

数学与系统科学研究院

计算数学所学术报告

报告人: **Prof. Guanghui Lan**

(*Department of Industrial and Systems Engineering,*

University of Florida)

报告题目:

**"Sparse" computation of gradients
for optimization with large data sets**

邀请人: 刘亚锋 博士

报告时间: **2015 年 7 月 31 日 (周五)**

上午 10:30-11:30

报告地点: 科技综合楼三层

311 报告厅

Abstract:

The last few years have seen an increasing interest in utilizing optimization for large-scale data analysis. However, optimization problems arising from these applications often involve, in addition to expensive smooth components for data fitting, nonsmooth and nonseparable regularization terms/constraints to enforce certain structural properties for the generated solutions (e.g, low rank or group sparsity). It is well-known that such nonsmooth components can significantly slow down the convergence of existing first-order optimization algorithms, leading to a large number of traverses through the data sets. To address this issue, we present a new class of optimization techniques, referred to as gradient sliding methods, which can skip the computation of gradients from time to time while still maintaining the overall optimal rate of convergence. In particular, the number of gradient evaluations required for these algorithms will be the same as if the aforementioned nonsmooth and nonseparable components do not exist. When applied to data analysis problems, these algorithms can reduce the number of scans through the data sets by orders of magnitude. Numerical experiments have been conducted to illustrate the effectiveness of these techniques.

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