Abstract:

Modern statistical analysis often requires an integration of statistical thinking and algorithmic thinking. In many problems, statistically sound estimation procedures (e.g., the MLE) may be difficult to compute, at least in the naive form. This challenge calls for a new look into simple statistical methods such as the spectral methods (including PCA), as well as an examination of optimization algorithms from the statistical lens.

In this talk, I will sample two typical modern statistical problems: one addresses network type data (community detection), and the other involves pairwise comparison data (phase synchronization). I will show that in high dimensions, spectral methods exhibit a very interesting new phenomenon in entrywise behavior, which leads to new theoretical insights and has practical relevance. Also, for a complex nonconvex problem, I will show how algorithmic analysis can benefit from classical statistical ideas.

This talk features joint work with (alphabetically) Emmanuel Abbe, Nicolas Boumal, Jianqing Fan, and Kaizheng Wang.