A Column Generation Approach for Coordination and Control of Multiple UAVs

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Abstract: In this work, we consider the problem of autonomous task allocation and trajectory planning for a set of UAVs. This is a bi-level problem: the upper-level is a task assignment problem, subjected to UAV capability constraints; the lower-level constructs the detailed trajectory of UAVs, subjected to dynamics, avoidance and dependency constraints. Although the entire problem can be formulated as a mixed-integer linear program (MILP), and thus it can be solved by available software, the computational time increases intensively. For solving more efficiently this problem we propose a new approach based on the column generation method. Then, the two branching techniques will be investigated in order to obtain a branch-and-price scheme for this problem. The efficiency of our approach is evaluated by comparing with solution given by CPLEX on different scenarios.

Keyword : Unmanned aerial vehicle, Task allocation, Trajectory design, Column generation, Mixed integer linear programming.

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