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Collection depots facility location problems

In the collection depots facility location (CDFL) problem, we are given the positions of two types of centers: clients and collection depots. Every client must be serviced by a vehicle dispatched from a service center (also called a facility). The itinerary of the vehicle begins and ends at the facility and must include the client and one collection depot. The cost of serving the client is proportional to the distance travelled by the service vehicle. The CDFL problem asks for an optimal placement of the facility (-ies) that minimizes some global function of the service cost for all clients.

We distinguish several types of CDFL problems depending on the objective function (center and median problems), the transportation model (planar with the Euclidean distance and network problems), and the number of facilities that are available (single or multi-facility problems). For the center problem we seek to minimize the service cost of the most expensive client, and for the median problem we need the smallest total service cost. If every client location is equipped with a collection depot, then the CDFL problem becomes a standard facility location problem where the service cost is proportional only to the distance between the facility and the client. Therefore, the CDFL problem is at least as hard as the classic versions of the center and median problems.

In this presentation, I will review a set of results on the CDFL problem recently obtained in our group, which illustrate the difficulty of CDFL compared to the standard location model. In addition to finding efficient algorithms for certain new problems, our techniques are very interesting theoretically because they are generalisations of standard approaches which may prove useful to other problem types.

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