INFORMATICS INSTITUTE OF TECHNOLOGY
In Collaboration with
UNIVERSITY OF WESTMINSTER

Learning Socially Compatible Autonomous Driving

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2019783 – w1790259

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Submitted in partial fulfilment of the requirements for the BEng (Hons) Software Engineering degree at the University of Westminster.

May 2023

ABSTRACT

In order to recognize and react appropriately to the driving intentions of human drivers, autonomous vehicles (AVs) must conduct extensive assessments. The inability of AVs to recognize the signs of cooperation offered by human drivers can have a negative effect on the transportation system by causing safety and efficiency issues.

This study presents an architecture that integrates social psychology factors into the framework of AVs in an effort to offer a viable solution to this challenge. The main findings make use of social value orientation (SVO), a method for predicting driving behavior and evaluating the degree of cooperation among human drivers. An architecture based on deep reinforcement learning (DRL) with SVO integration was used to model social compatibility among road agents while taking safety regulations into consideration.

To address the aforementioned concern, this study creates an architecture capable of capturing motion-controlling and socially compatible controls, performing well in complex interaction scenarios, and operating in accordance with the actions of other drivers. SVO integration proved to be an effective method of improving motion and interactive behaviors. Furthermore, the defined mechanism has a significant outcome when compared to motion control standards by outperforming every motion and socially compatible metrics.

Subject Descriptors: Autonomous Vehicles, Safety, Decision Making, Robots

Keywords: Autonomous Driving, Social Value Orientation, Deep Reinforcement Learning, Inverse Reinforcement Learning