

SÉMIN-AIRO
Série de séminaires en optimisation, apprentissage et prise de décision

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Ditch the Distribution: ETAs for Truck Scheduling

Abstract

Logistics synchronization problems often require coordinating vehicles with resources at their destinations. Uncertain travel times complicate this coordination. Existing models typically assume known travel time distributions and no new information about travel times until vehicles reach their destinations. In practice, navigation systems provide operators with frequent estimated times of arrival (ETAs), creating opportunities to improve synchronization through real-time information. Motivated by our collaboration with the logistics division of the Italian post, we study inbound truck scheduling at warehouse unloading docks with frequent ETA updates. We formulate the problem as a partially observable Markov decision process (POMDP) that represents arrival uncertainty through belief distributions updated with each ETA. We develop a lookahead policy for dynamic resource allocation under evolving ETA information. To evaluate the policy, we derive an information relaxation dual bound, which yields a challenging penalized perfect information problem. We develop a decomposition algorithm that separates truck-to-dock assignment and sequencing from service start time decisions. Experiments show that the dual bound substantially improves upon conventional perfect information bounds, the lookahead policy achieves near-optimal performance when arrival time distributions are known, and incorporating ETAs reduces expected waiting time by 29 percent relative to current industry practice.

Link zoom: <https://etsmtl.zoom.us/j/92207439300>

Bio

Ola Jabali is an associate professor at the operations research and discrete optimization group of Politecnico di Milano. Her research interests deal with modelling and solving realistic problems arising in transportation, production and logistics. She is an affiliated professor at HEC Montréal, Canada, and a collaborating member of the CIRRELT. She obtained her M.Sc. in industrial engineering from the Technion in 2006, and her Ph.D. in the same field in 2010 from the Eindhoven University of Technology. From 2012 to 2016 she was an assistant professor at the Department of Logistics and Operations Management at HEC Montréal. In 2016 she obtained the “Rita Levi Montalcini” fellowship for young researchers awarded by the Italian Ministry of Education, Universities and Research. In 2023 she received the Stella Dafermos Mid-Career Award from the Transportation Science and Logistics society of INFORMS. She is associate editor for INFOR: Information Systems and Operational Research, Transportation Research Part C: Emerging Technologies, and Transportation Science.



Monday
September 28th
12h00

ÉTS - Pavillon A
Dept. Génie de Systèmes
Room A-3644.1

Open to all
Pizza and coffee offered

Organizer:
Fausto Errico