Joint Estimation of Multiple Graphical Models

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Graphical models are a popular tool for exploring dependence relationships between variables. Here we develop methods for simultaneously estimating graphical models on several classes that share some common dependence structure, but also have individual differences, as may happen with different subtypes of the same disease. Joint estimation, which allows for sharing information across classes, results in more accurate estimation than fitting each class separately. We develop joint estimationn methods for both the Gaussian graphical models and the Ising models for discrete data, establish their asymptotic properties, and illustrate the methodology on examples of links between university webpages and the U.S. Senate voting records. Joint work with Jian Guo, George Michailidis, and Ji Zhu.