Joint Webinar CIRRELT, MobilOpt and Canada research chair in integrated logistics

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VEHICLE ROUTING WITH SPLIT DELIVERY: COMPACT FORMULATIONS AND TAILORED SOLUTION APPROACHES

Abstract: The split delivery vehicle routing problem (SDVRP) generalizes the traditional variants of routing problems by allowing multiple visits to customers. While this additional feature can promote significant cost reductions to optimal routes, it also brings challenges to modeling and solving the problem. In this talk, we first present three novel compact formulations purely based on arcs to model different variants of the SDVRP, with and without time windows. To our knowledge, these are the first compact formulations based only on arcs to fully model split delivery variants, as the other formulations in the literature rely on variables indexed by vehicle or by visit number, leading to a poor performance of general-purpose integer programming software. Computational experiments with benchmark instances show the superior performance obtained with the proposed formulations over other compact models. Moreover, we present two tailored solution methods inspired by the best-performing formulation. The first one is a new branch-and-cut (BC) algorithm, based on the regularity property constraints to cut-off infeasible integer solutions; and the other is a column generation-based heuristic, that is built upon inserting path-based variables into the formulation used in the BC algorithm. The proposed approaches solve more than 90 instances to proven optimality for the first time and improve the best known lower and/or upper bound for many other instances. – Joint work with Martin Savelsbergh.

About the speaker: Pedro Munari is a Professor at the Production Engineering Department of the Federal University of Sao Carlos, São Paulo, Brazil. He received his M.Sc. and Ph.D. in Computer Science and Computational Mathematics from the University of São Paulo. His Ph.D. dissertation was awarded the Doctoral Prize for the Best Dissertation from the Brazilian Society of Applied and Computational Mathematics. Prof. Munari has coordinated many grants from funding agencies and has developed applied projects with several companies in Brazil, with a focus on Operations Research and Logistics. His research interests include exact and heuristic methods, with focus on the column generation technique, branch-price-and-cut methods, and decomposition techniques for large-scale problems. Additionally, he has worked on new formulations and solution methods for challenging deterministic and stochastic combinatorial optimization problems, including vehicle routing problems as well as cutting and packing problems.

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MERCREDI / WEDNESDAY

1er décembre / December 1st

10h00

Ouvert à tous
Open to all

Responsables / Organizers

Maryam Darvish - Leandro Coelho

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