# Reinforcement Learning Based Vehicle Drift Motion Control System For Self-Driving Vehicle

Master Thesis Abstract

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Research into self-driving vehicles has become increasingly popular in recent years. Combined with artificial intelligence techniques, this is a good area for research due to the current trend of positive results from applications. In the field of data science, reinforcement learning has proven to be a powerful approach to motion control problems, including various robots, autonomous systems, and video game AIs (such as chess, GO, etc.).

Drifting is a driving technique where the driver deliberately oversteers while maintaining the direction of the turn. During the movement, the rear wheels slip, while the front wheels point in the opposite direction of the curve of the turn. This is a very challenging control technique, which makes it very important and interesting to implement with artificial intelligence-based control and has great potential for extending the accident avoidance capabilities of self-driving vehicles.

This thesis reports on new research results, the focus of which is the development of reinforcement learning-taught self-driving agents whose task is to perform a specific drifting maneuver in a MATLAB/Simulink simulation environment. One of the primary goals is to prepare the agents' capabilities for real-world zero-shot transfer testing, which would be a new milestone compared to the current state of the art. The thesis also presents a new adaptive exploration method developed for tabular Q-learning, which is also applied here for the training of self-driving agents. In addition, it presents results on the use of discrete space RL algorithms to solve the inherently continuous task of drifting, a unique achievement in the current scientific literature.