PROJECT of the PEGASUS FAMILY

VERIFICATION VALIDATION METHODS

Scenario-based Methods – Application

7.4 | Infrastructurally collected traffic data for scenario extraction and analysis

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Application Example

Infrastructural Traffic Data Measurement

The DLR Institute of Transportation Systems is able to continuously capture and analyze real-world microscopic traffic in manifold environments. For instance, the AIM Research Intersection in Braunschweig (see Figure 1 left) enables the analysis of long-term traffic in an urban environment in Brunswick. In addition, the mobile measurement station (see Figure 1 right) is used to study the short- to medium-term traffic in different environments. The captured microscopic traffic data are the foundation for follow-up scenario-driven analysis (see Figure 2).

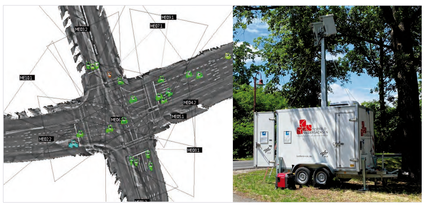


Figure 1: AIM Research Intersection (left) and mobile measurement station (right) for microscopic traffic measurement and the provisioning of concrete scenarios. (© DLR e.V.)

Scenario Mining Platform

For simulation-based testing of real concrete scenarios, it is mandatory to find these scenarios in the large-scale datasets captured by traffic measurement systems. For that purpose, DLR-TS developed a modular and scalable Scenario Mining Platform. It is designed to meet the needs for processing large-scale live and historical traffic data. Due to its underlying systematic approach of identifying and extracting scenarios (aka. scenario mining), it is a major step towards building a comprehensive catalogue of driving scenarios.

Following the 6-layer model defined in VVM, a key module of the entire scenario mining process is the categorization of traffic participants according to the route they choose to cross intersections. This association of entities from layer 1 (traffic participants) with layer 4 (road network) not only allows to define logical scenarios such as "*a vehicle turning left at an urban intersection with an oncoming vehicle crossing the intersection first*", but also enables to extract concrete scenarios. The definition of the logical scenario and the traffic data from infrastructure (and optionally experimental vehicles) is the input of the Scenario Mining Platform (see Figure 2). It extracts the concrete scenarios and provides the results in the VVM OMEGA format that are collected in the VVM Scenario database for further analysis (e.g. driving behavior, traffic safety) and/or simulation-based testing. An extracted concrete scenario matching the previous logical scenario definition is depicted in Figure 3, where a traffic participant (white car) commits a red light violation and performs a full break maneuver to avoid a collision with the oncoming traffic flow.

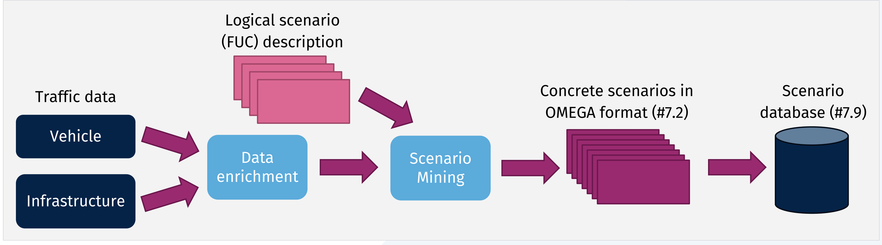
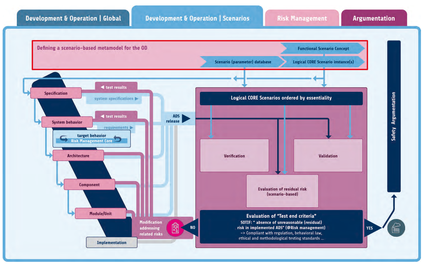


Figure 2: The overall process to identify and extract concrete scenarios from infrastructurally captured traffic data (and vehicle data). The extracted scenarios are converted to the OMEGA format and collected in the scenario database for, e.g., simulation based analysis. (© DLR e. V.)



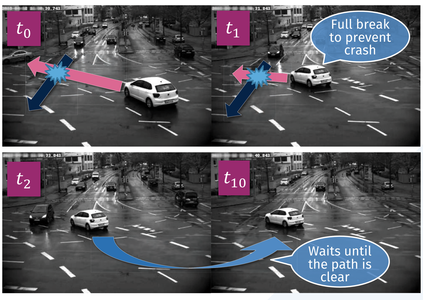


Figure 3: An automatically extracted concrete scenario given a logical scenario description with the left turning vehicle (white car) committing a red light violation. (© DLR e.V.)

Partners

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