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Unraveling Interlocking Vehicle Trajectories Towards Antwerp's Largest Bottleneck

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Preface

> "You have brains in your head, you have feet in your shoes
> you can steer yourself, any direction you choose
> you are on your own and know what you know
> and YOU are the guy who'll decide where to go"
> - Dr. Seuss, Oh, the places you'll go -

'Science arose from poetry, when time changes the two can meet again on a higher level as friends', this is a quote credited to Johann Wolfgang van Goethe, a famous German scientist and poet. This quote expresses neatly why I started the preface with a small poem, because to me, this form of art shares many similarities with mathematics. Both have rules and constraints, and it is through those constraints that we can express creativity. Therefore, I think "Oh, the places you'll go" is a most suitable poem to start a thesis concerning vehicle trajectories. Not only does this poem portray a story of personal growth, but it tells a tale of all the hardships that must be overcome throughout a journey. In the same way, I have personally grown during this last year, as a researcher, and as a person as well. Nonetheless, I recognise that I still have a long road ahead of me, but I finally think I'm heading in the right direction. The only part that I disagree with in this verse, is the fact that I had to make this trip completely on my own. There are various people involved which I would like to express gratitude towards for granting me the opportunity to follow this passion and help me complete this project.

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Contents

Abstract

This thesis provides a model to optimise vehicle trajectories, given a highway layout and a demand for trajectories that must be optimised. This model considers heterogeneous traffic, and is a mixed integer linear model. It can be used to analyse several aspects of traffic driving behaviour, but a focus is put on lane changing behaviour. The difference between cooperative driving behaviour and selfish driving behaviour is consequently analysed. This selfish behaviour can then be corrected to solve undesired characteristics, in particular the behaviour around a merging segment does not leave feasible gaps for vehicles to merge. One of the most important conclusions is that optimal behaviour is not uniquely defined, but can take many different forms which perform equally well.