Sparse Multivariate Statistics with Discrete Optimization

Abstract: Several statistical estimation tasks arising in modern multivariate statistics are naturally posed as discrete optimization problems. While continuous convex optimization methods have played a highly influential role in these tasks, the role of modern discrete optimization methods, namely, integer programming has been relatively less explored, despite the tremendous advances in the field over the past 10-15 years. In this talk I will describe how techniques in modern optimization: mixed integer optimization, first order methods in nonlinear optimization provides a systematic algorithmic lens to address some key problems in sparse multivariate statistics. I will illustrate this new approach with examples in variable selection in regression, robust statistical regression, function estimation and factor analysis.