Tuesday, 10:40-12h00

■ TB-01

Tuesday, 10:40-12h00
Aula Magna

Keynote Talk 6

Stream: Keynote Speakers
Invited session
Chair: *Valerie Belton*, Dept. Management Science, University of Strathclyde, 40 George Street, G1 1QE, Glasgow, United Kingdom, val.belton@strath.ac.uk

1 - Problem Structuring Methods 'in the Dock'! : Arguing the case for Soft OR

Fran Ackermann, Management Science, Strathclyde University, 40 George Street, G1 1QE, Glasgow, United Kingdom, fran.ackermann@strath.ac.uk

Problem Structuring Methods (or Soft OR) have been around for nearly 40 years and yet these methods are still very much overlooked in the OR world. Whilst there is almost certainly a number of explanations for this, two key stumbling blocks are 1) the subjective nature of the modelling yielding insights rather than testable results, and 2) the demand on users to both manage content (through modelling) and manage processes (work WITH rather than on behalf of groups). This keynote presentation aims to put a case forward to support an increase in the use of these methods, either on their own to support clients with messy complex problems or in combination with more mathematical methods thus facilitating models that address a shared well understood objective, provide testable results, and are negotiated and thus owned by key stakeholders.

■ TB-02

Tuesday, 10:40-12h00
3.2.14

Advanced Combinatorial Optimization 3

Stream: Combinatorial Optimization
Invited session
Chair: *J. M. Valério de Carvalho*, Departamento de Produção e Sistemas, Universidade do Minho, 4710 053, Braga, Portugal, vc@dps.uminho.pt

1 - Exact Integer Programming in SCIP

Kati Wolter, Optimization, Zuse Institute Berlin, Takustrasse 7, 14195, Berlin, Berlin, Germany, wolter@zib.de

Most MIP solvers focus on quickly finding solutions that are accurate with respect to numerical tolerances. There are, however, applications, e.g., chip verification, for which this slight inaccuracy is not acceptable. We introduce an approach for the exact solution of MIPs in SCIP. It combines inefficient but always applicable rational computations with a safe floating-point approach, which is efficient but of limited applicability. Preliminary computational results will be presented

2 - The Inverse 1-Median Problem in the d-dimensional space with the Chebyshev-Norm

Johannes Hatzl, Department of Optimization and Discrete Mathematics, Graz University of Technology, Steyrergasse 30, 8010, Graz, Austria, hatzl@opt.math.tugraz.at

In this talk, we consider the 1-median problem in the d-dimensional space with the Chebyshev-norm. We give an optimality criterion for this problem which enables us to solve the following inverse location problem in polynomial time: Given n points $P\_1,..., P\_n$ with non-negative weights and a point P_0 the task is to change the weights at minimum cost such that P_0 is a 1-median with respect to the modified weights. In fact, this problem reduces to a balancing flow problem for which an optimal solution can be obtained in polynomial time.

3 - Stabilization procedures based on dual feasible functions

Cláudio Alves, Produção e Sistemas, Escola de Engenharia, Universidade do Minho, Campus de Gualtar, 4710-057 Braga,

Braga, Portugal, claudio@dps.uminho.pt, *François Clautiaux, J. M. Valério de Carvalho, Jürgen Rietz*

Convergence of column generation for the cutting stock problem is addressed. We introduce a general framework for deriving dual cuts, and describe a new type of cuts, which exclude solutions that are linear combinations of some other known solutions. New lower and upper bounds for the dual variables are discussed. We also show how the prior knowledge of a good dual solution helps improving the results. It tightens the bounds around the dual values, and makes the search converge faster if a solution is sought in its neighborhood first. Computational experiments on hard instances are reported.

4 - Improving a lagrangean decomposition for the unconstrained binary quadratic programming problem

Luiz A. N. Lorena, LAC - Lab. Assoc. Computação e Mat. Aplicada, INPE - Brazilian Space Research Institute, Av. dos Astronautas - 1758, Caixa Postal 515, 12243-970, São José dos Campos, São Paulo, Brazil, lorena@lac.inpe.br, *Geraldo Mauri*

We present a lagrangean decomposition based on column generation techniques to solve the unconstrained binary quadratic programming problem. We use a mixed binary linear version of the original quadratic problem with constraints represented by a graph. This graph is partitioned in clusters of vertices forming sub-problems whose solutions use the dual variables obtained by a coordinator problem. Computational experiments consider a set of difficult instances and the results show the efficiency of the proposed method over traditional lagrangean relaxations and other methods found in the literature.

■ TB-03

Tuesday, 10:40-12h00
3.2.15

Routing problems

Stream: Metaheuristics
Invited session
Chair: *Jose Brandao*, Management, University of Minho, Largo do Paço, 4704 -553 , Braga, Portugal, sbrandao@eeg.uminho.pt
Chair: *Elisabeth Gussmagg-Pfliegl*, Faculty of Business, Economics and Statistics, University of Vienna, Chair for Production and Opterations Management, Bruennerstrasse 72, 1210, Vienna, Austria, elisabeth.gussmagg-pfliegl@univie.ac.at

1 - A hybrid approach for real world postman problems

Elisabeth Gussmagg-Pfliegl, Faculty of Business, Economics and Statistics, University of Vienna, Chair for Production and Opterations Management, Bruennerstrasse 72, 1210, Vienna, Austria, elisabeth.gussmagg-pfliegl@univie.ac.at, *Karl Doerner, Richard Hartl, Stefan Irnich, Fabien Tricoire*

We are solving a rich postman problem using a hybrid approach. Due to the complexity of the problem, and the size of the (real world) instances, we tackle the problem in two steps: first, we generate routes heuristically, secondly, a set covering problem is solved using an exact method. After each step, a local search is performed to improve the solution.

2 - Iterated tabu search algorithm for the open vehicle routing problem with time windows

Jose Brandao, Management, University of Minho, Largo do Paço, 4704 -553 , Braga, Portugal, sbrandao@eeg.uminho.pt

The problem studied here, the open vehicle routing problem with time windows (OVRPTW), is different from the vehicle routing problem with time windows in that the vehicles do not return to the distribution depot after delivering the goods to the customers. We have solved the OVRPTW using iterated tabu search. The performance of the algorithm is tested using a large set of benchmark problems.

3 - A heuristic approach for the CVRP with open routes

R. Aykut Arapoglu, Industrial Engineering Department, Eskisehir Osmangazi University, Meselik Campus, 26480, Eskisehir, Turkey, arapoglu@ogu.edu.tr, *Abdurrahman Yildiz*