



# COLLOQUIUM

## Big Data Optimization and Second Order Sparsity

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#### Abstract

Big data optimization problems provide many challenges as well as plenty of opportunities for algorithm developers. Concerned with inherent huge computational burdens of the interior point methods (IPMs) for solving optimization problems of large scales, many researchers and practitioners tend to the first order methods (FOMs) such as the accelerated proximal gradient methods and the alternating direction methods of multipliers for the rescue. While these FOMs have indeed been successful in some interesting applications, they also encounter enormous numerical difficulties in dealing with many real data optimization problems of big scales even with a low or moderate solution quality. New ideas for solving these problems are highly sought both in practice and in academic research. In this talk, I will explain how the second order sparsity (SOS) property exhibited in big composite optimization models can be (and should be) intelligently exploited to design scalable and efficient algorithms to overcome the mentioned numerical difficulties either in IPMs or in FOMs. A highly efficient software called LassoNAL for solving the well-known Lasso problem will be used to demonstrate how the key SOS property makes the solving of big data optimization models realistic.

**Biodata:** Professor Sun Defeng is currently Chair Professor of Applied Optimization and Operations Research at the Hong Kong Polytechnic University. Before moving to Hong Kong in August 2017, Professor Sun served as Professor at Department of Mathematics, National University of Singapore, Deputy Director (Research) at the NUS Risk Management Institute and Program Director for its Master of Financial Engineering program. He mainly publishes in continuous optimization. He has written a number of software for solving large-scale complex optimization problems, including SDPNAL/SDPNAL+ for general purpose large scale semidefinite programming, codes for correlation matrix calibrations and most recently the packages including LassoNAL for various statistical regression models. Currently Professor Sun focuses on establishing the foundation for the next generation methodologies for big data optimization and applications. Professor Sun has actively involved in many professional activities. He served as editor-in-chief of Asia-Pacific Journal of Operational Research from 2011 to 2013 and he now serves as associate editor of Mathematical Programming (Series A and Series B), SIAM Journal on Optimization, Journal of the Operations Research Society of China, and Journal of Computational Mathematics.

<b>Date:</b>	<b>December 19, 2017 (Tuesday)</b>
<b>Time:</b>	<b>3:00 - 4:00pm</b>
<b>Venue:</b>	<b>Room 210, Run Run Shaw Bldg., HKU</b>