

# Master/Bachelor thesis proposal

## Real-time and efficient vehicle tracking by using PHD filter

### 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 real-timely detect and guarantee the on-road safety area of the car.

Probability hypothesis density (PHD) filter is a multiple-target filter for recursively estimating the number and the state of a set of targets given a set of observations. It is very suitable for vehicle identification, as long as the real time performance is guaranteed.

Based on the above-mentioned goals, we would like to accelerate state-of-art vehicle identification algorithm via PHD filter.

### 2 Motivation and Goals

During the previous work, vehicle identification is implemented by using a real-time object detection system called YOLO. It uses a single neural network over a full image to predict bounding boxes and probabilities for each ROI in the image. Figure 1 is the result of vehicle identification on a road-captured video. The detection is performed frame by frame, thus increasing the processing latency. However, if the vehicles in certain frames are tracked instead of being detected, the latency could be reduced.

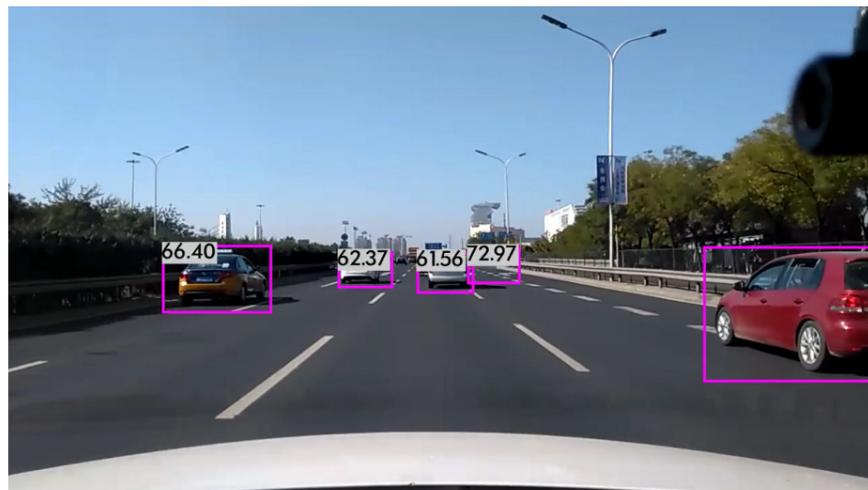


Figure 1: result of the naive application

### 3 Your tasks

- Improve the algorithm by using some filters such as PHD filter.

### 4 Requires

- Good knowledge on filtering technique
- Very good knowledge on C and C++ programming

### 5 Contact

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