

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

Abstract

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Self driving vehicles have become a more and more popular field of research in the recent years. Combined with the techniques of the Artificial Intelligence, the current tendency of positive results in applications are making this a good area to focus on research. Also, in the field of data science, Reinforcement Learning proved to be an efficient approach for motion control problems, including different kinds of robots, self operational systems and video game AI's (like chess, GO,...).

Drifting is a driving technique where the driver intentionally oversteers, with loss of traction, while maintaining control and driving the car through the entirety of a corner. During the motion, the rear tires are slipping while the front wheels are pointing toward the opposite direction of the turn. This is a very challenging motion to control, making it very important and interesting to implement through using Artificial Intelligence and self control.

This bachelor thesis reports new research results which main goal is to develop a self driving agent for drift motion control through simulation. We wanted the vehicle to be able to enter and stay in a drift state, using state of the art methods from the field of Reinforcement Learning.

We achieved our goal with splitting it into two subgoals, so we have two individual Soft Actor-Critic agents: one is able to stay in the target drift state once the vehicle enters a certain environment of the target state, and the other is able to approach the target state from a left turn state. We can assume that these two agents may be able to work together in sequential order to get the vehicle in and stay in the target drift state.

Relatively recent scientific findings in this field have shown that the use of preliminary data based on a human driver's abilities may not be ruled out to solve the task. However, our results show that the problem can be solved without the need for such prior knowledge.