
Flexible Time Window Management for Attended Deliveries

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Abstract

With the ongoing boom in e-commerce, many retailers offer tight delivery time windows to fulfill customers' expectations of high-quality delivery. After choosing products on an e-grocer's website, for example, customers conclude their booking with selecting one of the offered time windows, which are often as tight as one hour. While customers usually prefer tight delivery time windows, it is well known that these can cause high costs of delivery, because they restrict the underlying routing problem heavily. However, adapting the length of the offered time windows to the current flexibility of the route plan might alleviate this problem.

In this presentation, we investigate flexible time window management to enable more effective routing of attended deliveries with limited transportation resources. Extending customer acceptance mechanisms from the literature, we vary the length of time windows in the course of the booking horizon, considering that the acceptance of an order request can restrict the ability of accommodating future requests significantly. We make the length of a time window depend on customer status (premium/non-premium), time of request relative to the booking horizon (early/late), as well as spatio-temporal routing characteristics (proximity to current routes).

We investigate the impact of these ideas on the number of served customers given the demand structure of order data from an e-grocer in Berlin, Germany. To this end, we build routes iteratively and analyze the trade-off between a large number of high-quality delivery options and the retailers' need to serve as many customers as possible.

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