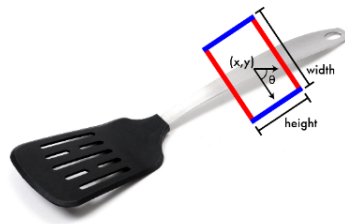


# Machine learning and pose estimation for autonomous grasping with collaborative robots tutorial

## Tutorial part 4 : How to use the machine learning code to get a grasping point

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In this tutorial we will see how to get a point of interest with the code developed by Ian Lenz, Honglak Lee, Ashutosh Saxena. In *Robotics: Science and Systems (RSS)*, 2013. [https://github.com/mirsking/Deep\\_learning\\_for\\_detectin\\_robotic\\_grasps/tree/master/deepGraspingCode](https://github.com/mirsking/Deep_learning_for_detectin_robotic_grasps/tree/master/deepGraspingCode) For this tutorial you will need *Matlab*, *Cuda* and *Cudnn* . You can see my previous tutorial for installation.

## 1 Software installation

Start by navigating to your personal workspace or your *Matlab* workspace. Then add the code from their git hub.

Navigate to the folder you clone from the github and open the folders data. In this folders add the data from Cornell institute. [http://pr.cs.cornell.edu/grasping/rect\\_data/data.php](http://pr.cs.cornell.edu/grasping/rect_data/data.php) In the background folders add the background images. Once you finish the download of the data open your Matlab and change your working space to he folders containing the files : loadProcessAndTrain.m.

In Matlab run loadProcessAndTrain.m. This will train the neural network with the dataset.

If everything went correctly you will get a success message after one hour, of course it's depend of your machine.

## 2 Get your first result

To begin I advise to use the network on one of the images of the dataset to check the proper functioning of the algorithm. Run the following command in Matlab:

```
onePassDectectionForInstDefaultParamsDisplay(100, '/path/to/cornell/data',  
'/path/to/cornell/background')
```

You will see a windows appear with the object and the detection processing. You will get the position of each corner in the image.

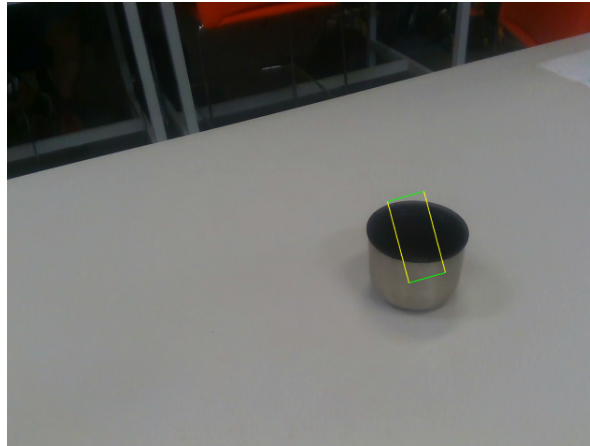


Once you get a correct result go to my github and download the folder : detection and change the previous folder detection by mine.

Then use the tutorial part 3 to save a pointcloud a rgb image and a depth image. First you will have to take a background and save it with the name : pcd0000r.png and save it in a folders name background in your catkin. Then use my software to save the rgb and depth image. Then you just have to run the following command :

```
onePassDectectionForInstDefaultParamsDisplay(1, '/path/to/catkin/data',  
'/path/to/catkin/background')
```

You will get the output with your object. For example :



### 3 Use the automation

Now that you know how to use the neural network you will be able to use the automatic part of the project.

First you will need to install iiwa stack. For that use the tutorial of Guillaume Heude. You need to plug the robot\_2 and the SR300, be sure everything work before continuing .

then you just have to open a terminal and run:

```
roslaunch your_package_name Main
```

Then open Matlab and run Master.m in the folders detectionFromData.

When you will press 1 the robot will go to the picture position take all the picture then he will move to the waiting position. Then the neural network will process the data and give you the position of the center of the grasp, the distance between the fingers of the grasp and the orientation of the grasp. He will publish this information in a ros topic.

If you want more information the code is fully commented and you can send me an email at [vpj.talbot@gmail.com](mailto:vpj.talbot@gmail.com)