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Some Results on Comparison of Dependence for Gaussian Graphical Markov Models

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Refreshments served at 3:00 PM in room 51-254 CHS

ABSTRACT: In graphical Markov models literature various separation criteria have been formulated to identify the independence relationships implied by the global Markov property of the underlying graph. They allow one to read off the conditional independencies directly from the graph, by checking for the existence of certain kinds of separating paths.

However, these criteria do not indicate the degree of conditional dependence between a pair of connected vertices given a subset disjoint to them. Conditional dependence between the vertices on a graph can be changed in two ways. The subset to be conditioned on may be fixed and the dependence of different pairs of vertices, conditional on that fixed set may be compared. On the other hand, one may be interested in fixing two vertices and comparing their dependence by conditioning on different subsets.

In this talk we address both of these issues for various Gaussian graphical models. We first show that, for a large class of graphs, for both kinds of changes in conditional dependence, squared conditional correlation and absolute value of partial regression coefficients can be ordered by only examining the relationship between the path connecting the pair of correlated vertices and the nature of the set of vertices conditioned upon. Almost similar results follow if we consider signed conditional correlation and regression coefficients.

Here in addition to the connecting path and the vertices conditioned upon, nature of the ordering depends on the sign of certain conditional correlations but not on their values. These order determining correlations can be estimated from the observed data.