



Séminaire conjoint CIRRELT / Chaire d'excellence « Data Science for Real-Time Decision-Making » et Chaire de recherche du Canada en analytique et logistique de soins de santé
Joint Seminar CIRRELT / Canada Excellence Research Chair in Data Science for Real-Time Decision-Making and Canada Research Chair in Healthcare Analytics and Logistics



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Discrete Nonlinear Optimization by State-Space Decompositions

Abstract: In this talk we will discuss a decomposition approach for binary optimization problems with nonlinear objectives and linear constraints. Our methodology relies on the partition of the objective function into separate low-dimensional dynamic programming (DP) models, each of which can be equivalently represented as a shortest-path problem in an underlying state transition graph. We show that the associated transition graphs can be related by a mixed-integer linear program (MILP) so as to produce exact solutions to the original nonlinear problem. To address DPs with large state spaces, we present a general relaxation mechanism which dynamically aggregates states during the construction of the transition graphs. The resulting MILP provides both lower and upper bounds to the nonlinear function, and may be embedded in branch-and-bound procedures to find provably optimal solutions. We describe how to specialize our technique for structured objectives (e.g., submodular functions) and consider three problems arising in revenue management, portfolio optimization, and healthcare. Numerical studies indicate that the proposed technique often outperforms state-of-the-art approaches by orders of magnitude in these applications.

Bio: David Bergman joins UConn after completing his Ph.D. in the Tepper School of Business at Carnegie Mellon University. His research interests lie in the area of operations research, and focuses on decision diagram-based optimization, but includes discrete optimization, integer programming, the integration of optimization techniques, and sports analytics.

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Salle / Room 5441
Pavillon André-Aisenstadt
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*Rafraîchissements offerts à la fin du séminaire.

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