
A Large Multiple-Neighborhood Search for Order Management in Attended Home Deliveries

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Abstract

In recent years, more and more online retailers offer deliveries within tight customer time windows. Customers typically select a delivery time window within the checkout process, and online retailers engage logistics service providers to carry out the deliveries. As a result, logistics service providers have to decide quickly whether they can fulfil a particular delivery request. In order to ensure their economic success, logistics service providers need to maximize the number of accepted deliveries while guaranteeing feasibility for a limited number of delivery vehicles. This problem can be modelled as a Dynamic Vehicle Routing Problem with Time Windows. In recent years, the focus for solving such problems has been on complex anticipatory approaches. These approaches require a predictable environment as well as a sufficient amount of historical data. Since this is not always given, we examine whether and under which conditions a myopic approach can compete with anticipation methods. We propose a Large Multiple-Neighborhood Search and, as a benchmark for perfect anticipation, implement a hindsight approach based on an Adaptive Large Neighborhood Search. The evaluation and comparison of these approaches is based on extensive computational simulation using the historical order data of a large German online retailer.

Keywords: Large Multiple Neighborhood Search, Dynamic Vehicle Routing Problem with Time Windows, Attended Home Deliveries

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