Department of
Industrial and
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LEHIGH UNIVERSITY

Lehigh University INFORMS Student Chapter Distinguished Seminar Series

Title:

A branch and bound approach to the k-minimum-ball problem

Speaker:

Farid Alizadeh, Rutgers University

Time & Location:

Wednesday, November 19, 4:00-5:00pm, Mohler Lab, #453

Abstract

The minimum ball problem (MIN-Ball) seeks the ball of smallest radius containing a number, say of n points in d dimensional Euclidean space. This problem is used in statistical learning theory and classification problems, among others. The MIN-Ball problem can be formulated as a second-order-cone program and solved in polynomial time, and fairly efficiently using interior point methods. The k-MIN-Ball problem seeks the ball of smallest radius containing at least k of the n points. This problem is used in the more robust version of classification where we wouldn't mind if a few of the outlying points are not included in the ball. The k-MIN-Ball problem is NP-hard. We describe a branch and bound technique for solving this problems by using a modification of the simplex like algorithms developed by Fisher et al and Dearing et al. Some preliminary computational results will be presented. This is work in progress.

Joint work with Marta Cavaleiro of RUTCOR, Rutgers University

Bio sketch

Farid Alizadeh received his PhD from the University of Minnesota. After spending two years as a postdoctoral associate at the university of California-Berkeley, he joined Rutgers, first at Rutgers Center for Operations Research and then at Rutgers Business School. Alizadeh is credited for laying the foundation of semidefinite programming (SDP), in particular, extending interior point algorithms from linear programming to SDP, and applying them to solve some combinatorial optimization problems. Later he, along with many others, extended these techniques to symmetric cones, in particular, second order cones. Presently, his research is focused on developing simplex-like algorithms for some concrete SDP and SOCP problems. He is on sabbatical leave from Rutgers and is teaching at Columbia University.