

Tuesday, 9:00-10:20**■ TA-01**

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Aula Magna

Keynote Talk 5

Stream: Keynote Speakers

Invited session

Chair: *Jose Fernando Oliveira*, Faculty of Engineering / INESC Porto, Universidade do Porto, Rua Dr. Roberto Frias, 4200-465, Porto, Portugal, jfo@fe.up.pt

1 - You want them to Remember? Then Make it Memorable!

James Cochran, Department of Marketing and Analysis, Louisiana Tech University, PO Box 10318, 71272, Ruston, LA, United States, jcochran@cab.latech.edu

Each of us has key concepts we want our students to understand and remember, but lecturing to students on these concepts often fails to engender their deep comprehension or long term retention. So how can instructors of operations research/management science effectively accomplish these pedagogical goals? In this session Professor Cochran will discuss the use of several interesting and novel active learning exercises, classroom cases, and live projects that can dramatically improve student comprehension and retention of key concepts. Throughout the session Professor Cochran will emphasize his points with live demonstrations of active learning exercises. Card tricks, classroom versions of television game shows, and a teaching case with integrated active learning will be featured. Because many of these exercises are easily transferable across topics, instructor/classroom styles, cultures, national borders, institutions, faculties, programs, levels of technology, and class sizes, it is very likely you will walk away from this session with ideas on how to improve your own teaching (indeed, Professor Cochran will be very disappointed if you don't!).

■ TA-02

Tuesday, 9:00-10:20

3.2.14

Advanced Combinatorial Optimization 2

Stream: Combinatorial Optimization

Invited session

Chair: *Aristide Mingozzi*, Department of Mathematics, University of Bologna, C.d.L. Scienze dell'Informazione, Via Sacchi, 3, 47023, Cesena, FC, Italy, mingozzi@csr.unibo.it

1 - Theoretical investigations on maximal dual feasible functions

J. M. Valério de Carvalho, Departamento de Produção e Sistemas, Universidade do Minho, 4710 053, Braga, Portugal, vc@dps.uminho.pt, *Jürgen Rietz*, *Cláudio Alves*

Dual feasible functions are used to get valid inequalities and lower bounds for integer linear problems. We illustrate their use in some examples, we provide a simpler proof for maximality, and we describe new results concerning the extremality of functions of the literature. Extremal functions are a dominant class of dual feasible functions.

2 - Monoidal Cut Strengthening Revisited

Andrea Qualizza, Tepper School of Business, Carnegie Mellon University, 5000 Forbes Avenue, 15213, Pittsburgh, PA, United States, qualizza@cmu.edu, *Egon Balas*

We discuss an enhancement of the Balas-Jeroslow procedure for strengthening disjunctive cuts for mixed 0-1 programs. When applied to a split cut derived from a source row of the simplex tableau, the enhanced procedure yields, besides the mixed integer Gomory cut, also cuts that are sometimes stronger.

3 - Models and Algorithms for Multi-Echelon Distribution Networks

Roberto Wolfler-Calvo, LIPN, Université Paris Nord, 93430, Villetaneuse, France, roberto.wolfler@lipn.univ-paris13.fr, *Aristide Mingozzi*, *Roberto Baldacci*

In Multi-Echelon Distribution Networks the deliveries from the production plants to the customers are managed through intermediate depots by means of two or more levels of delivery. Generally, two different types of decisions must be addressed in designing this type of distribution networks. The first one is of strategic type and consist in opening one or more depots, on a given set of a priori defined depot locations, and to design, for each opened depot, a number of routes in order to supply the demands of a given set of customers. This problem is called Location Routing Problem (LRP) and the objective is to minimize the sum of the route costs and the fixed costs of the opened depots. The second one is of tactical type and consist in designing the set of routes that must be operated from the different level of the networks. If the deliveries from the production plant to the customers are managed by means of two levels of delivery, the problem is known as Two Echelon Vehicle Routing Problem (2E-VRP) and the objective is to minimize the sum of the routing costs of the first and second level routes. In this paper we describe an exact method for solving both the LRP and the 2E-VRP. Computational results on benchmark instances from the literature are also presented.

4 - Reference Point based Solution Approach for the Resources Constrained Shortest Path Problem

Luigi Di Puglia Pugliese, D.E.I.S.: Department of Electronics, Computer Science and Systems, University of Calabria, Via ponte P. Bucci, 87036, Rende, Italy, Italy, lidipuglia@deis.unical.it, *Francesca Guerriero*

The Resources Constrained Shortest Path Problem (RCSPP) is one of the most studied problem in combinatorial optimization. The aim is to find the shortest path under additional constraints, representing upper bounds on the consumption of resources along the path. In the scientific literature, different approaches have been defined to solve the RCSPP. In this work we propose an innovative interactive method to address the RCSPP, based on a novel search strategy in the criteria space. The performance of the proposed approach is evaluated on the basis of an extensive computational study.

■ TA-04

Tuesday, 9:00-10:20

3.2.13

Project scheduling

Stream: Metaheuristics

Invited session

Chair: *André Rossi*, Lab-STICC - UMR 3192, Université de Bretagne-Sud, Centre de Recherche, BP 92116, 56321, Lorient, France, andre.rossi@univ-ubs.fr

Chair: *José Carlos Reston Filho*, P&D, Fundação André Nunes Coelho, Rua 4 N° 65 Casa 3, Cj Pq Tropical Parque 10, 69055-743, Manaus, Amazonas, Brazil, jcreston@gmail.com

1 - Towards the minimization of project duration and cost in stochastic project management environments

José Carlos Reston Filho, P&D, Fundação André Nunes Coelho, Rua 4 N° 65 Casa 3, Cj Pq Tropical Parque 10, 69055-743, Manaus, Amazonas, Brazil, jcreston@gmail.com, *Anabela Pereira Tereso*, *Lino Costa*

There is a general consensus that the rational use of available resources is, nowadays, an important task, since project managers are interested in the maximization of profit and the minimization of risk. In this work, it is proposed a multi-objective model to optimize the use of resources in a stochastic environment. In this multi-objective formulation the aim is to minimize the project duration and the total project cost at the same time. In the future, we intend to solve this problem using multi-objective evolutionary algorithms.

2 - An electromagnetism-like algorithm for a project scheduling problem with discounted cash flows

Marisa Toste, Ciências e Tecnologia, Escola Superior de Tecnologia e Gestão de Oliveira do Hospital do Instituto Politécnico de Coimbra, Rua General Santos Costa, 3400-124, Oliveira do Hospital, Portugal, marisa.toste@estgoh.ipc.pt, *Dalila Martins Fontes*

An electromagnetism algorithm is developed to address a resource constrained project scheduling problem. The chosen problem involves discounted cash flows and therefore the objective is to find a schedule that maximizes the project net present value. The electromagnetism method (EM) is a population based meta-heuristic algorithm utilizing an attraction-repulsion mechanism to move sample points (i.e., solutions) towards the optimality. Computational results, on problem instances found in previous literature, are reported.