

Mobile Robot Observing Kitchen Activities

-- Paul Duckworth, Muhannad Alomari, David Hogg, Anthony Cohn (2016)

-- University of Leeds, Leeds, UK. [Dataset].

The associated paper titled "Unsupervised Activity Recognition using Latent Semantic Analysis on a Mobile Robot" is available [here](#) and accepted at the 22nd European Conference on Artificial Intelligence (ECAI), 29 Aug - 02 Sep 2016, The Hague, Netherlands. Please cite if you use the dataset. (Citation available in download).

Overview:

This dataset contains 295 human detections from an autonomous mobile robot. The robot was equipped with an Asus Xtion Pro Live RGB-D camera. A new detection was generated each time the robot detected a person in the environment using an OpenNi2 skeleton tracker (where up to 10 people can be tracked at once).

Each detection has been annotated into the (multiple) human activities occurring, along with their temporal boundaries. There are 481 human activities annotated in total, some of which temporally overlap or co-occur, or have hierarchical structure, e.g. "making tea" is a composite activity which can include picking a tea bag, using the kettle and taking milk from the fridge etc. No structure was placed on activities prior to annotation (by independent volunteers), so they can vary. The dataset is unbalanced with respect to class labels, i.e. the number of examples in each class has a large variance, since the robot observed common activities more frequently.

A complete list of items included in the dataset is given below.

What's included:

`msg_definitions/`: Contains three ROS message definitions for a `joint_pose` (`joint_message.msg`), a `skeleton_pose` (`skeleton_message.msg`), and a `skeleton_activity` (`skeleton_complete.msg`) as described in the paper. Also can be found [here](#).

`Map/`: Contains the ROS `map_server` map. As per documentation [here](#): "Maps manipulated by the tools in this package are stored in a pair of files. The YAML file describes the map meta-data, and names the image file. The image file encodes the occupancy data."

`semantic_object_positions.txt`: Map frame locations (manually defined) of 13 static semantic objects in the `Kitchen` Region. Each line in this text file is a new object, and contains the object type and ID `objectType_objectID` and the `(x, y, z)` map frame coordinates.

`Data/`: Contains 5 zipped directories named using the date the recordings were collected

(yyyy-mm-dd). Collectively contain 295 human detections.

Data/2016-04-xx/: Contains one subdirectory per human detection from the mobile robot.

Each detection is named with a timestamp (hh:mm:ss_) and a unique identifier, e.g.

17:48:39_1609663a-aa5b-5969-8426-f8eb47a59e2e.

Each detection contains the following subdirectories:

```
-- /skeleton: Contains one txt file per timepoint (ROS /tf frame).
    Each file contains a timepoint, and the position of 15 tracked joints in the
    form (joint_name, 3d position (x,y,z), orientation (x,y,z,w)).
    (Note: The orientation returned from OpenNi2 is not reliable). An example:
        head
        position
        x:1.16305407715
        y:0.401361053467
        z:2.47517211914
        orientation
        x:0.0
        y:0.0
        z:0.0
        w:1.0

-- /robot: Contains one txt file per timepoint (ROS /tf frame).
    Each file contains the position (x,y,z) and the orientation (x,y,z,w) of the
    robot in the map coordinate frame during the skeleton_activity recording. e.g.
        position
        x:-4.60585201842
        y:-18.1709060722
        z:-6.93889390391e-18
        orientation
        x:0.0
        y:0.0
        z:0.451562860266
        w:0.892239308274

-- /rgb: Contains one image file per timepoint (ROS /tf frame).
    Each image is the recorded RGB image topic `/head_xtion/rgb_image_color` at the
    corresponding timepoint to the detection from the OpenNi2 skeleton_tracker.

-- /rgb_skl: Empty subdirectory. Please run the command `python2.7
create_sk_images.py` (included in the download) to obtain the skeleton join
positions overlaid onto the RGB images. This can take some time.

-- labels.txt: Contains annotated and temporally segmented ground truth labels
corresponding to the human activities taking place during the observation.
    Here multiple activities are annotated, including temporally co-occurring
activities.
    Each line corresponds to a new activity, and includes an `activity label`, a
`start frame` and an `end frame`, e.g. label:washing_up:8,124.

-- meta.txt: Contains the region and region ID of the robot during each detection.
The released dataset all occur in the `Kitchen` region. RegionID = 1.
```

Anonymisation Process:

As per our Ethics Approval, each individual recorded by the robot was presented with the option to be anonymised from the dataset, i.e. by blurring the raw RGB images containing their face. For this reason some of the detections are blurred, with a complete list of which detections contain the blurring available in the text file `anonymous_video_list.txt`.

Citation

Citation.txt: Please use this to cite the above ECAI 2016 paper titled "Unsupervised Activity Recognition using Latent Semantic Analysis on a Mobile Robot". Available [here](#).

Contact Information

For any further questions, do not hesitate to contact Paul Duckworth, or Professor Tony Cohn {p.duckworth, a.g.cohn}@leeds.ac.uk.