DANIEL J. EPSTEIN DEPARTMENT OF INDUSTRIAL AND SYSTEMS ENGINEERING

EPSTEIN INSTITUTE SEMINAR • ISE 651 SEMINAR

Successive Convex Approximation: A Unified Analysis and Applications in Big Data

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ABSTRACT

The (randomized) block coordinate descent (BCD) method is widely used for minimizing a continuous function of several block variables. At each iteration of this method, a single block of variables is optimized, while the remaining variables are held fixed. Unfortunately, the requirement for BCD convergence is often too restrictive for many practical scenarios. In this talk, we study an alternative inexact BCD approach which updates the variable blocks by successively minimizing a sequence of approximations which are either locally tight upper bounds for the objective or strictly convex local approximations. The main contributions of this work include the characterizations of the convergence conditions for a fairly wide class of such methods, especially for the cases where the objective functions are either non-differentiable or nonconvex. Our results unify and extend the existing convergence results for many classical algorithms such as the BCD method, the difference of convex functions (DC) method, the expectation maximization(EM) algorithm, as well as the block forward-backward splitting algorithm, all of which are popular for large scale optimization problems involving big data. At the end of the talk, we will see applications of this framework in tensor decomposition, dictionary learning for image processing, and beamformer design for wireless communications.

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VON KLEINSMID CENTER (VKC) ROOM 100
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SPEAKER BIO

Meisam Razaviyayn is a visiting PhD student at Daniel J. Epstein Department of Industrial and Systems Engineering at University of Southern California. He received his undergraduate degree in Electrical Engineering from Isfahan University of Technology in 2008. He obtained his M.S. in Mathematics and Electrical Engineering from University of Minnesota. Now he is in the last year of his PhD, advised by Professor Tom Luo at the university of Minnesota. Meisam received different awards and fellowships such as University of Minnesota Doctoral Dissertation Fellowship, Electrical and Computer Engineering Department Fellowship, Fifth Place in ACM International Programming Regional Contest, and Iran national mathematics Olympiad silver medal. He has also been among the finalist of the best paper prize for young researcher in continuous optimization, ICCOPT 2013, and the finalist for the best student paper award, SPAWC 2010. Meisam's research interests include large scale optimization, machine learning, computational issues in wireless data communication, and statistical signal processing.