



THE UNIVERSITY OF  
CHICAGO

Department of Statistics

STATISTICS COLLOQUIUM

---

YUXIN CHEN

Department of Electrical Engineering  
Princeton University

## Bridging Convex and Nonconvex Optimization in Noisy Matrix Completion: Stability and Uncertainty Quantification

MONDAY, May 13, 2019 at 4:30 PM

Eckhart 133, 5734 S. University Avenue

*Refreshments before the seminar at 4:00 PM in Jones 111*

### ABSTRACT

This talk is concerned with noisy matrix completion: given partial and corrupted entries of a large low-rank matrix, how to estimate and infer the underlying matrix? Arguably one of the most popular paradigms to tackle this problem is convex relaxation, which achieves remarkable efficacy in practice. However, the statistical stability guarantees of this approach is still far from optimal in the noisy setting, falling short of explaining the empirical success. Moreover, it is generally very challenging to pin down the distributions of the convex solution, which presents a major roadblock in assessing the uncertainty, or “confidence”, for the obtained estimates --- a crucial task at the core of statistical inference. Our recent work makes progress towards understanding stability and uncertainty quantification for matrix completion. When the rank of the unknown matrix is a constant: (1) we demonstrate that convex programming achieves near-optimal estimation errors vis-a-vis random noise; (2) we develop a de-biased estimator that admits accurate distributional characterizations, thus enabling asymptotically optimal inference. All of this is enabled by bridging convex relaxation with the nonconvex Burer-Monteiro approach, a seemingly distinct algorithmic paradigm that is provably robust against noise.

This is joint work with Cong Ma, Yuling Yan, Yuejie Chi, and Jianqing Fan.

---

For further information and inquiries about building access for persons with disabilities, please contact Jonathan Rodriguez at 773.702.8333 or send him an email at [jgrodriguez@galton.uchicago.edu](mailto:jgrodriguez@galton.uchicago.edu). If you wish to subscribe to our email list, please visit the following website:  
<https://lists.uchicago.edu/web/subscribe/statseminars>.