Darian Irani – irani2

Question 1:

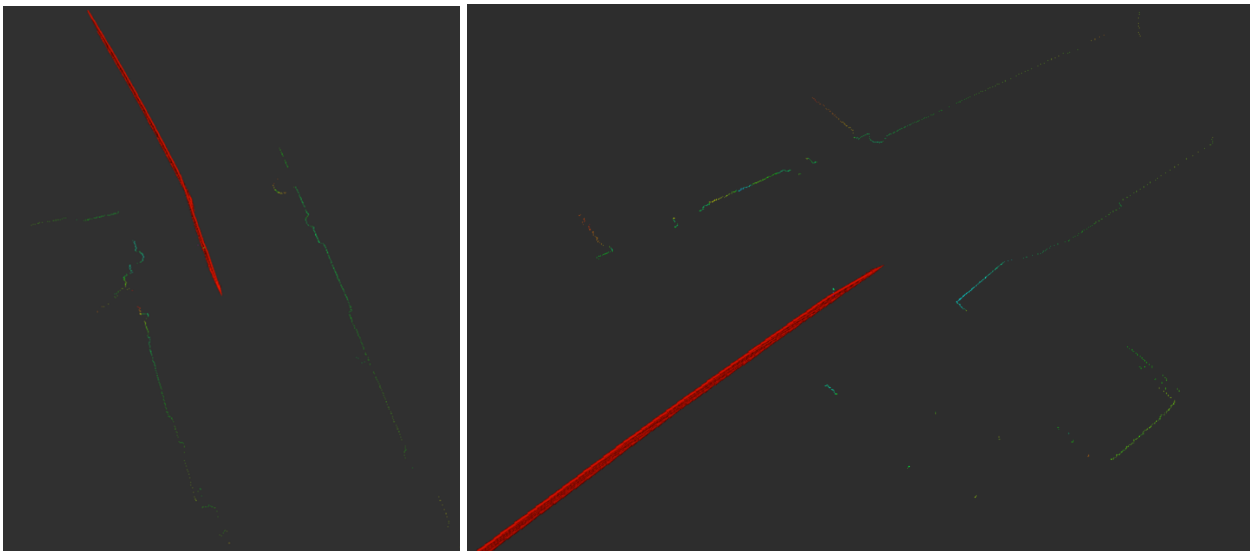

Figure 1: Robot's trajectory and LiDAR measurements

Question 2:

Figures 2 and 3 display the difference in tuning the threshold value by one order of magnitude.

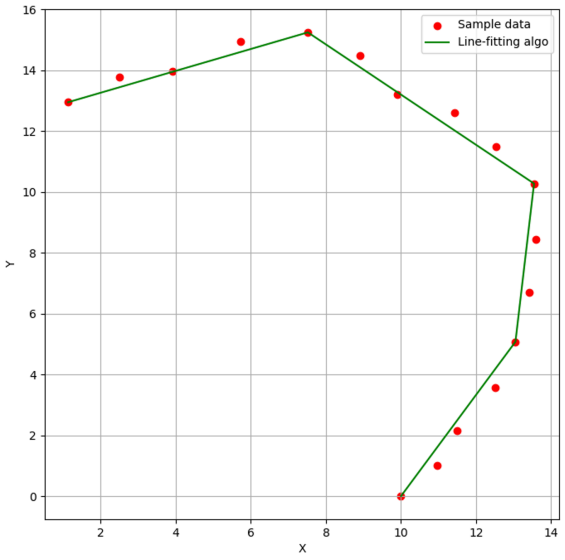

Figure 2: Sample data tested with Split & Merge algorithm (threshold = 1)

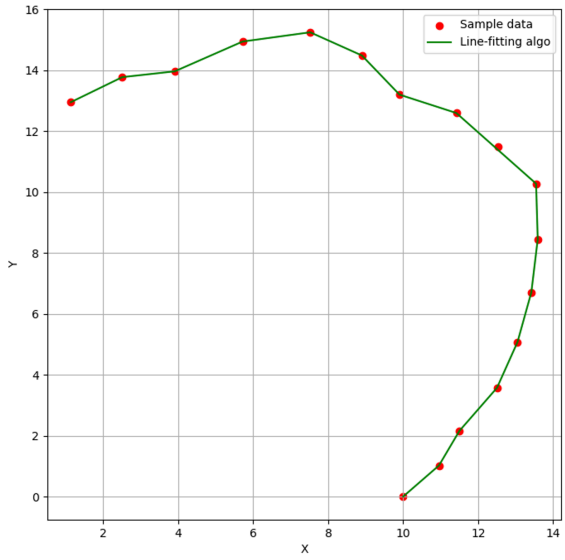

Figure 3: Sample data tested with Split & Merge algorithm (threshold = 0.1)

