

Routing Unmanned Air Vehicles under Multiple Objectives

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Abstract

Unmanned Air Vehicles (UAVs) are widely used for military and civilian purposes. The vehicle typically visits several targets during a mission. Under a single objective, such as minimizing the distance traveled, the UAV routing can be modeled as a traveling salesperson or an orienteering problem. In this talk, we will address the UAV routing problem under multiple objectives. When there are two or more objectives, there can be many efficient trajectories that may be followed between target pairs, each performing better than others in some objectives. There are many efficient tours that use some combinations of these efficient trajectories. Choosing a tour requires making trade-offs between different objectives. We consider traveled distance and detection threat objectives to characterize efficient tours for discrete and continuous terrains. We develop approaches to aid route planners in choosing preferred solutions. We also consider different versions where the UAV needs to be routed in real-time in a dynamic environment and where the set of targets to be visited is also part of the decision to be made, with the additional objective of collected information.