KI DELTA LEARNING
Scalable AI for Automated Driving

Real Data Acquisition with Ground Truth

Franz Andert, Silas Maile, Joshua Niemeijer, Jörg Schäfer, Tobias Wagner, Christian Witt

Sensors / Environment

Motivation and Background

Publicly available training data often includes only single frames, focuses mainly on non-European scenarios, comes with legal restrictions, and is limited in the sensor variety, position and field of view. Hence, one of the project's goals was to set up a new vehicle and to acquire data that fits with the specific deltas and research questions from the scientific work packages.

Vehicle Setup

A Mercedes-Benz V-class van was equipped with data recording computers and with the following sensors:

- 12 cameras (*DALSA Genie Nano* and *Bosch MPC3*) at different positions, front rear and side view, and elevated truck view
- 5 LiDARs (*Velodyne*, *Valeo Scala Mobility Kit*, *Innoviz One*), front view at different elevations
- 2 RADARs (*InnoSenT 5G3*) at front corners
- GNSS and inertial navigation system.

All the sensors were co-calibrated and synchronized via precision time protocol.

Figure 1: Research vehicle from the project consortium (© DLR)

Combining Vehicle and Infrastructure Data

The measurement campaign consists of several test runs in rural and urban areas throughout Germany and Italy to get sensor data from many different environmental conditions and traffic situations. During the drives in Berlin and Braunschweig, the project's vehicle was supported by DLR's research car, and we recorded maneuvers with mutual interactions like crossing or overtaking on both vehicles. In addition to that, the vehicles were driven along the large-scale testing facilities such as the Test Field Lower Saxony.

From these test runs, the stationary cameras provide ground truth data and possible aid for data labeling and deep learning strategies.

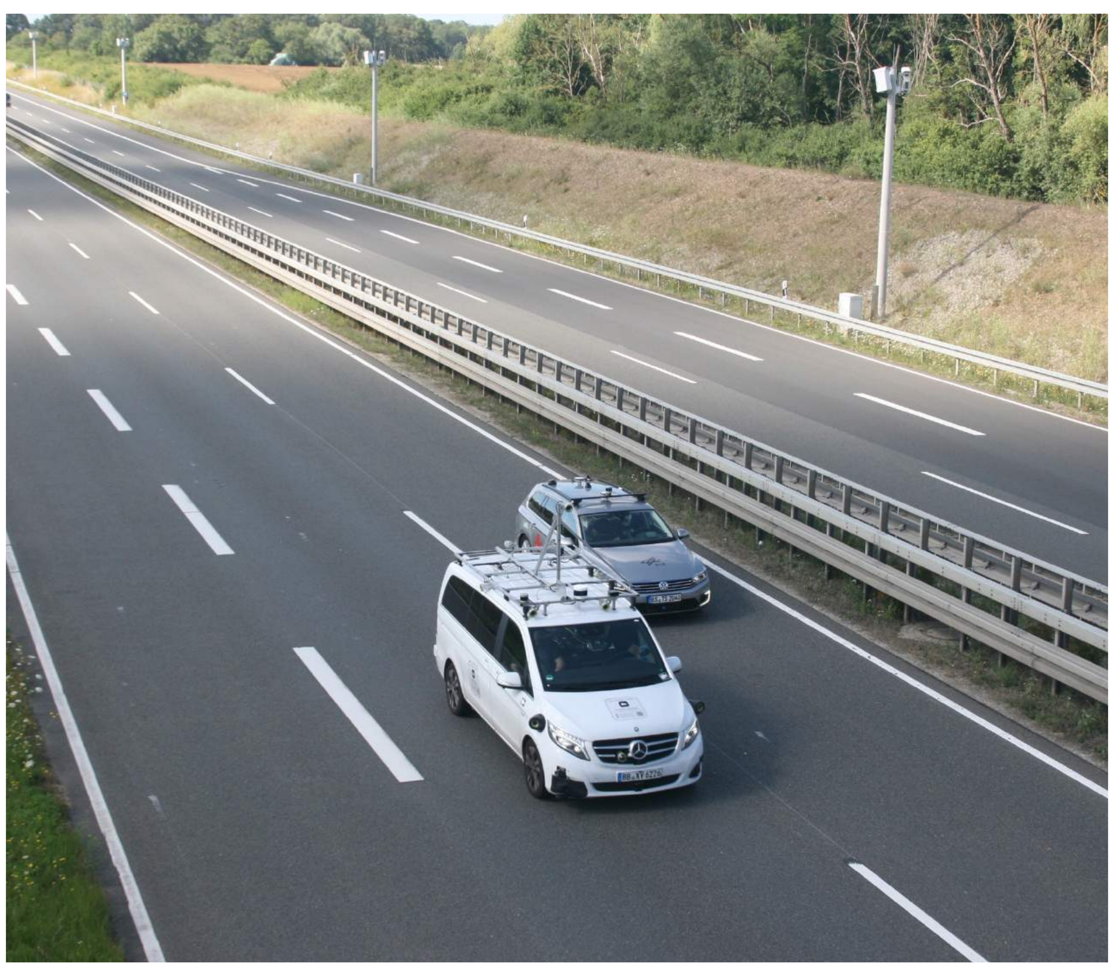

Figure 2: Overtaking maneuver at Test Field Lower Saxony. Data acquisition with object reference from road site cameras (© DLR)

Results

We recorded a total number of 7,000,000 combined sensor frames, which is about 193 hours of calibrated and timestamped raw data at 10 fps. All the data was tagged with the environmental specifics, e.g. road type, weather and lighting, obstacles, or special optical occurrences and traffic situations. From that, diversified samples are chosen for labeling. At current stage, labeling includes:

- 18,000 image samples with semantic and instance segmentation
- 18,000 LiDAR samples with 3D bounding box object detection.

Figure 3: Semantic segmentation sample image (© DXC CMORE)

Further Data Use

Based on the first impressions during the evaluation, the data is a valuable milestone for future research. It is planned to provide access according to GDPR regulation.

References:

Test Field Lower Saxony: https://verkehrsforschung.dlr.de/en/projects/test-bed-lower-saxony-automated-and-connected-mobility

Partners

External partners

For more information contact:

franz.andert@dlr.de, smaile@luxoft.com,
joshua.niemeijer@dlr.de, joerg.schaefer@dlr.de
tobias1.wagner@valeo.com, christian.witt@valeo.com

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