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Interdiction and Blocking Problems

Interdiction games are a special class of bilevel optimization problems whose aim is to model monitoring or halting of an adversary's activity in a given environment.
They are used to model defender-attacker sequential games in which an attacker (also known as a follower) optimizes some objective such as a shortest path or a maximum flow in a network, or a maximum profit of a subset of items that can be packed in a knapsack.
A defender, also known as a leader, has limited resources to protect the environment, e.g., by disabling the vertices/edges in a network or by changing their capacity, or by removing the knapsack items, to achieve the worst possible outcome for the attacker.
Interdiction problems (and their blocking counterparts) are very important in controlling the spread of infectious diseases, spread of fake news in social networks, in counterterrorism or in monitoring of communication networks.
In our lectures, we will review some basic modeling concepts (discrete versus continuous interdiction) and we will discuss algorithmic approaches based on duality reformulations and Benders-like cutting plane approaches.
Interdiction problems under uncertainty (stochastic versus robust) will be introduced as well.