Software Engineering Project:

Weekly Report

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I. SUMMARY OF THE WEEK

The registration of two point clouds can be split into the following steps: 1) Selection: The sampling of the input point clouds. 2) Matching: Estimating the correspondences between the points in the subsampled point clouds.3) Rejection: Filtering the correspondences to reduce the number of outliers. 4) Alignment: Assigning an error metric, and minimizing it to find the optimal transformation. Last week I tried KD tree algorithm on Matlab according to the article. I decided to use first ICP+Kd tree algorithm for our project. And also I studied on PCL to implement algorithm on our project. Also, for the registration there is a competition between feature based approaches and ICP based approaches. Since I was thinking to use ICP+Kd tree algorithm, According to article that I read last week, there is both advantages and disadvantages for feature based algorithms. The major advantages of using the feature-based methods over the ICP-based methods are:

- The registration process is independent of the initial alignment of PCs.
- It is not necessary to search for all points in PCs to find the corresponding pairs. Thus, redundant or irrelevant points such as outliers, or points that do not have correspondences have no direct effect on the registration.

The main disadvantages can be said like :

- Point clouds must have distinct features
- In general, the feature-based methods are slower than the ICP-based methods

In the following week, I will try to implement the article that I uploaded github for feature based algoritm from C. Basdogan and A.C. Oztireli. Pseudocodes are available in the article. To implement this, I will work on both Matlab (to see the main appearance) and study about PCL (to implement these algorithms-if they are really useful when I saw the results on Matlab)

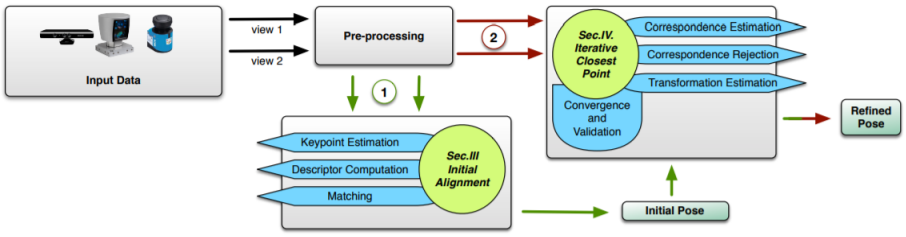

FIG. 1: Registrating a pair of point clouds. Path 1 is for feature-based registration algorithms and Path 2 is for ICP algorithms - From Marani , Reno et. al