Developement of an autonomous driving environment model visualization based on object list level

Tobias Wagner Christoph Zach Max Haindl Philipp Korn Stehpan ...? Dennis Roessler Max Pfaller Domi ...?

***Abstract*— This electronic document is a live template. The various components of your paper [title, text, heads, etc.] are already defined on the style sheet, as illustrated by the portions given in this document.**

I. INTRODUCTION

II. RELATED WORKS

IEEE Fabio Reway Test Method for Measuring the Simulation-to-Reality Gap of Camera-based Object Detection Algorithms for Autonomous Driving

III. MATERIALS AND METHODS

Kleines Intro was jetzt kommt

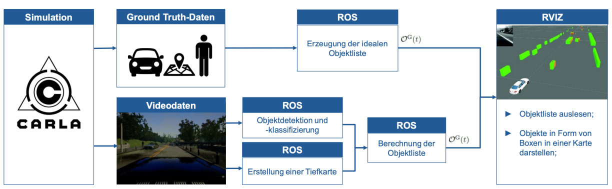

Fig. 1. Ueberblick

A. *Creating simulation scenario*

- Welcher Simulator wurde verwendet
- Welches Szenario (NCAP)
- Szenario beschreiben

B. *Creating objects list of ground-truth data (TP1*

- Erstellung Objektliste
- Objektliste anhand Attribut-Vektor beschreiben
- Ros-System beschreiben
- Feature Vektor Ermittlung

C. *Evaluation of video data (TP2)*

- Detektion Objekte (Yolo)
- Tracking Objekte (Tracker)
- Gleichung zur Berechnung von zB Geschwindigkeit, Beschleunigung
- Ermittlung Classification / prop mov / prop exis

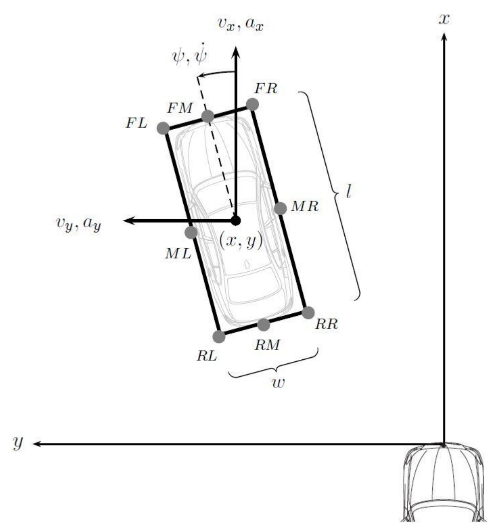

Fig. 2. Fahrzeugkoordinatensystem

*This work was not supported by any organization

D. Visualization of object lists(TP3)

The published topics of Ground-Truth data and Camera-Calculation data will be subscribed. Each topic contains the ego vehicle data and the specific generated object list. In order to evaluate the object lists, the objects will be analyzed per frame. In RVIZ, the objects are represented by primitive figures with the help of marker messages.

Marker messages are described with specific properties such as position, scale, type, color, orientation. Each object class receives selected shapes and colors so that they can be differentiate in RVIZ. The display variants for the possible object classes are shown in table II.

TABLE I
CLASSIFICATION ASSIGNMENT

Classification	Shape	Color[RGB]
car	cube	[1, 0, 0]
truck	cube	[0, 1, 0]
pedestrian	cylinder	[0, 0, 1]
motorcyle	cube	[1, 0, 1]
car	cube	[1, 0, 0]
bicycle	cylinder	[1, 1, 0]
stacionary	sphere	[0, 1, 1]
other	sphere	[1, 1, 1]

In Addition, the yaw angle of the objects has to be transformed into a quaternion for the visualization in RVIZ. The markers for the calculated camera data are assigned an RGB alpha value of 0.5, so that the difference between the camera data and the GT data is visually recognizable.

The highest detection probability of an object indicates the classification, so that the properties value of each shape can assigned to the marker message. Furthermore, each detection position must be mirrored on the Y-axis, because the vehicle coordinate system does not match to the RVIZ coordinate system. Finally, the generated markers are combined into a marker array and will be published.

The pubished topics of Ground-Truth data, camera date and ego vehicle data are also saved in a Rosbag File. Each bagfile contains the published ego data and the corresponding object lists.In the following, these files are used for postprocessing.

E. Evaluation of object lists(TP3)

- Objektlisten in BagFiles aufnehmen
- Geo und Time mapping
- Berechnung von iOu etc. verweis auf VerÃ¶ffentlichung von Fabio

IV. RESULTS

Ergebnisse des Projekts:

- Funktioniert die Auswertung
- Wie gut sind die Kamerawerte im Vergleich zu Groundtruth Werte
- sind die Werte represenativ

V. CONCLUSIONS

APPENDIX

ACKNOWLEDGMENT

REFERENCES

[1] F. Reway, W. Huber, and E. P. Ribeiro, "Test methodology for vision-based adas algorithms with an automotive camera-in-the-loop," in *2018 IEEE International Conference on Vehicular Electronics and Safety (ICVES)*, Sep. 2018, pp. 1–7.