CIRRELT

Séminaire conjoint / Joint Seminar

CRI²GS (Centre sur l'intelligence² en gestion de systèmes complexes)
École des sciences de la gestion (ESG) - UQÀM

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A Network Design Approach for the Restricted Truck Platooning Problem

Abstract: Advances in autonomous driving technology have fostered the idea of truck platooning. Thereby, several trucks drive in close succession, connected by a data link, thus exploiting the reduced air drag due to the predecessor's slipstream. This cooperative transportation mode allows for fuel savings by up to 14% for the trailing trucks, which can help to reduce transportation cost and pollution. In line with the sustained growth of interest in truck platooning, research on extensions and solution approaches to the MIP formulation of the combinatorial problem of routing and scheduling trucks under the option of platooning (called the *Truck Platooning Problem*) has been steadily increasing. However, most of the numerical studies were conducted on small problem instances and only few papers take into account realistic assumptions like drivers' wages or a maximum platoon size. In this work, we address the *day-before tactical planning problem* for routing and scheduling trucks. That is, we assume that there exists a platform where all carriers register their trips up to a certain cutoff date. Out of these trips, the platform creates platoons and returns to the carriers the trucks' individual routes and schedules for their tour. Since we look at long distance trips, we consider legal regulations on driving times as well as break times and daily rest periods. We formulate this problem as a MIP on a time-expanded two-layer network and call it the *Restricted Platooning Problem* (*RPP*). In a pre-processing step, we reduce the problem size by exploiting characteristics like the trucks' time windows or maximum fuel savings. This allows us to solve RPP-instances of considerable size to optimality. In order to solve instances of larger sizes (e.g. the European or North American highway network), we focus on decomposing the problem into smaller sub-problems that are easier to solve. In our numerical study, we aim at gaining insights regarding the efficiency of this decomposition approach, the value of centralized planning and the sensitivity to different parameters of the model.

Note : Szymon Albinski is a PhD student at the Logistics and Supply Chain Management Department of the School of Management. He is doing an internship at CIRRELT, under the supervision of Professor Teodor Gabriel Crainic. http://www.log.wi.tum.de/team/albinski/ | szymon.albinski@tum.de

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Ouvert à tous / Open to all

Organisateur / Organizer
Teodor Gabriel Crainic

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