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Praca dyplomowa magisterska

*Rozpoznawanie obiektów na obrazach RGB-D pod kątem zastosowań
w robotyce*

Object recognition in RGB-D images for robotic applications.

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Many thanks to all the people and beware global warming

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Introduction

The aim of this work is to survey modern RGB-D image processing algorithms for model-based object recognition. Analysis of each method is focused on their usability in time and resource constrained robotic environment. Based on provided performance tests, selected methods will be used to develop a complete object recognition system applicable in robotics.

The first chapter provides background on the RGB-D imaging. A brief introduction to depth acquisition techniques is provided. Finally, implementation and testing details are provided, including software tools, hardware platforms and example datasets. Second chapter introduces popular representation formats of combined color and depth data. Plain RGB-D images, point clouds and TSDF are discussed. For each format, its features and applicability is described. Efficient data storage, conversion algorithms and processing overhead are tested. Third chapter's content is focused on popular keypoint detection algorithms. Analysis of SIFT and SURF is provided. In fourth, point cloud segmentation is considered. Fifth chapter touches problems such as normal estimation, data alignment and matching methods. Comparative survey of the most popular descriptor types is provided in the sixth chapter. Their descriptive capabilities are tested against matching algorithms. A complete solution is proposed following, its performance is analysed with hypothesis verification methods, such as RANSAC, and tested on the sample datasets. Online performance tests are also provided. In the final chapter, robotic application scenarios are proposed. Developed system is implemented in a robotic simulator, to test its performance.

1. RGB-D images

1.1. What is RGB-D, why bother, methods of acquisition

1.2. Software tools

1.3. Test hardware

1.4. Related work

2. Representation

rgb-d, point clouds, tsdf algos for conversion, timing

3. Keypoints

keypoints

4. Segmentation

segmentation

5. Descriptors

rgb-d, point clouds, tsdf algos for conversion, timing

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Summary