

# Master/Bachelor thesis proposal

## Using machine learning to implement vehicle identification in heterogeneous systems

### 1 Introduction

Vehicle identification is an important functionality that is incorporated in modern advanced driver-assistance systems (ADAS) to achieve semiautomatic driving. Different types of vehicles pose this application a huge challenge to correctly and real-timely detect and guarantee the on-road safety area of the car.

Towards this two goals, machine learning and high performance computing techniques are used to tackle the issue. However the accuracy and performance are still under estimation because of hardware and software limits. Based on OpenCL, we want to accelerate vehicle identification applications in heterogeneous systems.

### 2 Motivation and Goals

In our previous work, the vehicle identification goal is already achieved, while the performance and precision can still be improved. Figure 1 is the result of the application, we use machine learning methods to train the vehicle data and then detect the potential cars. However, the detection error rate is still high and the algorithm is in sequential, therefore performance improvement and code parallelization are expected.



Figure 1: result of the naive application

### 3 Your tasks

- Accelerate the application via OpenCL programming framework.
- Improve the detection accuracy by using more datasets and better training model.

### 4 Requires

- Good knowledge on machine learning techniques
- Good knowledge on C++ and parallel programming

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