STOCHASTIC COMPETITIVE FACILITY LOCATION PROBLEM WITH QUANTILE CRITERION [1]

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We suggest a statement of stochastic facility location problem as a discrete bilevel stochastic programming problem with quantile criterion [1]. There are two players (the leader and the follower) in the problem. They sequentially locate facilities to get the largest income from customers. The facility locations in a finite set of feasible points are leader's and followers's variables. The follower locates own facilities knowing a leader's variable. The leader takes into account an optimal value of the follower's variables to locate own facilities. If the optimal follower's variable is not unique, the leader takes into account a worst one from the own point-of-view, i.e. we consider the pessimistic position. Unlike problem [2], the demand for goods is assumed to be random. We suppose that the leader knows only the distribution of the random demand but the follower takes decision knowing the demand exactly. The quantile of the leaders's income (Value-at-Risk) is considered to be the objective function of the problem. The quantile is the income guaranteed with fixed probabilily.

In case of a discrete distribution of the random demand with finite number of realizations we suggest a method to reduce the problem to a deterministic bilevel programming problem using complementary binary variables.

We suggest a method to compute the value of the objective function for a fixed leader's varible and methods to compute lower and upper bounds of the optimal value of the objective function. We build an algorythm to search a suboptimal solution of the problem based on a local search with random initial points. The opportunity to search the exact solution is discussed.

Large numerical experiment is made to show the quality of the bounds of the optimal value of the objective function and accuracy of the solution obtained with the algorythm.

REFERENCES

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[1] The research is supported by RFBR (project 14-07-00006 A).