

Bilevel programming, pricing problems and Stackelberg games

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A bilevel optimization problem consists in an optimization problem in which some of the constraints specify that a subset of variables must be an optimal solution to another optimization problem. This paradigm is particularly appropriate to model competition between agents, a leader and a follower, acting sequentially. In this talk I will discuss two such problems.

In the first one, called the network pricing problem, tolls must be determined on a specified subset of arcs of a multicommodity transportation network. The leader or first level corresponds to the profit maximizing owner of the subset of arcs and the follower to users traveling at minimum cost between nodes of the network.

The second problem, called the Stackelberg bimatrix game, involve a party with the capacity of committing to a given action or strategy, referred to as the leader, and a party responding to the leader's action, called the follower. The objective of the game is for the leader to commit to a reward-maximizing strategy anticipating that the follower will best respond.