Joint Estimation of Multiple Dependent Gaussian Graphical Models

Yuying Xie
University of North Carolina at Chapel Hill, Chapel Hill, NC, USA

Yufeng Liu*
University of North Carolina at Chapel Hill, Chapel Hill, NC, USA, yfliu@email.unc.edu

William Valdar
University of North Carolina at Chapel Hill, Chapel Hill, NC, USA

Gaussian graphical models are widely used to represent conditional dependence among random variables. In this talk, we propose a new estimator for such models appropriate for data arising from several dependent networks. Existing methods that assume independence among graphs are not applicable in this setting. To estimate multiple dependent graphs, we decompose the graphical models into two layers: the systemic layer, which is the network shared among graphs, and the category-specific layer, which represents the graph-specific variation. We propose a new graphical EM technique that jointly estimates the two layers of graphs. Applications to mouse genetic data will be presented.

Key Words: EM algorithm, mouse genetics, shrinkage, variable selection