

Fast heuristics for wildfire initial attack

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Abstract—Wildfire is a major issue worldwide. Addressing its negative impacts requires contributions of many disciplines, including those related to decision making.

In this presentation, we represent wildfire propagation as a spread phenomenon in a network derived from actual landscapes through their topologies, fuels and wind scenarios.

We consider the problem of dispatching, routing and positioning firefighting resources in order to minimise the fire growth rate and, in a second level, the cost of the resources that are effectively used.

Different aspects of the problem are considered, such as the movement of the resources (both terrestrial and aerial) in different networks (e.g. of roads/paths) and safety considerations.

In a practical setting, landscapes with a reasonable size and resolution may result in large networks and, consequently, in large mathematical programming models difficult to solve directly. In this work, we propose a set of heuristics based on decomposing the original problem in subproblems made of subsets of the available resource units.

We present computational results for the heuristics on instances derived from real landscapes.

Keywords—Wildfire suppression, optimisation, networks, mixed integer programming, heuristics