

# EPSTEIN INSTITUTE SEMINAR ▪ ISE 651

## Compute Faster and Learn Better: Machine Learning via Nonconvex Model-based Optimization

**ABSTRACT** – Nonconvex optimization naturally arises in many machine learning problems. Machine learning researchers exploit various nonconvex formulations to gain modeling flexibility, estimation robustness, adaptivity, and computational scalability. Although classical computational complexity theory has shown that solving nonconvex optimization is generally NP-hard in the worst case, practitioners have proposed numerous heuristic optimization algorithms, which achieve outstanding empirical performance in real-world applications.

To bridge this gap between practice and theory, we propose a new generation of model-based optimization algorithms and theory, which incorporate the statistical thinking into modern optimization. Specifically, when designing practical computational algorithms, we take the underlying statistical models into consideration. Our novel algorithms exploit hidden geometric structures behind many nonconvex optimization problems, and can obtain global optima with the desired statistics properties in polynomial time with high probability.



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**SPEAKER BIO** – Dr. Tuo Zhao (<http://www2.isye.gatech.edu/~tzhao80/>) is an assistant professor of Industrial and Systems Engineering and adjunct assistant professor of Computational Science and Engineering at Georgia Tech. He received his Ph.D. in computer science at Johns Hopkins University. He was a visiting graduate scholar in Department of Operations Research and Financial Engineering at Princeton University. He was the core member of the JHU team winning the INDI ADHD 200 global competition on fMRI imaging-based diagnosis classification. He has received several academic awards, including Siebel Scholarship, Baidu Fellowship, ASA Best Student Paper Award on Statistical Computing, and INFORMS Best Paper Award on Data Mining.

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**TUESDAY, SEPTEMBER 19, 2017**

**3:30PM – 4:50PM**

USC ANDRUS GERONTOLOGY CENTER (GER), Room 206