A column generation approach for multi modal operational transportation planning

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Abstract

We address the problem of operational transportation planning in a multi modal context. In this problem customer requests have to be transported from a set of pickup locations to a set of delivery locations, whereby the pickup and delivery locations are paired. Along their trip, customer requests can either be transported completely by truck, or use the truck just for the first- and last-mile and use another (or several other) mode of transportation for the long haul. We consider rail and water transport for the long haul, and thus the transshipments can take place either at a port or a train station. Furthermore, we consider time windows at the pickup and delivery locations, and allow for split loads. The fleet of long haul vehicles (i.e. ships and trains) is fixed for the planning horizon, whereas an unlimited supply of trucks is assumed. The objective is to minimize the sum of transportation cost (fixed and variable cost of all vehicles) and transshipment cost. We solve this problem with a column generation approach, where the pricing problem is solved in a heuristic fashion.

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