Towards Scenario-based Testing for Automated Driving Functions

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\textbf{Abstract}: Autonomous vehicles are envisioned to share the road with humans within the next decade. This change will revolutionize road traffic and provide a positive benefit for road safety, traffic density, and emissions. The general public and product liability regulations impose high standards on manufacturers regarding the safe operation of their autonomous vehicles. However, the documentation of the safety of such vehicles is an open challenge. Vehicles' behavior will be predominantly defined in software. It will not be possible to analyze or test software of such autonomous systems exhaustively for all possible real-world driving situations. One alternative envisioned strategy for documenting safety is to show statistically (and partly in simulations) that the software is safe enough in relevant traffic situations. To this end, it is necessary to develop techniques for modeling and simulating driving situations, specifying and monitoring functional requirements, and metrics for quantifying safety. We present our ongoing work on a framework for scenario-based testing of autonomous driving functions in simulations: Domain-specific languages are employed in the reflection of requirements as runtime monitors as well as in the modeling of test scenarios. The runtime monitors evaluate and identify relevant situations in simulations and real driving data for optimizing test suites.

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