Lecture 6: Visual Recognition for robotics grasping applications

Object Manipulation and Task Planning

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1 Challenges of visual recognition

- View-point
- Illumination
- Scale
- Deformation
- Occlusion
- Apperance variation
- Clutter

2 Evaluation definitions

When a model has high *recall* it classifies most of the positives correctly.
Mean avearage precision is a weighted average of intersections over union.

3 Object detection architectures

Traditional methods constitute surf and sift. They use a sliding window approach. This is called exhaustive search.

4 Object Detection

- ImageNet (14+) million annotatad images.
- Coco labelled images

5 6D Pose estimation

Knowing the objects position w.r.t. the camera. We can describe both rotations and translations.

5.0.1 Table top segmentation

One algorithm is based on pointclouds, called **table top segmentation**. Use RANSAC to remove the table top. use K-means clustering to cluster the points into the objects.

5.0.2 Grasping affordances

Depending on the type of grasp, and where you grasp the object, determines the tasks that are possible with the object. E.g. grapping a watee bottle from the bottom, so it is upside down, thus you cannot drink from it.

5.0.3 Grasp representation

Sample radom contact points. Find c_1 and c_2 and then the center of grasp.
In most setups, we have a single view. Extract the coordinate frame using PCA.

5.0.4 Dex-net (learning based grasping)

Utilizing the data to compute the probability of a successfull grasp.

5.0.5 Grasp Pose Detection (GPD)

Great with unknown objects.