SOC2012: Overview of the RGB-D Stereo Object Category (SOC) Database - Version 2012

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I. Database Structure and File Formats

The SOC2012 database is arranged in three main directiories:

- **./object**
- **./scenes**
- **./overview**

where:

- **./object** directory contains data for single objects:
  - from 14 object categories with 10 object instances per category what gives in total 140 object instances.
  $categoryName = \{ball, bottle, box, can, car, citrus, cup, mammal, mobile, sd, tissue, toipap, tube, vegroot\}$
  $categoryLabel = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14\}$
  - that were collected from 16 views uniformly spaced around the object (every 22.5 degree).
  NOTE: Within each category objects are approximatly aligned with respect to the pose. However, the pose labels are not exact, since objects within one category differ in shape.
  $angelsLabels = \{000, 022, 045, 067, 090, 112, 135, 157, 180, 202, 225, 247, 270, 292, 315, 337\}$.

  ./data-raw directory contains raw (not preprocessed) data as they were collected by the ARMAR-III robotic head. For each object instance, for example

  ./ball01 we provide for each object view an image with a segmentation mask, a segmented 3D point clouds and camera parameters:

  - leftFinal_*.ppm - RGB image captured by the left foveal camera
  - mask_*.ppm - corresponding segmentation mask for the leftFinal_*.ppm
  - filterSegment_*.crd - segmented 3D color pointcloud in the robot arm coordinate system. The outlier points are removed. Additionally, each 3D point is annotated with corresponding image coordinates (pixels values). The .crd file format is described in Section **??**. Software to load a .crd file to the PCL and Matlab is provided in **./overview/software**.
  - camOrig_*.txt - coordinates of a camera orgin in the robot arm coordinate system
  - fov2Arm_*.txt - transformation matrix from a camera to the arm coordinate system

  NOTE: ARMAR-III robotic head is equiped with an active stereo camera system. Thus, positions of the camera for each collected view differ.

- **./data-pointcloud** we provide for each object view a segmented and filtred 3D pointcloud. The point density is equlized using the grid filtering implemented in the PCL library. We used these 3D data in the experimental evaluation in [1], [2], [3], [4].

References

[1] Marianna Madry, Dan Song, and Danica Kragic. From object categories to grasp transfer using probabilistic reasoning. In *IEEE International Conference on Robotics and Automation (ICRA)*, pages 1716 –1723, May 2012.

[2] Marianna Madry, Carl Henrik Ek, Renaud Detry, Kaiyu Hang, and Danica Kragic. Improving Generalization for 3D Object Categorization with Global Structure Histograms. In *IEEE International Conference on Intelligent Robots and Systems (IROS)*, pages 1379 – 1386, October 2012.

[3] Marianna Madry, Heydar Maboudi Afkham, Carl Henrik Ek, Stefan Carlsson, and Danica Kragic. Extracting Essential Local Object Characteristics for 3D Object Categorization. In *IEEE International Conference on Intelligent Robots and Systems (IROS)*, November 2013. To appear.

[4] Marianna Madry, Dan Song, Carl Henrik Ek, and Danica Kragic. "Robot bring me something to drink from": object representation for transferring task specific grasps. In *The ICRA'12 Workshop on Semantic Perception, Mapping and Exploration (SPME)*, May 2012.