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Séminaire conjoint CIRRELT, MobilOpt et la Chaire de recherche du Canada en logistique intégrée

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Solving the integrated vehicle routing and 3D-packing problems: mathematical formulations and decomposition strategy

Abstract: This talk addresses the integration of the vehicle routing and three-dimensional packing problems, commonly referred to as the Three-Dimensional Loading Capacitated Vehicle Routing Problem (3L-CVRP). Combining these two classical problems is of significant practical relevance, as the efficiency of load allocation directly impacts the effectiveness of delivery routes. Among the various possible variants, this study focused on the 3L-CVRP with time windows and allowing all feasible orientations of the boxes within the containers. Two mathematical formulations were proposed, with three- and two-index routing variables. Preprocessing techniques were applied to enhance computational efficiency. To solve larger instances, a logic-based Benders decomposition method was also proposed. The performance of the mathematical models and decomposition strategies was assessed through computational experiments using multiple benchmark datasets. The results show the competitiveness of the proposed approaches, which found optimal solutions in 40 out of 124 experiments, 13 of which represent the first proven optimal solutions reported in the literature. Moreover, the proposed methods obtained 28 new best-known solutions on classical and widely studied benchmark sets.

Short biography: Douglas is a postdoctoral researcher in Operations Research at the University of São Paulo (USP), Brazil, working on a São Paulo Research Foundation (FAPESP)-funded project. He previously held a postdoctoral position at São Paulo State University (UNESP), Brazil. He holds a degree in Information Systems and a PhD in Industrial Engineering from UNESP. Douglas' research focuses on the design and application of mathematical models, heuristics, and matheuristics for complex optimization problems, including cutting stock, lot sizing, and vehicle routing, in both deterministic and stochastic settings. He has also contributed to research projects on staff scheduling and the application of machine learning to demand forecasting.

Zoom: https://ulaval.zoom.us/j/61984866799?pwd=EsNjiqCpBIllOaMYRHgletajcbCmRS.1
Meeting ID: 619 8486 6799 – **Passcode:** 415013

Lundi / Monday
15 décembre / December 15th
10h00

Université Laval
Pavillon Palasis-Prince
Salle / Room: 1307

Ouvert à tous / Open to all
Café et viennoiseries

Responsable / Organizer:
Leandro Coelho

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