

Übungen zur Vorlesung Sensor-enabled Intelligent Environments

Point Cloud Processing

For this homework you won't require ROS, but it would be good practice to use it. You can find a lot of examples online, so it shouldn't be a problem to do it in C++, thus making a node is easy.

1. Create a 2D dataset with 500 random points and 500 points on a arbitrary line (plus small amount of gaussian noise)
 - Range on X and Y dimensions: [0.0-1.0]
 - You can create it directly in your program or load it from a file
 - If you are using ROS you can use the ASCII version of the PCD format (see below)
2. Visualize the 2D Hough space for a line fitting problem for this dataset
 - You will have to choose a discretization and a suitable range for the paramteres
 - Use the line representation without singularities presented at session 3
 - PPM file format might be helpful (<http://netpbm.sourceforge.net/doc/ppm.html>), or use OpenCV (also presented at session 3)
3. Write a RANSAC estimator for the line equation and run it on the same dataset
 - If you don't remember the discussions from the last session: wikipedia.org is your friend :)
4. Compare the line parameter from the maximum vote from Hough space with those from RANSAC and from the original line equation
5. Send the line parameters, screenshot and source code (or submit it as **sei_four** package if you were working in ROS) to **marton@cs.tum.edu** by 31.5.2010. (Notice the extra weekend!)

Here is an example of a simple ASCII PCD file:

```
# .PCD v.2 - Point Cloud Data file format
# (comments)
COLUMNS x y z
POINTS 4
DATA ascii
0 0 0
1 0 0
0 1 0
0 0 1
```