An Arc Routing Problem with a fleet of drones

Isaac Plana[*†1], James Campbell[2], Angel Corberán[1], José Maria Sanchis[3], and Paula Segura[1]

[1]Universidad de Valencia – Spain
[2]University of Missouri-St. Louis – United States
[3]Polytechnic University of Valencia – Spain

Abstract

Here we present an arc routing problem where a fleet of drones is available and, considering that the autonomy of the drones is restricted, the length of the single routes is limited by a maximum distance. Some applications for drone arc routing problems include traffic monitoring by flying over roadways, infrastructure inspection such as by flying along power transmission lines, pipelines or fences, and surveillance along linear features such as coastlines or territorial borders. Unlike the vehicles in traditional arc routing problems, drones can travel directly between any two points in the plane without following the edges of the network. Therefore, a drone route may service only part of an edge, with multiple routes being used to cover the entire edge. For this problem, we propose a matheuristic algorithm and present an Integer Linear Programming formulation. A preliminary branch-and-cut algorithm is also introduced and some computational results are presented.

Keywords: drones, arc routing, distance constraints, matheuristic, branch and cut

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[*]Speaker
[†]Corresponding author: isaac.plana@uv.es