Lab2 - Line features with Split & Merge
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1 Introduction

In this lab we will be focused on implementing split and merge algorithm to extract line features in the given map. The results and images are tabulated in the following sections

2 Algorithm

In the algorithm, we acquire the first point $(x1; y1)$ and the last point $(x2; y2)$, and then we get the line $ax+by+c=0$ through these two points with the parameters: $a = y1-y2; b = x2-x1; c = x1*y2-x2*y1$ we will find the maximal distance between the points. When the distance is larger than a threshold, we split the whole point set into two. If it is small, we will split the line as well when the distance between two consecutive points is larger than another threshold. This process should be done recursively until the number of points in a point set is small enough. This step mainly aims to distinguish the lines in the corner from normal lines.
For merging, calculate the angles of every two consecutive points and then compare the absolute difference of the angles with a threshold. And then check the distance between the last point of the first line and the first point of the second line. If both angle and distance difference values are really small, we merge the two lines. The result is shown in below figure:

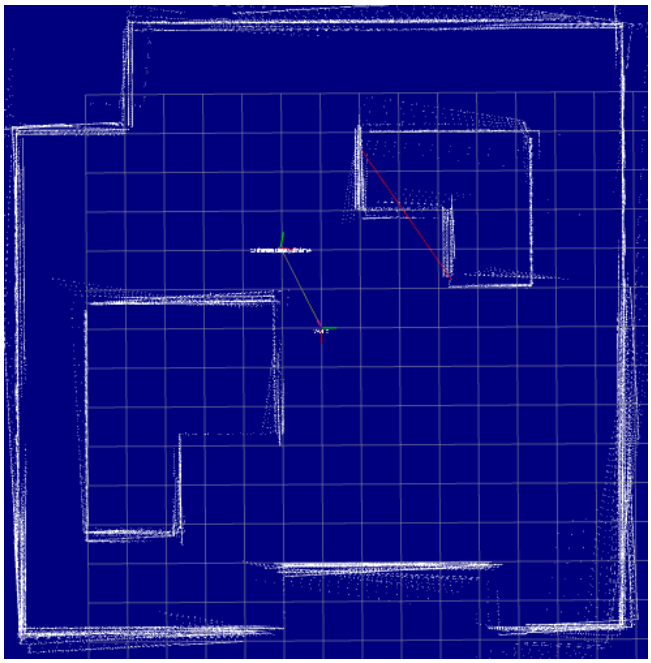

Figure 1

3 Problems and Discussion

When we write and implement our code in python and try to run the code we always have the error with index 0 is outbounded and the plotted result is out of the wall. The problem is unable to figure out and will be improved before the next lab.