Séminaire du CIRRELT

Pr. Alberto Locatelli

Department of Sciences and Methods for Engineering (DISMI)
University of Modena and Reggio Emilia, Italy

Mathematical Formulations for the Robust Bin Packing Problem with Fragility Constraints

Abstract: In the Bin Packing Problem with Fragility Constraints (BPPFC), we are given a set items, each item with a weight and fragility, and a large number of uncapacitated bins. The problem consists in packing all items into the minimum number of bins, ensuring that the total weight packed in any bin does not exceed the smallest fragility among the set of items assigned to the bin. This problem appears, for example, in the telecommunication field, where each call is characterized by a noise and a noise tolerance. Therefore, the assignment of calls to available channels cannot exceed the noise acceptance limit of the fragilest call in the channel. Considering the fact that the noise of the calls is not exactly known in advance, but typically belongs to a given interval, we address a variant of the BPPFC designed to represent data uncertainties affecting the weights. The resulting Robust Bin Packing Problem with Fragility Constraints (RBPPFC) uses a budgeted uncertainty set. To solve the problem, we proposed a compact mixed-integer linear programming model, an arc flow formulation based on the dynamic programming algorithm and a constraint programming formulation. To assess the efficiency of the models and compare them with each other, we have tested them on a set of adapted instances from the literature, identifying the methods that yield the best results.

Biography: Alberto Locatelli is an assistant professor at the Department of Sciences and Methods for Engineering (DISMI), University of Modena and Reggio Emilia. He holds a master's degree in Mathematics from the University of Padua, and in March 2023, he successfully completed his Ph.D. in "Industrial Innovation Engineering" at the University of Modena and Reggio Emilia. His research focuses mainly on the study, design, and experimental evaluation of algorithms for solving combinatorial optimization problems. Over the years, he has developed a particular interest in knapsack problems and tool switching problems. Additionally, he is exploring the integration of optimization algorithms with machine learning techniques to effectively tackle real-world scheduling challenges.

Mercredi
7 août 2024
10h00

Université Laval
Pavillon Palasis-Prince
Salle 2327

Ouvert à tous

Café et viennoiseries

Responsable :
Jean-François Côté