A matheuristic for the $(r|p)$-centriod problem under L1 metric

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We consider the $(r|p)$-centroid problem under L1 metric. This Stackelberg game was first studied by Hakimi in 1981 [1] for location on a network. It's a well-known bi-level facility location problem, in which, two players, called the leader and the follower, open facilities to service clients. We assume that clients are identified with their location on the 2-dimensional plane, and facilities can be opened anywhere in the plane. The leader opens p facilities. Later on, the follower opens r facilities. Each client patronizes the closest facility. The distance between the clients and facilities is determined according to the $L1$ metric. In case of ties, the leaders facility is preferred. The goal is to find p facilities for the leader to maximize his market share.

While this problem is well studied in case of Euclidean metric, e.g. [2] and more , it's not the case for the Manhattan version. In this work we provide the complexity results concerning both the Follower's and the Leader's problem. In order to tackle the problem we propose an effective heuristic method combined with the mathematical programming techniques (a matheuristic). We discuss the results of the numerical experiments which was carried out on instances form the benchmark library "Discrete Location Problems" [3]

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References

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