
Allocating and Transporting Resources to Demand-Locations

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Abstract

Imagine a scenario where we have a limited number of *resources* and a number of *demands* for these resources. For each resource, we know its present location and the point in time at which it will become available. For each demand, we know the resource it needs. We also know when, where and for how long it needs that resource. Furthermore, a resource could be compatible with other resources. This means, a demand for a particular resource could also be satisfied with one of the resources compatible to it.

Now place the scenario mentioned above in a dynamic, online setting. That is, the demands come in over time, some resources stay a bit longer at their current location, and some other resources need a break. So given this dynamic situation, the problem we tackle is to first (re-)allocate the available and soon to be available resources to as many demands as possible, and thereafter to suggest a way to transport the allocated resources to their demand-locations by solving a vehicle routing problem with pickups and deliveries (VRPPD).

We present a rolling horizon framework that solves this problem repeatedly and economically. Based on the current situation, including the status of vehicles, our framework can create new routes and update existing routes as well.

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