Operations Research and Engineering Management
Dissertation Defense

Nonconvex Optimization for Statistical Learning with Structured Sparsity

**Ph.D. Dissertation
Presented by
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Abstract
Sparse learning problems, known as feature selection problems or variable selection problems, are a popular branch in the field of statistical learning. Facing a dataset with only a few observations but a large number of features, we are interested in extracting the most useful features automatically by solving an optimization problem. In this dissertation, we start by introducing a novel penalty function as well as an iterative reweighted algorithm to solve a special type of feature selection problems, i.e, group sparsity problems. The penalty function, named group LOG, shows a better ability to recover the ground-truth compared to other existing penalty functions in some datasets. Then, we propose a generalized formulation for a non-overlapping group sparsity problem that can be reduced to many existing works and provide the related algorithm by applying the alternating direction method of multipliers (ADMM) framework. In the end, we investigate a class of difference-of-convex (DC) programs that includes feature selection problems. Not only do we exhibit an exact algorithm for such problems, but we also design an inexact algorithm, which allows early termination in each iteration and justifies the stopping criteria in practice.

Biography
Chengyu Ke is a Ph.D. candidate in the Operations Research and Engineering Management department of Bobby B. Lyle School of Engineering at Southern Methodist University. He received his B.S. degree in Financial Engineering from the Southwestern University of Finance and Economics, China, in 2016 and his M.S. degree in Financial Engineering from the University of Southern California, Los Angeles, CA, in 2018.