Practical course robotics
project proposal

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1 Introduction

Robust grasping of unknown and even known objects is a problem at the heart of many tasks in the field of robotics. Often robot perception pipelines suffer from high noise and uncertainty. In this work we leverage the combination of pretrained deep neural networks and a computer vision pipeline to extract robust grasp poses from RGBD-images of real world objects. This perception pipeline is integrated in a robot motion framework to perform the grasps with a robot.

2 Goal

Our main goal is to set up a framework which extracts robust grasp poses from RGBD-Images and grasps an object lying on a table.

3 Problems and methods

This section gives an overview over the general problems of the objective and the methods we will use to overcome these difficulties.

3.1 Localization of objects

needs to be infered if more than one object is in the scene. We will use a SSD for that.

3.2 Localization of robust grasp points

- Problems:
  - Localization of objects.
  - Localization of robust grasp points.
- Methods:
  - Robot control using *rai* framework
  - Sampling of grasp candidates using a grasping policy (e.g. *CrossEntropyRobustGrasping-Policy*[1])
  - evaluation of grasp candidates with pretrained *GQCNN*[2]
  - localization of objects using bounding boxes (if necessary)

	Marc	Ralf
16.05.19	Basic setup, process RGBD images from Baxter/PR2 with GQCNN	Ralfas asdasdasda sdas dasd asdasd as dasd
23.05.19	Grasp object with default grasping policy	
06.06.19	Tune control, recalculate online if object moves	
13.06.19	Experiment with different grasping policies	

4 Milestones

Requirements

- Baxter
- PR2
- Optional: machine with GPU for further training. We can also bring our own desktop pc.
- Details about camera intrinsics
- RAI framework running on machines with nvidia graphics card (but this problem might be related to the newest nvidia-driver.)

[1] https://github.com/BerkeleyAutomation/gqcnn/blob/a0930e9d2fef3c930c41dd91cde902d261348fbe/gqcnn/grasping/policy/policy.py#L627

[2] https://github.com/BerkeleyAutomation/gqcnn