

Scenario Space Exploration with Guaranteed Criticality Coverage

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Assuring the safety of an automated driving system is difficult, because a large, heterogeneous set of traffic situations has to be handled by the system. Systematic testing of the full system at the end of the development seems necessary to be able to reach the required level of assurance.

In our approach, the set of potentially relevant, concrete test cases result by parameter instantiation from finitely many more abstract, so called logical scenarios. For nearly all interesting automation systems, even virtual testing via simulation can cover only a tiny fraction of this set of concrete test cases.

Here we present an approach by which a selection of test cases can be shown to be sufficient to assert the system's safety. For that, we make reasonable assumptions about the system's inner workings, and about the way safety of a traffic situation can be captured mathematically. Based on these assumptions, a criterion for sufficient test coverage can be derived. We continue by giving the concept of an exploration procedure which achieves a coverage meeting this criterion.

In the context of ongoing research projects which develop and apply simulation tools for the verification and validation, we are in process of elaborating on this concept, implementing, and testing it.

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