

Semester Project Proposal: Realtime Object Detection on Embedded Platforms

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Abstract

This project aims at developing an efficient object detector for to perform real-time inference on the humanoid NAO robot of the Nomadz Robocup Team at ETH Zürich.

Description

Autonomous robotic systems heavily rely on a robust visual perception to understand their environment. One step in enabling an abstract visual understanding is the detection of relevant objects. State of the art machine learning based methods show impressive results in detecting a multitude of objects in diverse environments and can solve additional related tasks such as segmentation or key-point detection simultaneously [1]. Boosted by many real world applications e.g. for robotics and autonomous driving, significant effort was invested to make these algorithms real time capable on modern GPU accelerated hardware [2]. Nevertheless, applications such as RoboCup pose an opposite challenge: Vision in a specific environment where a well constrained task need to be solved on very limited hardware using limited training data.

Goal

The goal of this project is the development and implementation of an algorithm for robot, ball and line detection that is real-time capable on the NAO robot. In the first stage, the scalability of current object detection algorithms for constrained tasks will be evaluated. Based on this, an object detector will be implemented to be used directly on the robot. Research aspects include multitasking, compact and efficient networks. For training and evaluations, a high quality NAO robot detection dataset is available.

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References

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