

Open-Source Software in OR Education

Invited abstract in session **TD-21: Software for OR/MS II - Open Source**, stream **Software for OR/MS**.

Tuesday, 14:00-15:20

Room: 6.2.47

Authors (first author is the speaker)

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Abstract

This contribution will focus on Computational Tools of Open-Source Software in OR Education. Some educational experiences in the area of Forecasting; Simulation; Graphs and Networks; Decision Theory and Linear Programming based on: R 2.10.0, Scilab 5.1.1 and an Open Source Spreadsheet will be illustrated, with a brief reference to the acceptance of pupils and colleagues.

Keywords

- Education and Distance Learning
- Open Source Software
- Optimization Modeling

Status: accepted

We address a situation where machines process one cutting pattern at a time and equal pieces cut from the patterns are piled in stacks in the work area. The sequence in which preset cutting patterns are processed can affect the flow and total completion time, so it is desirable to optimize the occupation of the stacks to eliminate unnecessary dispersion. A solution can be modelled by an interval graph exhibiting a set of intervals that match the duration of stacks. We propose an IP model that reduces the occupation of the stacks, by adding the least number of edges to the graph.

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Software for OR/MS II - Open Source

Stream: Software for OR/MS

Invited session

Chair: *Vinícius Armentano*, Faculdade de Engenharia Elétrica e de Computação, Universidade de Campinas, FEEC-UNICAMP- CP 6101, Av. Albert Einstein 400, 13083-970, Campinas, São Paulo, Brazil, vinicius@densis.fee.unicamp.br

1 - Open-Source Software in OR Education

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This contribution will focus on Computational Tools of Open-Source Software in OR Education. Some educational experiences in the area of Forecasting; Simulation; Graphs and Networks; Decision Theory and Linear Programming based on: R 2.10.0, Scilab 5.1.1 and an Open Source Spreadsheet will be illustrated, with a brief reference to the acceptance of pupils and colleagues.

2 - Parallel Machine Scheduling Using Free Software: an Application

António Duarte, Instituto Politécnico de Bragança, Campus de Santa Apolónia, Apartado 1038, 5301-854, Bragança, Portugal, aduarte@ipb.pt, *J. M. Valério de Carvalho*

We will show how to implement large scale optimization by only using freely available software tools. We solve exactly a parallel machine scheduling problem with identical parallel machines and malleable tasks, subject to arbitrary release dates and due dates. The objective is to minimize a function of late work and setup costs. We use the COIN-OR BCP framework to implement column generation to solve a model that results from a Dantzig-Wolfe decomposition, and also CRIFOR MCFZIB to solve an equivalent network flow model. Computational results are presented.

3 - Consumers and Suppliers Decision Process in Information System Markets

João Rosário, Marketing, Escola Superior de Comunicação Social-Instituto Politécnico de Lisboa, Portugal, jrosario@escs.ipl.pt, *António Palma dos Reis*

The objective of this presentation is to discuss the consumer decision process in the Information Systems markets and how these markets evolve influenced by these consumer decisions and the suppliers' decisions and business models. Will be discussed the factors that have influence on the consumers buying process decision and the option between Proprietary Software and Open Source Software in the Operating Systems and Office Suites categories; the gratuity degree of Open Source Software; and also on the supply side the advantages and disadvantages regarding innovation, software developing organization and market survival of Open Source Software versus Proprietary Software business models.

4 - Fleet Deployment Optimization for Tramp Shipping

Vinícius Armentano, Faculdade de Engenharia Elétrica e de Computação, Universidade de Campinas, FEEC-UNICAMP- CP 6101, Av. Albert Einstein 400, 13083-970, Campinas, São Paulo, Brazil, vinicius@densis.fee.unicamp.br, *Rodrigo Branchini*

We address a tactical planning problem faced by many tramp shipping companies that have cargo contracts which they are committed to carry, while trying to serve optional spot cargoes to increase their revenue over medium-term horizon. The decisions include the number and type of vessels deployed, the assignment of vessels to contractual and spot voyages and the determination of vessel routes and schedules in order to maximize the profit. This problem is modeled as a mixed integer programming which is solved using COIN-OR open source platform. Computational results are reported.

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Health Care Policy Making II

Stream: Health Care Management [c]

Contributed session

Chair: *Jose Luis Andrade*, Industrial Management, School of Engineering, University of Seville, Camino de los Descubrimientos s/n, 41092, Seville, Spain, jlandrade@esi.us.es

1 - Innovative Approach to Design Decisions on a Regional Network of Clinical Laboratories

Jose Luis Andrade, Industrial Management, School of Engineering, University of Seville, Camino de los Descubrimientos s/n, 41092, Seville, Spain, jlandrade@esi.us.es

We present a model supporting design and operation decisions on a regional network of clinical laboratories (able to reassign resources, redistribute workloads and reorganize flows), modelled as a multicommodity flow problem which conducts to a MIP formulation. We build a prototype tool for Health Care Managers to analyse scenarios and select the best options to improve the behaviour of the whole network. It is a graphical tool that launches an optimization process and supports: zoom, iconographical presentation of solutions and on-click access to input data or output solution, among others.

2 - A Case-based Reasoning System for Radiotherapy Treatment Planning in Brain Cancer

Rupa Jagannathan, Computer Science, University of Nottingham, Jubilee Campus, Wollaton Road, NG8 1BB, Nottingham, Nottinghamshire, United Kingdom, rxj@cs.nott.ac.uk, *Sanja Petrovic*, *Angela Mckenna*, *Louise Newton*

A decision support system for brain cancer radiotherapy treatment planning is presented. The aim of treatment planning is to attain a uniform tumouricidal dose for the tumour cells while minimizing the damage caused to adjacent healthy tissue and organs. This is a complex decision-making process that relies on subjective experience and expert clinical domain knowledge. We develop a case-based reasoning system that generates treatment plans for new patients based on the plans for previous similar patients. Our experiments, which use real brain cancer patient cases, show promising results.

3 - Decision Support System for Warfarin Therapy Management

Barbaros Yet, Technology Management and Economics, Chalmers University of Technology, Sweden, barbaros@student.chalmers.se, *Kaveh Bastani*, *Hendry Raharjo*, *Svante Lifvergren*, *Bo Bergman*

Warfarin therapy is known as a complex process due to variation in the patients' response. Failure to deal with such variation may lead to thrombosis or bleeding. There have been studies done on investigating the sources of variation, such as alcohol consumption and interacting drugs. However, this knowledge is, unfortunately, often used loosely by the physicians. This paper proposes a decision support system to integrate experts' knowledge in a systematic way using Bayesian Network. The model is built upon literature review in medical fields and interviews with doctors in a Swedish hospital.

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MOO: Nonlinear Multi-Objective Optimization Techniques in Action

Stream: Multi-Objective Optimization

Invited session

Chair: *Jussi Hakanen*, Dept. of Mathematical Information Technology, University of Jyväskylä, P.O. Box 35 (Agora), FI-40014, University of Jyväskylä, Finland, jussi.hakanen@jyu.fi

Chair: *Kaisa Miettinen*, Dept. of Mathematical Information Technology, University of Jyväskylä, P.O. Box 35 (Agora), FI-40014, University of Jyväskylä, Finland, kaisa.miettinen@jyu.fi