

CS6320: 3D Computer Vision

Final Project Proposal

Multiple baseline stereo

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Introduction The objective of this project would be to explore the use of multiple images acquired with multiple baselines in depth computation.

In fact depth computation is one of the key goal of computer vision.

Objective The objective of this project would be to try to implement Masatoshi Okutomi and Takeo Kanade paper: "*A Multiple-Baseline Stereo*" which deals with depth determination using multiple cameras. Our implementation will rely on a single camera translated to create the set of images. We will discuss other correlation based similarity measurements used in the stereoscopic method. Indeed, in the second project, we only focused on the Zero Mean Normalized Cross Correlation (ZMNCC) but other similarity measurement exists and could be used. In Okutomi and Kanade paper they used the Sum of Square differences measurement (SSD) and we will try to see if we can use other methods. Some discussions about multi camera or multi-view geometry could be added to discuss the challenges of such a project.

Data We will acquire image sets with our camera. We will remind the intrinsic parameters of the used camera that have been determined with calibration. We will also try to test our implementation if we find test data set available.

Methods We will try to implement depth reconstruction based on Okutomi and Kanade method. We will discuss the use of other similarity measurements, discuss the number of images used. One aspect that would be considered here is rectification. Indeed, we will take pictures with horizontal translation to modify the baseline, but how this could be extended to images with other kinds of motion that could be rectified. The trifocal tensor which is a mathematical framework to deal with 3 view geometry could also be discussed.