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

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Robust Policies for a Multi-Stage Assignment and Fleet Sizing Problem under Demand Uncertainty

Université Laval | Canada research chair in integrated logistics

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Abstract: Motivated by an on-demand waste collection service offered by an Italian company, we study the Multi-stage Assignment and Fleet Sizing Problem under Demand Uncertainty with Customer Flexibility. In a stochastic dynamic setting over several days, we consider a set of customers, each placing exactly one order on a known day. The demand for future requests is unknown, and all orders must be fulfilled. Customers have day windows that, if some flexibility is allowed, can be extended by anticipating or delaying the service by paying a penalty. At the end of each day, we decide which pending orders to serve on the day after by exploiting a heterogeneous fleet of vehicles. The goal is to minimize total costs due to fleet sizing and customer inconvenience. First, we formulate this multi-stage problem as a bilevel program and a Markov Decision Process. Then, we provide lower and upper bounds for its multi-period static approximation by employing robust optimization techniques. Successively, we apply these bounds in a rolling-horizon fashion to solve the original problem with Approximate Dynamic Programming. In particular, we design myopic and robust direct look-ahead approximation policies. To show when and how the latter is preferable, we perform an experimental evaluation on synthetic instances and actual data from our case study and provide managerial insights.

Short biography: Demetrio Laganà is an Associate Professor of Operations Research at the Department of Mechanical, Energy, and Management Engineering, University of Calabria. His research interests lie in the field of combinatorial optimization, with a particular focus on distribution and integrated logistics. He has authored over 50 publications on exact and heuristic methods for routing problems (arc and node), inventory routing and supply chain management. In 2020, the paper 'An Exact Solution Framework for Multi-Trip Vehicle Routing Problems with Time Windows', published in Operations Research together with Rosario Paradiso, Roberto Roberti and Wout Dullaert, received the 2020 INFORMS Transportation and Logistics (TSL) best paper award. Recently, he has been working on optimization problems for last-mile logistics in the dynamic and stochastic domain.

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Meeting ID: 677 4029 9318 - Passcode: 104214

Jeudi / Thursday
11 juillet / July 11th
10h

Université Laval
Pavillon Palasis-Prince
Salle / Room 2327

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Café et viennoiseries

Responsable / Organizer:
Leandro Coelho

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