Active strategies for object discovery

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1 Introduction

1.1 Motivation

1.2 Related work

2 Theoretical background

2.1 Saliency-based object discovery

2.2 Frontier exploration

2.3 Sampling-based exploration

2.4 Particle filter SLAM

2.5 Euclidean point cloud clustering

2.6 IoR mechanism to guide attention

2.7 Building a 3D map with octomap data structure

3 Implementation

3.1 Overview of the system

- our hardware
- flowchart

3.2 SLAM

- input: point cloud to laser scan and odometry from robot
- gmapping
- output: estimate of robot pose and 2d occupancy grid map

3.3 Generation of object proposals

- 2D Object candidate generation
- Building the proposal point cloud
- Clustering the point cloud
- Projection of point cloud into map
- merging and handling of candidates in octomap

3.4 NBV planning

- random
- frontier exploration
- information gain
  - using the octomap
  - IoR mechanism for obstacles

3.5 Robot navigation

4 Analysis

4.1 Experimental setups

4.2 Metrics

4.3 Results

5 Conclusion

5.1 Summary

5.2 Learnings and deviations from our original plans

5.3 Future work