

Deep learning for abnormal driving behaviour detection



Problem description

Abnormal driving behaviours which bring great uncertainty to the traffic, may lead to accidents causing serious danger to both the driver and the public. To ensure traffic safety, accurate identification and detection of abnormal driving is vital which can also help to evaluate the drivers' driving style and alert surrounding vehicles. Furthermore, detecting and removing abnormal driving behaviours from naturalistic driving data would be the prerequisite step for imitate training of a human-like driving model. Existing abnormal driving detectors are mainly based upon shallow supervised learning, which require large amount of labelled data. Usually, there is plenty of normal driving data available, while collecting data involving abnormal driving is difficult and even dangerous. So, how to make use of available data to train a model able to detect potential upcoming abnormal samples would be a meaningful and yet a challenging task. The aim of this research is to explore possible deep learning architectures to identify potential abnormal driving behaviours using open-sourced datasets. Rough pipeline is already available within the TTS Lab research group, and could be polished regarding the interests of the Master student. For this thesis, a research intern at Netherlands Organisation for Applied Scientific Research (TNO) is possible.

Assignments

- Review literature regarding abnormal driving behaviours' definition and detection;
- Review state-of-the-art DL methods for abnormal detection, methods could be from other fields e.g., CV, NLP;
- Based upon literature review, define the abnormal driving behaviours you would like to tackle (open-source data and references are available);
- Screen out DL architectures and methods suitable for identifying abnormal behaviour in selected driving tasks;
- Implement, validate, and compare the selected abnormal detection methods with baseline models, using open-source datasets (e.g., SPMD, SHRP2, highD);
- (Optional) High quality publication is possible and highly encouraged!

Requirements:

- Experienced in Python and TensorFlow/Pytorch;
- Familiar with DL/ML/CV;
- Prior knowledge and experience of abnormal detection, and/or DNNs would be a high priority but not a must.

Research group

Transport & Planning

Thesis supervisors:

Daily supervisors: Dr. ir. Haneen Farah; Yongqi Dong

External supervisor: Researcher from TNO

Information

For further information on this Master topic, please contact: h.farah@tudelft.nl; y.dong-4@tudelft.nl

