

ABSTRACT

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The next p -center problem with customers' preferences

The p -center problem is a classical discrete location problem that aims at selecting p out of n locations where to install centers so that the maximum distance between a user and its closest center is minimized. The *next p -center problem* assumes that centers can fail and then, the decision maker locates the facilities taking into account not only the closest center of each customer, but also a close second one.

This talk deals with an extension of the next p -center problem where customers' preferences and subsets of sites that each customer is willing to accept as service centers are considered. Since centers can fail, the decision maker assumes a risk-averse attitude so that he evaluates an alternative by the worst-case situation among the most preferred open centers for the customers. Therefore, this new problem aims at choosing at most p centers so that each demand point can visit at least two acceptable centers and the maximum sum of distances from any demand point to any of its preferred centers plus the distance from any of the preferred centers to any of the centers the user prefers once he is there is minimized.

We present three different mixed-integer linear programming formulations for the problem. We strengthen the formulations using valid inequalities and variable fixing criteria and we develop a heuristic algorithm to obtain valid upper bounds and to provide good quality solutions for large size instances. Finally, an extensive computational experience has been performed to assess the usefulness of the formulations to solve this new problem using standard MIP solvers.