian directed graphical model. Particularly, for testing of connectivity, the asymptotic distribution is either chi-squared or normal depending on if the number of testable links in a DAG model is small; for testing of directionality, the asymptotic distribution is the minimum of \(d\) independent chi-squared variables with one-degree of freedom or a generalized Gamma distribution depending on if \(d\) is small, where \(d\) is the number of breakpoints in a hypothesized pathway. Computational methods will be discussed, in addition to some numerical examples to infer a directed pathway in a gene network. This work is joint with Chunlin Li and Wei Pan of the University of Minnesota.

Wednesday, March 11 at 3:00 PM in 636 SEO