

---

# The Bi-objective p-Center and p-Dispersion problem

Sergio Pérez-Peló<sup>\*1</sup>, Jesús Sánchez-Oro<sup>†2</sup>, Ana Dolores López-Sánchez<sup>3</sup>, and Abraham Duarte<sup>1</sup>

<sup>1</sup>Universidad Rey Juan Carlos [Madrid] (URJC) – Calle Tulipán s/n. 28933 Móstoles. Madrid, Spain

<sup>2</sup>Universidad Rey Juan Carlos (URJC) – Calle Tulipán s/n. 28933 Móstoles. Madrid, Spain

<sup>3</sup>Pablo de Olavide University – Spain

## Abstract

Location problems are strategically solved to place facilities having into account a set of customers that require a supply. Vehicle routing problems deal with design of routes among facilities and customers that must be served. The overall cost can be reduced if facilities are properly located even when both problems have been addressed independently. In this work, we address a bi-objective location problem whose aim is to place a set of  $p$  facilities. Note that we name  $p$  as open facilities and  $n-p$  as closed facilities. On the one hand, the p-Center problem seeks to locate  $p$  facilities in order to minimize the maximum distance between each closed facility and its assigned open facility. On the other hand, the p-Dispersion problem aims to maximize the minimum distance between all pairs of open facilities in order to achieve the maximum diversity among them. When both objectives are simultaneously tackled we are solving the bi-objective p-Center and p-Dispersion problem (BpCD). To solve the BpCD an Iterated Greedy (IG) heuristic is implemented. IG builds an initial set of efficient solutions using a greedy algorithm. Since we are addressing a bi-objective optimization problem, two different greedy functions are considered and the output is the set of non-dominated solutions or efficient solutions instead of the optimal solution. Then, the IG destroys a percentage of each efficient solution, that will be subsequently reconstructed and three local searches are applied to each reconstructed in order to improve them. Results show the performance of the algorithm.

**Keywords:** PDispersion, PCenter, Multiobjective, Facility Location, Iterated Greedy

---

\*Speaker

†Corresponding author: [jesus.sanchezoro@urjc.es](mailto:jesus.sanchezoro@urjc.es)