Master/Bachelor thesis proposal
Fast pedestrian detection in heterogeneous systems via deep learning

1 Introduction

Pedestrian detection is an important functionality that is incorporated in modern advanced driver-assistance systems (ADAS) to achieve semiautomatic driving. The variance of pedestrian gestures, the noise of surrounding environment and the huge HD image computation workload makes it difficult to accurately detect on-road pedestrian within real time constraint.

Towards this goal, machine learning, especially deep learning is emerging to be 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 pedestrian detection applications in heterogeneous systems.

2 Motivation and Goals

In our previous work, pedestrian detection is implemented via traditional pattern recognition techniques like SVM and AdaBoost classifier. Although these methods could give fairly high accuracy, the performance and precision can still be improved to meet the increasing HD image data. Therefore, we intend to use machine learning, especially deep learning techniques to fast identify and detect multiple pedestrians within an image frame, a possible method can be using neural network combined with typical image features like HOG, LUV and color features as training input.

The goal of this work is to implement fast pedestrian detection via deep learning techniques mentioned above, to ensure its use in a heterogeneous system consisting of high performance accelerators like multi-core CPU, GPU and FPGA.

3 Your tasks

- Develop a neural network to accurately detect the pedestrian in an image.
- Improve the detection accuracy by using more datasets and better training model.

4 Requires

- Very good knowledge on deep learning techniques
- Good knowledge on C++ programming

5 Contact

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