IE Decision Systems Engineering Fall '19 Seminar Series

Friday, November 1st | 12PM | BYENG 210

"A Team Orienteering Problem for Fixed-Wing Drones"

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Abstract

Over the past decade, vehicle routing problems (VRPs) involving drones have garnered tremendous attention in academia and industry due to their rapidly growing applications in delivery, healthcare, monitoring, sensing, mapping and surveillance. Drones available in the market can broadly be classified into rotary drones and fixed-wing drones. The latter can reach higher altitudes, carry a heavier payload and travel longer distances than rotary drones. However, unlike rotary drones, they have kinematic constraints associated with them, thereby preventing them to make on-the-spot turns and restricting them to a minimum turn radius. This makes route planning with such drones much more complex than solving traditional VRPs. In this work, we formulate a team orienteering problem with multiple fixed-wing drones. We present the implications of kinematic constraints on the drone routing problem formulation and propose a systematic technique to address them. Further, we propose a novel branch-and-price algorithm with acceleration schemes and branching techniques specific to these constraints. We also present computational results corroborating the effectiveness of our algorithm using benchmark instances.

Biography

Sujeevraja Sanjeevi is a Team Lead Operations Research Developer in the Airline Solutions Product Engineering team at Sabre. He has 5+ years of experience in building optimization solvers for airline disruption management. He currently leads the development of "Recovery Manager Ops", an optimization solver offered by Sabre for aircraft schedule recovery. He has also worked on crew recovery in the past. His research interests include deterministic and stochastic large-scale optimization with applications in airline scheduling and vehicle routing, and the development of cutting planes for linear and non-linear mixed integer programming problems. He received MS and PhD degrees in Industrial Engineering from Texas A&M University, and is a member of INFORMS. Further details can be found on his personal webpage.

(https://sujeevraja.github.io).

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