The PDP with alternative locations and overlapping time windows

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Abstract

Sending and receiving parcels can be a nuisance in both a B2C and C2C settings. Public post services or commercial shipping companies are not very accommodating for private mail by enforcing personal visits at pickup or drop off points, or simply by maintaining rigid schedules. Courier services on the other hand are often too expensive. None of these options are sufficiently accommodating. Therefore we propose the PDP with alternative locations and overlapping time windows. The transportation requests have to be served by a fleet of homogeneous capacitated vehicles, and each request may have multiple alternative pickup locations throughout the day with non-overlapping time windows (since the product cannot be in two places at once). Request may also have multiple alternative delivery locations, since the parcel is no longer delivered to a single specific person, but rather to a 'household'. A household consists of multiple persons in different locations that can be available simultaneously. Household members can accept the parcel at multiple locations throughout the day whether they are at work or at home.

We propose a solution approach combining a genetic algorithm and large neighbourhood search with problem specific operators to solve the pickup and delivery problem with alternative locations. Preliminary computational results are discussed and a comparison with already existing literature is provided.

Keywords: PDP, Genetic algorithm, Large Neighborhood Search

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