ESTIMATION OF A DIRECTED ACYCLIC GAUSSIAN GRAPH

Abstract: Directed acyclic graphs are widely used to describe, among interacting units, causal relations. Causal relations are estimated by reconstructing a directed acyclic graph’s structure, presenting a great challenge when the unknown total ordering of a DAG needs to be estimated.

In such a situation, it remains unclear if a graph's structure is reconstructable in the absence of an identifiable likelihood with regard to graphs, and in facing super-exponentially many candidate graphs in the number of nodes. In this talk, I will introduce a global approach for observational data and interventional data, to identify all estimable causal directions and estimate model parameters. This approach uses constrained maximum likelihood with nonconvex constraints reinforcing the non-loop requirement to yield an estimated directed acyclic graph, where super-exponentially many constraints characterize the major challenge. Computational issues will be discussed in addition to some theoretical aspects. This work is joint with Y. Yuan, W. Pan and Z. Wang.