

## VACANCY: Short term prediction – hybrid approach

### ABOUT GOUDAPPEL

At Goudappel and Dat.mobility we are experts in the field of mobility. We connect our expertise on integrated solutions for the journey of today and the world of tomorrow. We contribute to accessibility, quality of life, safety, sustainability and economic vitality in the Netherlands and abroad.

Within our organization, we think highly of students and attach great value to interns and graduates. New ideas arise and innovative research is carried out by the new generation of mobility experts. This keeps our organization fresh and ensures that knowledge can be shared. In addition, your internship or graduation theses can be an interesting start to your career. You might be our future colleague!

### INTRODUCTION

In traffic management the main challenge is to make the step from adaptive traffic management with no cooperation between public (i.e. road authorities) and private parties providing mobility services (e.g. MaaS, information services, route guidance, etc.) towards anticipated traffic management and with cooperation on network level. To achieve this, it is essential that future traffic states can be predicted for all circumstances, i.e. highways, urban and provincial networks, and for regular and non-regular conditions. Existing research has been mainly on data driven machine learning algorithms (non-parametric models like (deep) neural networks and Bayesian networks) like long short-term memory neural networks. Although such methods only use a small number of parameters, focus on the huge increase of data availability and better performance in scalability, they have some serious deficiencies which reduces the applicability of such methods in practice (e.g. flexibility, coping with incidents, fusion of various data sources and coping with missing data, interpretation or impact assessment of measures). Hybrid approaches combining data driven and model based approaches can be used to overcome

these deficiencies. Goudappel develops such short term prediction models and wants to further improve and extend these models.

## **PROBLEM DESCRIPTION**

Model based approaches in which real-time data is fused with a real-time simulation model are valuable and in general capable to provide short term predictions in which non-regular traffic conditions can be taken into account. However, after a certain amount of time (typically after 60 minutes depending on conditions) or during regular traffic conditions the added value of a model based approach becomes less and also less relevant in practice, compared to data driven approaches. The usage of a fully data driven approach is of interest to extend the prediction horizon especially regarding the scalability. However, in what way can these approaches be combined (outcome or methodology (also see vacancy correction module) to produce a consistent prediction (i.e. fusion and switch), producing the best possible prediction for all time horizons.

## **RESULT / OBJECTIVE**

The development of an hybrid approach fusing model driven and data driven prediction models in a consistent way.

## **ASSIGNMENT**

Develop a suitable data driven prediction model and fuse this model or the outcomes of this model with the existing model based prediction model. For this purpose the living lab of Deventer can be used providing an operational system and historical data.

## **INFORMATION**

When interested in this internship assignment please contact: Tineke School or Luc Wismans [tschool@dat.nl](mailto:tschool@dat.nl) or [lwismans@goudappel.nl](mailto:lwismans@goudappel.nl).

More information on Goudappel and DAT.Mobility can be found via [www.goudappel.nl](http://www.goudappel.nl) and [www.dat.nl](http://www.dat.nl).