



Research School for Operations
Management and Logistics

Use Machine Learning to solve stochastic vehicle routing problems

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As e-commerce continues to grow, the logistics of moving products along the last leg from warehouses to end-customers has become more important and complex. The market is highly competitive, volumes increase and customers expect faster, on-demand deliveries, 7 days a week. As of 2022, the USA e-commerce retail market is expected to grow to a staggering US\$ 638 billion, from US\$ 409 billion in 2017 [Statista 2018]. Similar growth rates are reported for Europe. To cope with this growth in expected volume, the capacity of last-mile delivery systems will have to expand significantly.

The focus of this particular project is on e-fulfillment, which collectively denotes warehousing operations, last-mile delivery and their interdependence. Within the context of e-fulfillment, we study data-driven optimization. Key to this research is the question how data can be used to make better decisions. Data from various sources is available in abundance: sensor and tracking data (IoT), demand, traffic and weather forecasts, etc. It however remains largely unclear how this data can be used effectively to improve e-fulfillment. Consequently, the main goal of this project is to develop data-driven optimization techniques to improve efficiency in e-fulfillment, while reducing costs, increasing customer satisfaction, and lowering the ecological impact.