

The Multi-Depot Drone General Routing Problem

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Unlike ground vehicle routing problems, drone routing problems are characterized by the fact that drones can enter and leave the edges at any point and can serve only part of them. Therefore, the service of an edge can be done by several drones, making an already difficult problem much harder.

As with other drone routing problems, we discretize the one we study here by adding a set of intermediate points to each original edge, obtaining then an arc routing problem where a set of edges has to be traversed. Furthermore, we consider here that a set of vertices has also to be visited, getting a general routing problem. The problem can be defined as follows. Given a set of depots, each one with a drone, and a set of edges to traverse E_R and vertices to visit V_R , the Multi-Depot Drone General Routing Problem consists of finding a route for each drone such that they jointly serve all the edges and vertices of E_R and V_R with minimum total cost. The drones have to return to the depot from which they started and must satisfy limited capacity and autonomy constraints.

In this talk, we present an integer linear programming formulation and a metaheuristic algorithm for the Multi-Depot Drone General Routing Problem. The algorithm consists of creating solutions and improving them with a local search procedure. The proposed local search method is a variable neighborhood descent consisting of 4 neighborhoods. Each one of them tries to reduce the cost of the solution by trying to change the position of the edges or vertices visited within the same vehicle or a different one. Extensive computational results on a set of instances with different characteristics will be presented.