

Object tracking and trajectory prediction for safety enhancement of autonomous driving

Thesis Type: Master Thesis for Telecommunication Engineering, Computer Engineering or related fields

Research Area: Multi-Layer Wireless Solutions

Requirements

- Excellent software programming skills
- Strong experience with Python/bash scripting and Linux environment
- Strong experience with C/C++ programming languages
- Basic knowledge of image processing
- Basic knowledge of machine learning

Description

Motivation

The knowledge of the surrounding environment is crucial for the connected and autonomous vehicles. These vehicles must timely know the position and the trajectories of other road users to perform safe road manoeuvres. If other road users cannot communicate such information, each vehicle has to rely on its own sensors to identify other cars, bicycles and pedestrians and to foresee their trajectories. A significant support can be provided from the road-side infrastructure. In critical places, fixed sensors can continuously sense the surrounding environment to identify vehicles, pedestrians, other road users and obstacles and the infrastructure can communicate the gathered information to the connected vehicles.

Objective

The aim of the thesis is to develop a framework for the identification of road users and for the prediction of their trajectories.

The first part of the thesis will be devoted to the analysis of state-of-art objects tracking methods. In the second part of the thesis, the student will develop a real object tracking system exploiting available cutting-edge image processing tool. Final step is the definition of trajectory prediction algorithm exploiting the gathered information.

The student will have the possibility to work with real-data coming from the field in an informal cutting-edge research laboratory using the latest available technologies on these fields.

Contact: send a resume with attached the list of exams to daniele.brevi@linksfoundation.com specifying the thesis code and title.

Image processing tools for autonomous driving

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Research Area: Multi-Layer Wireless Solutions

Requirements

- Excellent software programming skills
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- Basic knowledge of image processing
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Description

Motivation

Accurate and time-efficient image processing tools are essential for autonomous driving vehicles. A timely detection of other vehicles, road users and obstacles can ensure to the autonomous vehicle the capability to perform safe road manoeuvres. Several cutting-edge tools are now being proposed by several research actors and companies. In the autonomous driving context, it is necessary to find the best trade-off between accuracy and time performance given the resources-constrained environment. A thorough evaluation is needed as well as a customization of the tools for the autonomous driving context.

Objective

The aim of the thesis is to evaluate different image processing tools for finding the most suited for the automotive driving context. Customization of the selected tool is the final target of the thesis. The first part of the thesis will be devoted to the analysis of cutting-edge image processing tools for selecting the most suitable one for the specific targeted scenario. The evaluation will be based on different performance criteria. In the second part of the thesis, the student will customize the selected image processing tool for enhancing its performance for the context of autonomous driving.

The student will have the possibility to work with real-data coming from the field in an informal cutting-edge research laboratory using the latest available technologies on these fields.

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