
A heuristic for a bi-objective large scale waste collection problem

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Abstract

In the last few years, the application of decision making to logistic problems has become crucial for public organizations. The search of efficient decisions might contribute in the achievement of different profits for a company, such as cost reduction, service improvement or duty schedules to mention a few. In the particular case of waste collection service, this task involves a set of economic, social, labor and environmental aspects, which implies a big effort from these companies that must provide a good service. Additionally to the problem's constraints, there is a need for optimizing different objectives that might come into conflict with each other. Therefore, we need to resort to a multiobjective approach to deal with this problem. As it is customary in multiobjective optimization, we do not have a unique solution, and we are seeking for a good approximation of the set of efficient solutions. In this paper, two different objectives are considered: to minimize the overall travel cost and to balance the driven routes. The resolution process has two steps: first, the bi-objective problem is transformed, using a reference point, into a mono-objective problem; and then, a metaheuristic strategy is applied. In particular, we consider the hybridization between a Greedy Randomized Procedure and Path Relinking. We explore different designs within both methodologies. The performance of this method is analyzed with its application to solve a real waste collection problem from a southern region of Spain.

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