Question 3:

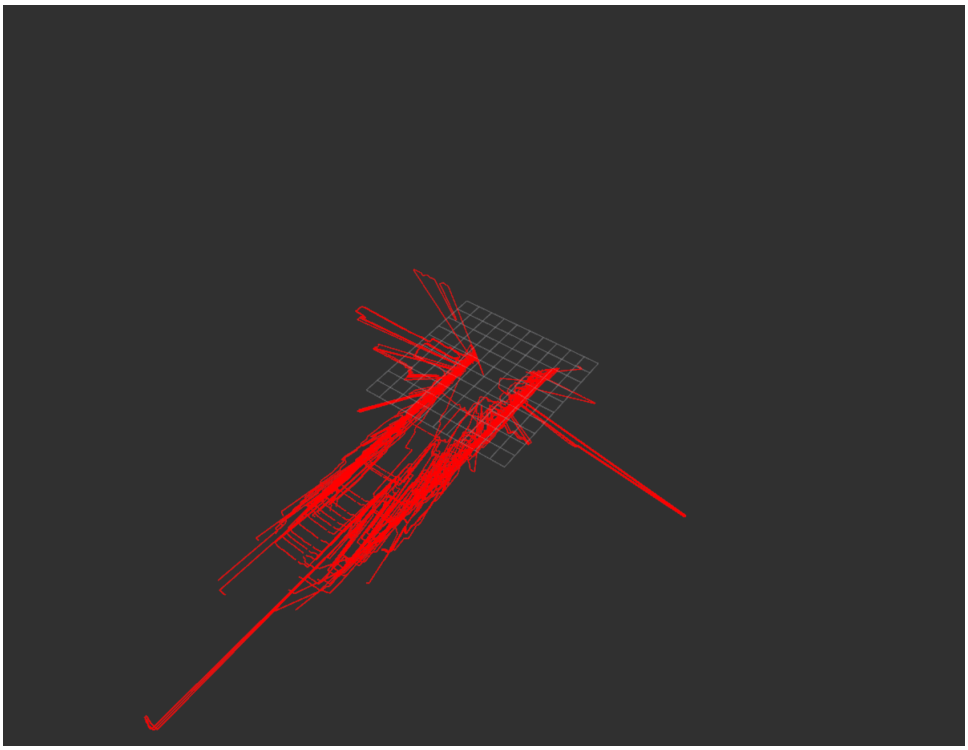

Figure 3: Fitting lines and corners from LiDAR data

Question 4:

