Friday, 16:45 - 18:15

FF-01

Friday, 16:45 - 18:15
AudiMax

Semidefinite Programming 2

Stream: Contributed Sessions

Contributed session

Chair: *Shunsuke Hayashi*, Graduate School of Informatics, Kyoto University, Yoshida-Honmachi, Sakyo-Ku, 606-8501, Kyoto, Japan, shunhaya@amp.i.kyoto-u.ac.jp

1 - Probabilistic analysis of semidefinite programming relaxations, with application to detection for multiple-input multiple-output (mimo) systems

Anthony So, Department of Systems Engineering and Engineering Management, The Chinese University of Hong Kong, Rm 604 WMW Mong Engineering Building, 00000, Shatin, NT, Hong Kong, manchoso@se.cuhk.edu.hk

A fundamental problem in modern digital communication is the so-called MIMO detection problem. A popular heuristic is the semidefinite relaxation (SDR) detector, which, as its name suggests, solves a semidefinite programming relaxation of the problem. Although the SDR detector has excellent empirical performance, its theoretical properties are still not well understood. In this talk we introduce a general approach for analyzing the approximation guarantee of the SDR detector. Our approach is based on SDP duality theory and results from non-asymptotic random matrix theory.

2 - Exploiting sparsity in nonlinear matrix inequalities and their sdp relaxations

Martin Mevissen, Tokyo Institute of Technology, Ookayama 2-12-1-W8-29, Meguro-ku, 152-8552, Tokyo, martime6@is.titech.ac.jp, *Sunyoung Kim*, *Masakazu Kojima*, *Makoto Yamashita*

A framework for exploiting sparsity in an optimization problem with nonlinear matrix inequalities via positive semidefinite matrix completion is presented. We distinguish two types of sparsity, the domain-space sparsity for a symmetric matrix variable, and the range-space sparsity for a matrix inequality constraint of the problem. Conversion methods which exploit these types of sparsity and allow to solve the problem more efficiently are proposed. We demonstrate the potential of these methods on quadratic SDPs and improve the accuracy of their linear SDP relaxations by a sampling technique.

3 - Sdp reformulation for robust lps and socps based on nonconvex qp duality

Shunsuke Hayashi, Graduate School of Informatics, Kyoto University, Yoshida-Honmachi, Sakyo-Ku, 606-8501, Kyoto, Japan, shunhaya@amp.i.kyoto-u.ac.jp, *Ryoichi Nishimura*, *Masao Fukushima*

In this paper, we focus on some classes of uncertain linear programs (LPs) and second-order cone programs (SOCPs). We reformulate their robust counterparts as semidefinite programs (SDPs) and show that those problems are equivalent under mild assumptions. In the reformulation, the strong duality for nonconvex quadratic programs plays a significant role. In the numerical experiment, we compare our SDP reformulation approach with another approach based on Hildebrand's Lorentz-positiveness idea. The obtained results show that our approach is far less expensive than the other one.

FF-02

Friday, 16:45 - 18:15
C014

Semi-infinite Programming 2

Stream: Contributed Sessions

Contributed session

Chair: *Ana I. Pereira*, Polytechnic Institute of Braganca, Campus de Sta Apolonia, Apartado 134, 5301-857, Braganca, Portugal, apereira@ipb.pt

1 - On the representation of the feasible set in linear optimization

Miguel Goberna, Estadística e Investigación Operativa, Universidad de Alicante, Ctra. San Vicente s/n, 03080, San Vicente del Raspeig, Alicante, Spain, mgoberna@ua.es

This talk discusses three types of representations for a given nonempty closed convex set in finite dimensional Euclidean spaces: linear inequality systems, reference cones and (Minkowski) sums of compact convex sets with closed convex cones. Any closed convex cone admits linear and conic representations whereas the sums of compact convex sets with closed convex cones are characterized in different ways. The role of these representations of the feasible set in linear optimization is also discussed.

2 - On a class of linear semi-infinite programs

Sven-AAke Gustafson, University of Stavanger, Stavanger, 4036, Stavanger, sven4014@yahoo.no

We will consider a class of semi-infinite programs such that it is possible to verify by means of a finite number of arithmetic operations that the calculated solution is indeed optimal. Many programs in this class have important applications. Programs in this class are used to approximate a more general problem by means of piecewise linear interpolation, piecewise cubic interpolation or orthogonal expansions. Often there is a trade-off between the truncation error caused by the approximation and the stability of the approximating problem.

3 - Interior point filter method to solve semi-infinite programming problems

Ana I. Pereira, Polytechnic Institute of Braganca, Campus de Sta Apolonia, Apartado 134, 5301-857, Braganca, Portugal, apereira@ipb.pt, *M. Fernanda P. Costa*, *Edite M.G.P. Fernandes*

We present a new reduction-type method for solving semi-infinite programming problems, where the multi-local optimization is carried out with a sequential simulated annealing algorithm, and the finite reduced problem is solved by an interior point method combined with a line search filter strategy to ensure the global convergence. Numerical experiments with a set of well-known problems are shown.

FF-03

Friday, 16:45 - 18:15
C018

Global Optimization 3

Stream: Contributed Sessions

Contributed session

Chair: *Martin Stöcker*, Fakultät Mathematik, Professur Wirtschaftsmathematik, Technische Universität Chemnitz, Reichenhainer Str. 41, Zimmer 725, 09107 , Chemnitz, Germany, martin.stoecker@mathematik.tu-chemnitz.de