■ MD-22

Monday, 14:00-15:30
OPT Adal 050

Multiobjective Combinatorial Optimization I

Stream: Multiple Objective Optimization

Invited session

Chair: *Matthias Ehrgott*, Engineering Science, University of Auckland, Private Bag 92019, 1001, Auckland, New Zealand, m.ehrgott@auckland.ac.nz

1 - A hierarchical multicriteria routing model in multimedia networks

João Clímaco, University of Coimbra and INESC Coimbra, 3000-033, Coimbra, Portugal, jclimaco@inescc.pt, *José Craveirinha*, *Marta Pascoal*

Routing problems in multiservice communication networks involve the calculation of paths satisfying multiple constraints and seek simultaneously to "optimise" the relevant metrics. We propose a bilevel multicriteria routing model. The objective functions of the first level seek to minimise the negative impact of the use of a path in the remaining flows of the network, while the second level objective functions seek to optimise QoS parameters of the associated with the chosen path. A resolution and its application to video-traffic are presented. Extensive comparative results are discussed.

2 - A Multiple Objective Model for the Identification of Load Management Actions

Carlos Antunes, DEEC, University of Coimbra and INESC Coimbra, Rua Antero de Quental 199, 3000-033, Coimbra, Portugal, ch@deec.uc.pt, *Alvaro Gomes*, *António Martins*

Even in unbundled electricity markets, load management actions keep their potential attractiveness, due to operational issues and economic benefits. Multiple objectives are relevant in the design and selection of load control actions, such as minimizing maximum power demand, losses, and discomfort caused to customers, and maximizing profits,. Evolutionary algorithms (EAs) are well suited for complex combinatorial MO problems since they work with a set of potential solutions in each generation. This study describes the use of an EA in the identification and selection of loads control actions.

3 - Finding Mines in a Line: A Biobjective Formulation

Luis Paquete, Faculdade de Economia, Universidade do Algarve, Campus de Gambelas, 8000, Faro, Portugal, lpaquete@ualg.pt, *Marco Pranzo*, *Manbir Sodhi*, *Thomas Stützle*

We describe a real-life application for finding underwater mines using an Autonomous Underwater Vehicle (AUV). The search area is defined as a line partitioned into small segments and the probability of finding a mine for each segment is known in advance. The main goal is to define which segments have to be visited by the AUV such that the sum of the corresponding probabilities is maximized and the total mission time is minimized. We discuss algorithms for solving the biobjective problem in terms of Pareto optimality and present computational results.

4 - Multiobjective metaheuristic solution procedures for R&D project selection under uncertainty

Christian Stummer, Dept. of Business Studies, University of Vienna, Bruenner Str. 72, A-1210, Vienna, Austria, christian.stummer@univie.ac.at, *Markus Günther*, *Walter Gutjahr*

More often than not research and development (R&D) managers face the problem of selecting the "best" (feasible) portfolio from among an extensive set of project proposals. In practice, the problem is even more complicated because the decision-making process is usually driven by several conflicting (stochastic) objectives. In order to provide interactive decision support, efficient portfolios have to be determined which implies solving the underlying multiobjective combinatorial optimization (MOCO) problem. In our talk we outline proper metaheuristic solution procedures for this task.

■ MD-23

Monday, 14:00-15:30
OPT Adal 051

Approximating Layout and Packing Problems

Stream: Approximation Algorithms

Invited session

Chair: *Roberto Solis-Oba*, Department of Computer Science , University of Western Ontario, Middlesex College Building, N6A5B7, London, Ontario, Canada, solis@csd.uwo.ca

Chair: *Frits Spieksma*, Applied Economics, Katholieke Universiteit Leuven, Naamsestraat 69, 3000, Leuven, Belgium, Frits.Spieksma@econ.kuleuven.be

1 - Approximation Algorithms for 2D Strip Packing Problems

Klaus Jansen, Institut für Informatik und Praktische Mathematik, Universität Kiel, Olshausenstr. 40, 24098, Kiel, Germany, kj@informatik.uni-kiel.de, *Rob van Stee*

We consider the following packing problem: Given a rectangular strip of fixed width 1 and large height and a set of demand rectangles R_1,...,R_n with widths w_i and heights h_i in the interval [0,1], the problem is to cut the strip into the demand rectangles while minimizing the total height used. In the talk we describe first an AFPTAS by Kenyon and Remila for the 2D strip packing problem. Next we present an AFPTAS by Jansen and van Stee for the 2D strip packing problem when rotations of 90 degrees are allowed. Finally we show some recent results for several variants of the problem.

2 - Approximation Schemes for Packing with Item Fragmentation

Hadas Shachnai, Department of Computer Science, Technion - Israel Institute of Technology, 32000, Haifa, Israel, hadas@cs.technion.ac.il

We consider two variants of the classical bin packing problem in which items may be fragmented. While both variants do not belong to the class of problems that admit a polynomial time approximation scheme (PTAS), we show that the two problems admit a dual PTAS, an asymptotic PTAS, and a dual asymptotic fully polynomial time approximation scheme (AFPTAS). Our AFPTASs are based on a non-standard transformation of the mixed packing and covering linear program formulations of our problems into pure covering programs, which enables to efficiently solve these programs.

3 - Approximation Algorithms for Global Routing in VLSI Design

Tamas Terlaky, Computing and Software, McMaster University, 1280 Main Street West, L9B 2S9, Hamilton, Ontario, Canada, terlaky@mcmaster.ca, *Hu Zhang*, *Anthony Vannelli*

We consider two global routing problems in VLSI design. In the first problem, given a lattice graph and a collection of nets (subsets of the vertex set) to be connected by trees, we try to maximize the number of routed nets with respect to the edge capacities. In the second problem, we try to minimize a combination of the total tree length and the total number of bends while routing all nets. We design the first approximation algorithms for both problems, which have theoretical approximation bounds and polynomial running times. This is joint work with M. Saad, T. Terlaky and A. Vannelli.