

1 - Eigenvalues of Voting Power Indexes

Lee Papayanopoulos, MSIS, Rutgers University, RBS, 1 Washington Park, 07102, Newark, NJ, United States, lp1@business.rutgers.edu

We explore the eigenvectors and eigenvalues of power indexes used in legislative representation and their use in integer/mixed integer search methods for "fair" weighted votes, namely, votes that render the voting power distribution (a combinatorial vector function) near-collinear with an associated population vector of constituencies.

2 - Extensive experiments with the improved hybrid genetic algorithm for the quadratic assignment problem

Alfonas Misevicius, Multimedia Engineering, Kaunas University of Technology, Studentu st 50-400a/416a, LT-51368, Kaunas, Lithuania, alfonas.misevicius@ktu.lt

Hybrid genetic algorithms (HGAs) are among the most efficient optimization techniques. In contrast to the standard GAs, which are based on natural evolution in a straightforward manner, the hybrid GAs can be understood as modeling of more complex environments, where the lifecycle transformations play the important role. In this work, several modifications of the improved HGA for the quadratic assignment problem (QAP) are tested, in particular: initial burst, incorporating the iterated local search, extra improvement, cohesive crossover, different population update schemes, using restarts, etc.

3 - The hypergraph assignment problem

Olga Heismann, Zuse Institute Berlin, Germany, heismann@zib.de, Ralf Borndörfer

The hypergraph assignment problem (HAP) is the generalization of assignments on directed graphs to directed hypergraphs. It serves, in particular, as a universal tool to model several train composition rules in vehicle rotation planning for long distance passenger railways. Even for problems with a small hyperarc size and hypergraphs with a special partitioned structure the HAP is NP-hard. We present interesting polyhedral results derived from a complete facet classification of small HAP polytopes. These can be generalized to cut inequalities for the LP relaxation of large-scale problems.

4 - 0-1 quadratic optimization problems: convexification and solution.

Monique Guignard-Spielberg, OPIM, University of Pennsylvania, 5th floor, JMHH, 3730 Walnut Street, 191046340, Philadelphia, PA, United States, guignard_monique@yahoo.fr, Lucas Létocart, Gérard Plateau

Convexification of the objective function of a 0-1 quadratic optimization problem (GQAP, QKP,...) is theoretically possible using an SDP model and its dual. We will discuss the numerical difficulties encountered in the process, and will show that for small to medium size instances, one may be able to obtain an equivalent convex model and a reasonable lower bound. One can also try to generate improved bounds and good feasible solutions using the convex hull relaxation (CHR), and/or try to solve the convex model by standard MIQCP software, such as CPLEX.

WD-05

Wednesday, 14:30-16:00

RB-L3

Topics in integer and mixed integer programming II

Stream: Discrete Optimization, Geometry & Graphs (contributed)

Contributed session

Chair: Iskander Aliev, School of Mathematics, Cardiff University, Senghennydd Road, CF24 4AG, Cardiff, alievi@cf.ac.uk

1 - Optimize the payout probability table in slot machines

Xiaoming Liu, FBA, University of Macau, University of Macau, Macau, NA, MACAU, China, xmliu@umac.mo, Zhaotong Lian, Xin Li

This paper theoretically derives the game values of slot machines from the payout probability distribution. It provides explicit formulas for all quantitative measurements that are of interest to both casino managers and players. Optimization of the pay-out distribution is also given to maximize the pulls per losing player. The optimal payout and probability lists are shown. Some numerical results are given. These results can be utilized by slot managers to choose the best trade-off customer experience and casino gain.

2 - The Master Corner Polyhedron: Vertices

Vladimir Shlyk, Mathematics 3, Belarusian State Technical University, 65 Independence av., 15 Kulman str., Apt. 27, 220100, Minsk, Belarus, v.shlyk@gmail.com

As shown by R. Gomory, the set of vertices of the master corner polyhedron over a group is the union of orbits under the stabilizer of a certain group element. We prove that two combinatorial operations transforming vertices to their neighbors map the orbits onto the others. So any system of representatives for some special orbits forms a polyhedron vertex basis, often small in size. We geometrically characterize the irreducible points and establish relations between the coefficients of the facets through a given vertex. The computational potential of the results is discussed.

3 - The K-Separator Problem

Mohamed Ahmed Mohamed Sidi, Telecom SudParis, 9 Rue Charles Fourier, 91000, Evry, France, m-ahmed.m-sidi@telecom-sudparis.eu, Walid Ben-ameur, Jose Neto

Let G be a vertex-weighted undirected graph and k be a positive number. We want to compute a minimum-weight subset of vertices whose removal leads to a graph where the size of each connected component is less than or equal to k . Let us call such a set a k -separator. If $k=1$ we get vertex cover problem. The case $k=2$ is equivalent to compute the dissociation number of a graph (case of unit weights). We give some formulations of the problem. We point out some cases where the problem is easy to. Some simple approximation algorithms are described. Numerical results are also reported.

4 - s-Fold Feasibility of Integer Knapsacks

Iskander Aliev, School of Mathematics, Cardiff University, Senghennydd Road, CF24 4AG, Cardiff, alievi@cf.ac.uk

The integer knapsack problem is a well-known problem in integer programming. Since this problem is NP-hard in general, we are interested in well-solved special cases. In particular, when the right-hand sides satisfy certain geometric criteria, the existence of a feasible solution can be determined immediately, without the need for complex optimization techniques. We focus on the case where the knapsack polytope contains at least a prescribed number of integer points. We show that the feasibility of the problem appears to be closely related to the behaviour of the s -covering radius.

WD-06

Wednesday, 14:30-16:00

RB-Gamma

Game Theory Applications

Stream: Dynamical Systems and Game Theory
Invited session

Chair: Luis Ferreira, Matemática, Escola Superior de Estudos Industriais e de Gestão, IPP, ESEIG, Rua D Sancho I, número 981, 4480-876, Vila do Conde, Porto, Portugal, migferreira2@gmail.com

1 - Analysis of stroke patients EEG signals on the base of cooperative game theory

Hamidreza Navidi, science, Shahed University, 0098, Tehran, Iran, Islamic Republic Of, navidi@shahed.ac.ir, Majid Hassanpour-ezatti, Saeid Barjesteh, Hadi Aghayari

Electroencephalogram (EEG) is useful tool for detection of stroke. Here, a model presented on the base of cooperative game theory to analyses of features extraction of stroke patient EEG signals and the contribution rate of these features on outbreak of stroke is calculated.