Professorship of Operations and Supply Chain Management
TUM School of Management
Technical University of Munich

The Vehicle Routing Problem With Truck Platooning

Recent developments in automated driving technologies allow trucks to travel (semi)-autonomously when forming a so-called platoon, where several trucks drive close to each other, linked via wireless communication. Within such a platoon, only the first truck is steered manually while following vehicles drive autonomously according to the leading truck's actions.

This concept allows for lower operational costs by i) saving fuel as aerodynamic drag is reduced significantly for follower vehicles, and ii) by increased vehicle/labor utilization as relaxed hours of service regulations apply to drivers not actively steering a vehicle.

Efficiently exploiting such platooning concepts requires careful planning for logistics service providers as truck routes need to be synchronized. This often involves accepting non-optimal routing decisions, e.g., waiting for a platooning partner or accepting detours may provide a worthwhile trade-off when platooning is possible.

Aims and scope of the thesis
This thesis aims to investigate the benefit of considering platooning opportunities from the perspective of a logistics service provider operating a fleet of long-haul trucks. This comprises the following tasks:

- Formulation of a mathematical model for a vehicle routing problem with platooning opportunities
- Development and implementation of a scalable solution approach, e.g. a (meta-)heuristic
- Generation of a suitable dataset
- Evaluation of the benefits truck platooning provides over conventional vehicle routing

Requirements
This thesis targets students of the TUM-BWL (with a major in Supply Chain Management), Management & Technology, Informatics, Engineering, or similar study programs. Knowledge of mathematical programming, optimization, and a general-purpose programming language (e.g. C++, Java, Python) is required. Prior participation in one of the courses offered by the chair (i.e. Modeling Future Mobility Systems, Advanced Seminar) is recommended. The thesis should be written in English.

Related Research
- Bhoopalam, A. and Agatz, N. and Zuidwijk, R. (2018): Planning of truck platoons: A literature review and directions for future research. In: Transportation Research Part B: Methodological, Volume 107, 2018, Pages 212-228.
- Stehbeck, F. (2019): Designing and Scheduling Cost-Efficient Tours by Using the Concept of Truck Platooning. In: Junior Management Science, Volume 4, Issue 4, Pages 566-634.

Begin: as soon as possible

Advisor: Patrick Sean Klein

Application: See `https://www.osm.wi.tum.de/education/masters-thesis/`