**Motivation**

- Field tests during the development phase ensure that
  - The system performs according to the intended specifications
  - Unexpected reactions of the system are eradicated
  - The efforts caused by the testing of integrated safety functions are high
  - Costs are expected to grow dramatically considering automated driving

**Objective**

- Contribute towards a reduction of kilometers driven for validation
- Automated identification, analysis and assessment of traffic scenarios
- Generic representation of traffic scenarios
- Feature definition to analyze traffic scenarios with machine learning
- Group scenarios and extract representatives for template generation

**Scenario Extraction**

- Data driven approach: data structure determines the scenario description and feature selection
- Feature set is provided to the clustering process, which delivers the similarity matrix
- Assigning classes according to similarity matrix and train supervised model in order to assign new traffic scenarios

**Data Acquisition**

- Generic scenario description allows data import from various data source
- Simulation framework built up on Open-Source tool SUMO [1]
- House developed simulation tool CARMOS
- Public available data set (highD [2], real world highway traffic)
- Replicate representative traffic scenarios on test facility (planned)

**Cluster Analysis**

- An Unsupervised Random Forest Clustering Technique for Automatic Traffic Scenario Categorization
  - in 21st IEEE International Conference on Intelligent Transportation Systems, 2018
- Unsupervised and Supervised Learning with the Random Forest Algorithm for Traffic Scenario Clustering and Classification
  - in 30th IEEE Intelligent Vehicles Symposium, 2019
- Highway traffic data - macroscopic, microscopic and criticality analysis for capturing relevant traffic scenarios and traffic modeling based on the highD data set
  - in arxiv.org (open access platform), 2019

**Conclusion and Outlook**

- Clustering method for automated categorization developed, validated on
  - Simulated data
  - Real world highway traffic data set [2]
- Data generation frameworks developed
- CARMOS for highway traffic
- Open source simulation
- Main results published

- Driver or market specific clustering
- Replicate representative driving scenarios on the CARISSMA test track

**References**