MD-32

Monday, 14:00-15:30
NONL Adal XIII=218

Disciplined Convex Programming

Stream: Convex Optimization Methods

Invited session

Chair: *Michael Grant*, Electrical Engineering, Stanford University, 1025 Windsor Drive, 94025, Menlo Park, CA, United States, mcgrant@stanford.edu

Chair: *Stephen Boyd*, Electrical Engineering, Stanford University, 264 Packard, 94305, Stanford, CA, United States, boyd@stanford.edu

1 - CVXOPT - a Python package for convex optimization

Joachim Dahl, Communication Technology, Aalborg University, Fr. Bajersvej 7A-208, 9220, Aalborg, Denmark, joachim@kom.aau.dk

CVXOPT is a free software package for convex optimization, written in Python. Python is an interpreted language that runs on a wide range of platforms, including embedded devices, and offers a large collection of libraries (network and database interfaces, plotting and visualization, GUIs, etc.). CVXOPT includes routines for basic dense and sparse matrix operations, interfaces to free linear algebra packages (BLAS, LAPACK, UMFPACK, CHOLMOD) and convex solvers written in Python. We present the current state of CVXOPT, and show examples of algorithms and applications implemented in Python.

2 - CVX: a framework for modeling disciplined convex programming

Michael Grant, Electrical Engineering, Stanford University, 1025 Windsor Drive, 94025, Menlo Park, CA, United States, mcgrant@stanford.edu, *Stephen Boyd*, *Yinyu Ye*

In this presentation we introduce CVX, a modeling system for constructing, analyzing, and solving disciplined convex programs. The system turns Matlab into a modeling language, allowing constraints and objectives to be specified in natural Matlab syntax.

3 - Engineering optimization using CVX

Stephen Boyd, Electrical Engineering, Stanford University, 264 Packard, 94305, Stanford, CA, United States, boyd@stanford.edu, *Michael Grant*

Over the last 10 years, convex optimization has been applied to a wide variety of practical problems in engineering, in areas such as control systems, signal processing, machine learning, communications, networking, and circuit design. In this talk we will show how CVX can be used to rapidly develop convex optimization models for these applications.

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Monday, 14:00-15:30
NONL Adal A=313

Global Optimization: Software and Applications II

Stream: Global Optimization: Software and Applications

Invited session

Chair: *Zelda B. Zabinsky*, Industrial Engineering, University of Washington, Box 352650, 98195, Seattle, WA, United States, zelda@u.washington.edu

1 - A reduction type method for solving semi-infinite programming problems

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

A reduction type method for solving semi-infinite programming problems is presented. The multi-local optimization procedure relies on a simulated annealing algorithm combined with a function stretching technique. An appropriate descent direction is obtained by solving the locally finite reduced problem using a quasi-Newton penalty technique. To guarantee the global convergence of the algorithm, a sufficient reduction in an extended exponential merit function is forced through an Armijo condition. The numerical results seem to show that the algorithm has a satisfactory computational behaviour.

2 - Solving a nonlinear nonconvex problem with fractional objective function

Paula Amaral, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, Departamento de Matemática, Campo da Caparica, 2829-516, Caparica, Lisbon, Portugal, paca@fct.unl.pt, *Joaquim Judice*, *Hanif Sherali*

In this talk we describe two global optimisation approaches for solving a non-convex nonlinear problem where the objective function is a sum of fractional functions. One algorithm uses a linearization of the denominators in the objective function. The second algorithm exploits Reformulation-Linearization techniques (RLT). The problem we are dealing with arises in the context of the correction of an inconsistent linear system. By correction we mean a perturbation of both the matrix of coefficients and right-hand-side of the linear system of inequalities.

3 - Simulated Annealing with Hit-and-Run for Mixed Continuous/Discrete Global Optimization

Zelda B. Zabinsky, Industrial Engineering, University of Washington, Box 352650, 98195, Seattle, WA, United States, zelda@u.washington.edu

Simulated annealing algorithms using the Hit-and-Run sampling method as a generator of candidate points have been successful in a continuous domain, from both a theoretical analysis and from numerical experiments. Recent work will be presented on new versions of Hit-and-Run for discrete and mixed discrete-continuous domains. The underlying Markov chain Monte Carlo sampling method uses a random bi-directional walk, and three versions will be presented, Sphere, Box, and Mixed Biwalk. Some analytical results and computational results for global optimization will be presented.

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Monday, 14:00-15:30
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Game Theory

Stream: Systems and Game Theory

Invited session

Chair: *Dmitrii Lozovanu*, Institute of Mathematics and Computer Science, Academy of Sciences, Kishinev, Moldova, Republic Of, lozovanu@math.md

1 - A characterization of convex games by means of bargaining sets

Josep M Izquierdo, Economic Mathematics, Universitat de Barcelona, Diagonal 690, E-08034, Barcelona, Catalunya, Spain, jizquierdoa@ub.edu, *Carles Rafels*

We give two characterization results of convexity for TU games. To this end we define the concepts of max-marginal worth vector and max-Weber set which is the convex hull of all max-marginal worth vectors. The first characterization states that a game is convex if and only if the max-Weber set is included in the Weber set and this latter is a subset of the Mas-Colell bargaining set. The second one only applies to super-additive games and it states that a game is convex if and only the max-Weber set is included in the Weber set and this latter is a subset of the Davis-Maschler bargaining set.

2 - A new characterization of the extreme core allocations of the assignment game

Marina Nunez, Economic and Financial Mathematics, University of Barcelona, Av Diagonal, 690, 08034,