

## **3D Scanner C++ Project**

Weekly Report (18/12/2017 - 24/12/2017)

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## Assessment of the week

For this week we basically tried to research on algorithms in which we can use to smoothing the mesh. The previous mesh we generated had many faults and did not give any clear view of the object. In some cases the mesh gotten was just out of order this was due to the uncompounded point cloud registration.

## Smoothing

Given samples  $X$ , corrupted by noise, of a surface  $S$ , estimate de-noised samples  $X$  while preserving the features of  $S$  captured by  $X$ . Our samples could be point samples scattered on the surface, or points with normals, or small triangles or patches. We assume that all information in the samples is noisy, including position, normal, and connectivity. The goal is to remove the noise from the position and normal information.

More generally, the problem is inherently ambiguous, since there is no universal definition of a feature, and nothing in the samples to distinguish surface variations due to features versus those caused by noise. Thus, it is necessary to make some assumptions in order to de-noise the samples  $X$ . In particular, we will assume that variations due to noise occur at a significantly smaller scale than those from features. This assumption is not too restrictive; as will be seen, the only penalty when it is violated is that small features are smoothed away with the noise, while large features will still be preserved.

We also assume that  $S$  is "reasonable" well sampled by  $X$ , though we do not provide a formal definition of "reasonable". In rough terms, we require that the sampling rate is sufficient for an accurate reconstruction of  $S$ . These are similar and related to the requirements for sampling and reconstructing signals, such as the Nyquist limit, though not in a formal sense.

This will be handy in getting the right filters to be used for the mesh and also to enable us get a good reconstruction of the scan being made.

## Previous Objectives

1. Start with the GUI (In progress)
2. Research about modification on the mesh algorithm (In Progress)
3. Try to include Open-CV on the previous year program (In progress)

## This Week Objectives

1. Research Filters to use for the mesh
2. Start with the GUI (In progress)
3. Try to include Open-CV on the previous year program (In progress)

## Reference

- **Trello Account** <https://trello.com/b/MaBdGQ7p/software-engineering>
- **GitHub Account** <https://github.com/MSCV1-2017/3D-ScannerProject>
- **Previous Project** <https://github.com/umaatgithub/3D-KORN>