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

Juan David Quintana Pérez<sup>\*1</sup>, Jesús Sánchez-Oro<sup>†1</sup>, and Ana Dolores López-Sánchez<sup>‡2</sup>

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

<sup>2</sup>Pablo de Olavide University – Spain

## Abstract

In the logistic field is crucial to locate in an accurate way a set of facilities since this is going to optimize the routing cost among facilities and customers.

In general, in any location problem the aim is to place  $p$  facilities out of a candidate set of  $n$  facilities, where  $p$  is smaller than  $n$ . From now on, we refer to  $p$  as open facilities and  $n-p$  as closed facilities. Depending on the objective function that we want to optimize and the constraints that we include (capacitated or uncapacitated, discrete or continuous, among others), we can solve a wide variety of location problems.

As is well-known the  $p$ -Median problem seeks to determine the locations of  $p$  facilities in order to minimize the total distance between open facilities and their nearest closed facilities. The  $p$ -Dispersion problem aims to maximize the minimum distance between all pairs of open facilities in order to achieve the maximum diversity among the open facilities.

The bi-objective  $p$ -Median and  $p$ -Dispersion problem (BpMD) combines both objectives that are in conflict, being the goal to search for the set of non-dominated solutions or efficient solutions instead of the optimal solution.

To solve the BpMD we have implemented a Greedy Randomized Adaptive Search Procedure (GRASP) to construct the initial set of efficient solutions and then, we have combined the GRASP with Path Relinking in order to improve the set of efficient solutions. Computational results show the quality of our proposal.

**Keywords:** facility location, pdispersion, Maxmin diversity, pMedian partitioning, grasp, path relinking

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\*Speaker

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

‡Corresponding author: [adlopsan@upo.es](mailto:adlopsan@upo.es)