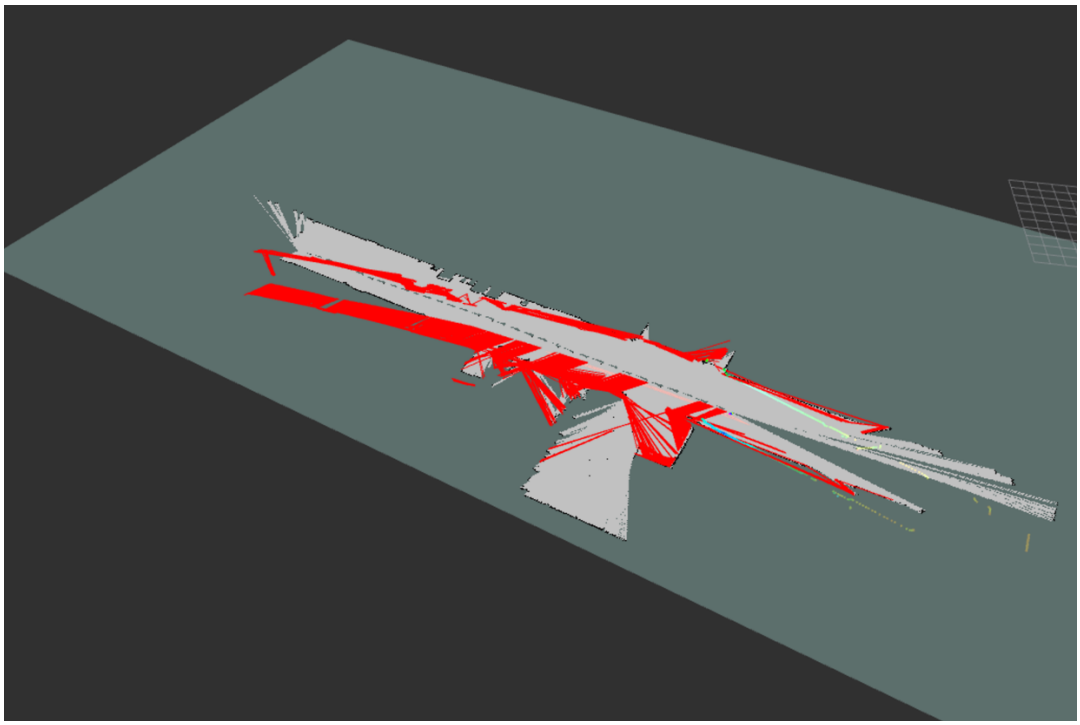

Figure 5: Map created by gmapping (grey) and Split & Merge algorithm (red)

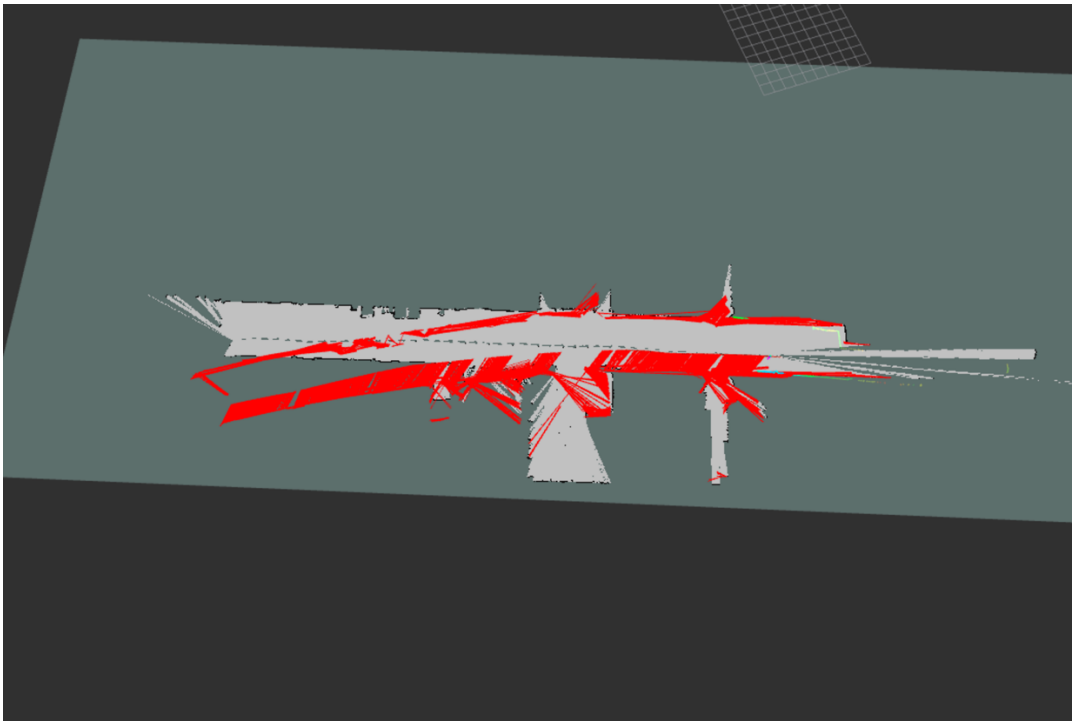

Figure 6: Map created by gmapping (grey) and Split & Merge algorithm (red)

*Figure 7: Map created by gmapping (grey) and Split & Merge algorithm (red) – **final output***

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Question 5:

The Gmapping map has a higher level of detail with smoother lines and fewer artifacts, while the split and merge algorithm has produced a more fragmented and less accurate representation of the environment.

Gmapping takes into account the robot's pose and probabilistic nature of sensor data, while the split and merge algorithm is more deterministic and geometric in its approach.

The split and merge algorithm seems to be more susceptible to noise and may require additional post-processing steps to match the quality of a SLAM-generated map.