Lagrangean bounds for Combinatorial Stochastic Facility Location-assignment Problems

Laureano F. Escudero[1] María Araceli Garín[2] Celeste Pizarro[3] Aitziber Unzueta[4]
[1] Universidad Rey Juan Carlos, URJC, Spain
laureano.escudero@urjc.es
[2] Universidad del País Vasco, UPV/EHU, Spain
mariaaraceli.garin@ehu.es
[3] Universidad Rey Juan Carlos,URJC, Spain
celeste.pizarro@urjc.es
[4] Universidad del País Vasco, UPV/EHU, Spain
aitziber.unzueta@ehu.es

Discrete facility location-assignment decisions often have long lasting effects. Frequently, such decisions can be planned as a set of sequential actions to be implemented at different moments of a given time horizon. Broadly speaking, multi-period location problems are related to the evolution of dynamic organizations and, in most of the cases, look for facility location and customer assignment decisions that fulfil certain coverage levels of demand points at each time period. There is a broad literature on the deterministic version of different multi-period facility location problems. However, there are not many works published in the open literature dealing with facility location problems under uncertainty. In this work we present an application of a matheuristic based on a pure 0-1 multistage scenario Cluster Decomposition approach for obtaining strong (lower in case of minimization) bounds on the solution value of large sized instances of the multi-period stochastic location problem. It sites facilities to locations and assigns customers to facilities under uncertainty (represented in a multi-period scenario tree) along a time horizon. It is well known that the general static deterministic location problem is NP-hard and, so, it is the multi-period stochastic version. As customary, the computing time required for solving the problem is unaffordable by plain use of IP optimizers. So, a decomposition methodology should be used. In our case we consider a specialization of the Cluster Lagrangean Decomposition for obtaining strong (lower) bounds on the problem that, in most of the instances we have experimented with, provides the optimal solution.

References

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