Project Proposal

Kinect Fusion

1 Abstract

We plan to re-implement the paper KinectFusion [1]. It is a system a for accurate real-time mapping of complex and arbitrary indoor scenes in variable lighting conditions, using only a moving low-cost depth camera and commodity graphics hardware. It fuses all of the depth data streamed from a Kinect sensor into a single global implicit surface model of the observed scene in real-time. The current sensor pose is simultaneously obtained by tracking the live depth frame relative to the global model using a coarse-to-fine iterative closest point (ICP) algorithm, which uses all of the observed depth data available. Modelling of natural scenes, in real-time with only commodity sensor and GPU hardware, promises an exciting step forward in augmented reality (AR), in particular, it allows dense surfaces to be reconstructed in real-time, with a level of detail and robustness beyond any solution yet presented using passive computer vision. The planned processing pipeline and methods are shown in Figure 1.

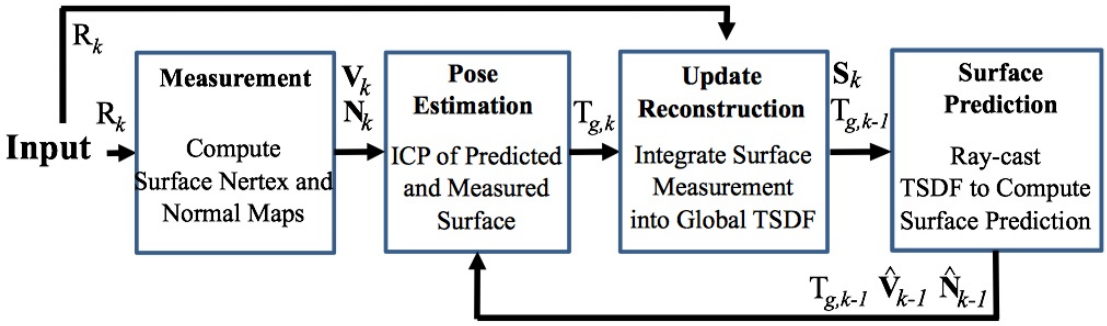

Figure 1: Method overview.

2 Requirements

dataset: TUM RGBD dataset(category: handheld SLAM)
library: 1.CUDA 2.Eigen 3.OpenCV

3 Team

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4 Milestones

The First Week: In the first week, we are going to have a complete digestion and comprehension over the paper, by summarizing the major approaches and methodologies, we can have an overview of how the article is devised.
The Second Week: Code implementation, by implementing the methodologies provided in the article, we will better know how the ideas are structured from a practical perspective.
The Third Week: Model improvement, based on the article, we are going to make improvements and think of our methods to attempt to optimize the output achieved in the second week.
The Fourth Week: Model testing, we are going to make a complete test on our own method and summarize our originality and compare our result against the article's.

References

[1] R. A. Newcombe, S. Izadi, O. Hilliges, D. Molyneaux, D. Kim, A. J. Davison, P. Kohi, J. Shotton, S. Hodges, and A. Fitzgibbon. Kinectfusion: Real-time dense surface mapping and tracking. *2011 10th IEEE International Symposium on Mixed and Augmented Reality*, pages 127–136, 2011.