

Cognitive modelling of human behaviour for interactions between human drivers and autonomous vehicles



Automated vehicles (AVs) are penetrating the roads fast. As they are unlikely to fully replace human drivers in the foreseeable future, AVs will need to interact with other human drivers. For this reason, it is now more important than ever to understand the behaviour of human road users, so that AVs can predict how humans around behave, and incorporate these predictions in its motion plan in real time. The main challenge is that human drivers might adapt and change their behaviour when interacting with AVs compared to when interacting with conventional vehicles, and therefore understanding this behavioural adaptation is crucial.

In this project you will explore how the models of human cognition established in cognitive science and neuroscience (for instance, evidence accumulation models of decision making) can be applied for explaining and predicting the behaviour of human drivers in stereotypical traffic interactions with AVs (for example, lane merging on highway or overtaking). Since obtaining data from the field is challenging at this stage, you will utilize a driving simulator for this purpose. The experiment design and simulator experiment have been established. Your task will concentrate on executing the experiment, collecting the data, and developing and estimating the cognitive model.

The project can include (but not limited to):

- Studying the literature on 1) human driver behaviour and 2) models of human cognition
- Conducting the human factors experiment in a driving simulator and analysing the data
- Developing and estimating a cognitive model of human driver's decision making
- Validating the predictive power of the model for real-time prediction of human behaviour

Requirements:

- Interest in human factors research
- Proficiency in Python

For more information and details on this proposed project please contact the supervisors below.

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