High Dimensional Estimation: from foundations to Econometric models

Alex Belloni (Duke)

Abstract:
In this mini-course we start with the foundations of modern statistical techniques based on L1-penalization for high dimensional estimation under sparsity assumptions. We will cover rates of convergence for Lasso, sparsity bounds on the selected model, and simple lower bounds on its performance. We then will shift our interests to how further develop these ideas on models that are motivated by Econometric applications. For example, heteroskedastic errors, logistic regression, conditional quantiles, and error-in-variables. Some emphasis will be placed on properly handling the different assumptions induced by the (econometric) data generating process (e.g. approximate sparse models and non-Gaussian errors). We will finish the mini-course by establishing results on the uniform validity of confidence regions (e.g. confidence intervals) for parameters. We will attempt to cover partially linear models, instrumental variables, and Z-estimators.