数学与系统科学研究院

计算数学所学术报告

报告人： **Dr. Chunfeng Cui**

（ *University of California, Santa Barbara, U.S.* ）

报告题目：

Computational Methods for Big and Small Data Sciences

邀请人： 刘歆 副研究员

报告时间：2019 年 12 月 17 日（周二）

下午 **15:30-16:30**

报告地点： 科技综合楼三层

311 报告厅

Abstract：

Due to the wide deployment of social networks and mobile devices, massive data is generated on the internet every second. Such big-data resources open new opportunities for artificial intelligence and machine learning, but meanwhile they also cause new challenges in data storage, representation, and computation. On the other hand, in many engineering designs (such as robotic systems, antennas, electronic and photonic ICs), obtaining data samples by measurement or numerical simulation is expensive, therefore people have to verify and optimize complex engineering designs with limited small data sets.

This talk will present computational techniques to address the challenges in both small- and big-data problems. Specifically, I will present algorithmic solutions by exploring the interface of tensor computation, uncertainty quantification, and machine learning. Firstly, I will present a global optimization method for solving the non-convex tensor eigenvalue problem, which has been applied to the hypergraph matching and latent variable modeling. Then, I will describe a new uncertainty quantification framework with theoretical performance guarantees even if the input uncertainties are non-Gaussian correlated. Our method allows us to efficiently predict and analyze the performance uncertainties of multi-domain systems (e.g., electronic and photonic IC, autonomous systems) with a small number of simulation data samples. Finally, motivated by the implementation of deep neural networks on edge devices, I will talk about a structural analysis framework to reveal how many neurons and layers are necessary, and a new universal adversarial attack framework.

欢迎大家参加！