Séminaire conjoint CIRRELT et Département GOL de HEC Montréal/
Joint Seminar between CIRRELT and the Department of Logistics and Operations Management (GOL) at HEC Montréal

CIRRELT

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AN EXACT METHOD FOR RELIABLE SHORTEST PATH PROBLEMS WITH CORRELATION

Abstract: Shortest path problems often arise in contexts where travel times are uncertain. In these settings, reliable paths are often valued more than paths with lower expected travel times. This has led to several variants of reliable shortest path problems (RSPP) that handle travel time reliability differently. We propose an algorithmic framework for solving RSPPs with nonnegatively correlated travel times and resource constraints. By building upon the flexibility of the pulse algorithm, our unified and exact algorithmic framework solves multiple variants of the RSPP: the α-reliable shortest path (α-RSP), the maximum probability of on-time arrival (MPOAP) problem, and the shortest α-reliable path (S-αRP). We derive a bound on the reliability of path travel times and incorporate three pruning strategies: bounds, infeasibility, and dominance, leveraging properties of the normal distribution and nonnegative correlation structures. Computational experiments on large-scale transportation networks (with up to 33,113 nodes and 75,379 arcs) demonstrate the framework's competitive performance, enabling potential real-world applications and extensions to other problems.

Bio: Andrés Medaglia is a Full Professor of Industrial Engineering at Universidad de los Andes and Director of the Center for Optimization and Applied Probability (COPA) in Bogotá, Colombia. With over 20 years of experience, he develops and applies optimization methodologies in transportation and logistics, healthy and sustainable cities, engineering design, and agricultural systems.

LUNDI / MONDAY

29 septembre 2025, 14h00
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Responsable / Organizer

Jorge Mendoza