

# MASTER THESIS

## Hybrid Deep Reinforcement Learning for Multi-Pedestrian Intention-Aware Navigation of Autonomous Cars



The aim of this Master Thesis is to investigate the combined use of social relation detection between pedestrians with deep reinforcement learning for collision-free navigation of autonomous cars in critical traffic scenarios.

To this end, the thesis develops a method for socially aware multi-pedestrian path prediction (intention estimation) such as SS-LSTM for moving ego-view of a car simulated in OpenDS5. Special focus is on the visual and semantic detection of social interaction factors (e.g. for joint awareness and behavior correspondences) of observed pedestrians across the street. The thesis examines the integration of this extended multi-pedestrian intention estimation method with selected method of deep reinforcement learning for collision-free navigation of the autonomous car. The comparative experimental evaluation of social relation detection and navigation behavior shall focus on given initial set of critical traffic scenarios simulated in OpenDS5 with pedestrians and car modelled with DFKI's AJAN agent engineering tool.

Requirements:

- Basic proficiency in programming (e.g. Java, Python, Deep Learning frameworks such as TensorFlow)
- Basic knowledge on AI, ML including deep learning, semantic Web (RDF/S, OWL)

OpenDS: <https://opens.dfki.de>

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