Line Fitting

RANSAC iterations

2/2 points (graded)

Suppose that you are given a generic point cloud of 1000 points, 80% of which are inliers and a function "one_RANSAC_iteration", which performs one iteration of RANSAC on a given set of points.

EXERCISE 1:

Supposing that we are interested to identify the line which fits most points, how many times do we need to call this function (i.e. how many RANSAC iterations are required) to find at least one set of all inliers with probability p = 95% ? You may assume that the set of points is large such that the portion of outliers do not change when removing a point.

The number of iterations required is:

3 ✔ **Answer:** 2.93

3

EXERCISE 2:

Instead of a discovering line, suppose that we are interested in identifying a plane, which fits most points in the point cloud. Assuming that "one_RANSAC_iteration" is adapted to check for planes, how many iterations do we need to perform such that the probability of finding at least one set of all inliers remains p = 95% ?

[Hint: consider how many points are necessary to come up with one plane-hypothesis]

The number of iterations required is:

5 ✔ **Answer:** 4.5

5

Explanation

EXERCISE 1:

The number of RANSAC iterations required in the line fitting example with the given parameters is computed by applying the expression we have seen in the Lecture Segments:

w = 0.8

p = 0.95

k = log(1-p)/log(1-w^2) = 2.93 (3 would be also accepted)

EXERCISE 2:

In order to construct a plane hypothesis to test with RANSAC, we need a minimal set of 3 points. Hence, following the same reasoning as in the lecture notes to discover the required RANSAC iterations:

w = 0.8

p = 0.95

k = log(1-p)/log(1-w^3) = 4.18 (4 or 5 would be also accepted)

Once you are done, proceed with the problem below.

Submit

Answers are displayed within the problem

Line Parameters with the Hough Transform (External resource)

(9.0 / 9.0 points)