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Time and location: 11:00 a.m.-12:00 p.m. on Wednesday, July 13th, 2022; Room S121 PBB

Title: Machine Learning-Based Feasibility Checks for Dynamic Time Slot Management

Abstract: In e-grocery, the customer must be at home to receive the bulky and temperature sensitive goods. Online grocers usually offer a menu of delivery timeslots for customers to choose from. They aim to only offer those time slots that allow for a timely delivery given the available vehicle capacity. Therefore, to ensure a reliable service, the retailer may want to close certain time slot options as capacity fills up. Which customers can be served in each time slot largely depends on the specific order sizes and delivery locations. Conceptually, checking whether it is possible to serve a certain customer in a certain time slot given a set of already accepted customers involves solving a vehicle routing problem with time windows. This is challenging in practice as there is little time available as e-grocers strive for almost instant response times. We explore the use of machine learning to support time slot decisions in this context. Our results on realistic instances using a commercial route solver suggest that machine learning can be a promising way to assess the feasibility of customer insertions. On large-scale routing problems it performs better than insertion heuristics.