Development of Machine Intelligence for Fully Autonomous Ground Vehicles Via Video Analysis

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Abstract

The automation of vehicles is progressing from one automation level to the next, with the goal of reaching level 5, which involves no steering wheel, pedals, brakes, or windshield. This is achieved by the vehicle taking on an increasing number of autonomous decision-making tasks under the guidance of intelligent control systems that are equipped with enhancing sensor technologies and Artificial Intelligence (AI). Major vehicle companies are competing to build the most experienced (AI-) driver on the roads. In this report, how the intelligence of Self-Driving Vehicles (SDVs) is being built by the automotive industry for the efficient deployment of handover wheels is analysed and applications of machine intelligence for SDVs are implemented through video analysis using Deep Learning (DL). The results show that i) the use of DL techniques as well as reinforcement learning (RL) - Deep RL approaches - can contribute to the intelligence of SDVs significantly and ii) SDVs, equipped with advanced mechatronics systems, can be fully autonomous with the level-5 automation as they are trained appropriately with proper datasets.

Index Terms— Autonomous vehicles, self-driving vehicles, driverless vehicles, sensor fusion, autonomous driving, vehicle automation, deep learning, neural networks.

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