Computer Vision Assignment Six @ ETH Zurich
Stereo Matching

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1 Disparity Computation

Figure 1: Original Image.

Figure 2: Original Image rectified.

Figure 3: Disparity Computation using winner takes all algorithm with window=3.

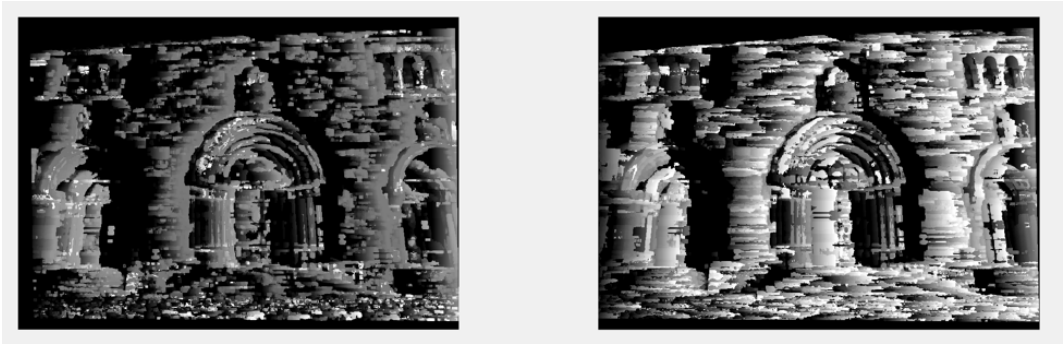

Figure 4: Disparity Computation using winner takes all algorithm with window=5.

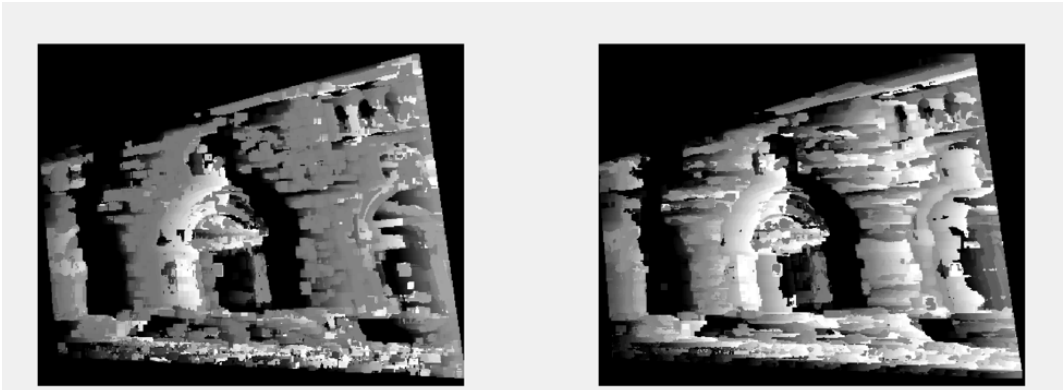

Figure 5: Disparity Computation using winner takes all algorithm with window=7.

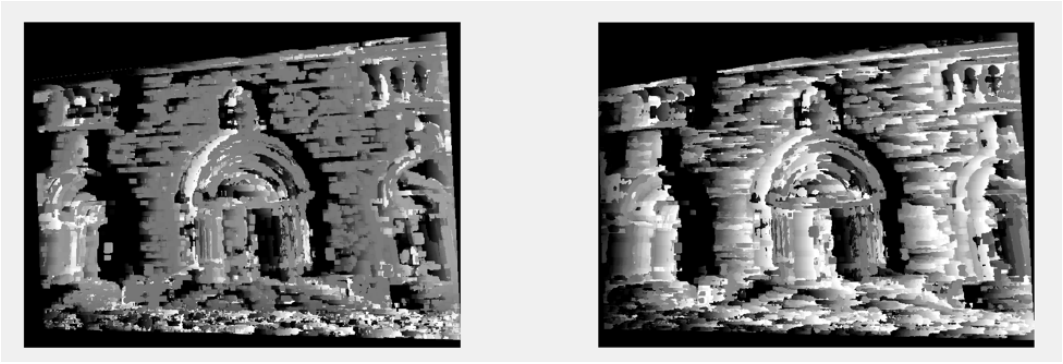

Figure 6: Disparity Computation using winner takes all algorithm with window=9.

Following the winner takes all algorithm from the slides, the above results were obtained. As it can be noticed that when increasing the window size, the disparity map is more smoothed but when using smaller window; more details are obtained. Please note that I used the vl-sift package since the code provided was not working on my laptop (Mac 2016 with OSX sierra), I also had to recompile an updated source code of the GC library used.

2 Graph Cut

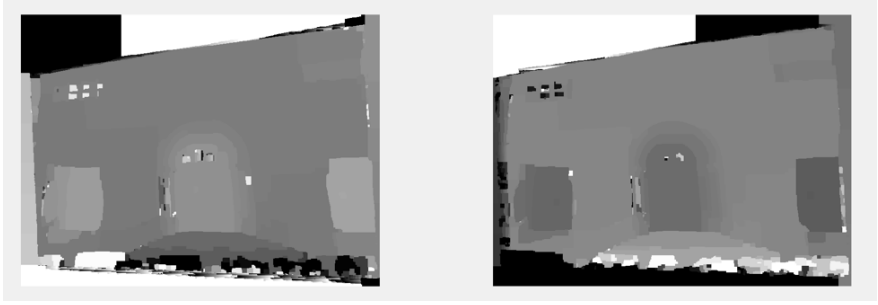

Figure 7: Disparity Computation using graph cut algorithm with window=3.

Likewise the graphcut algorithm was implemented by following the algorithm specifications from the slides. Comparing it to the winner takes it all algorithm, we can notice that the results obtained from the graph cut algorithm are way smoother and has less noise in the disparity map. However, it seems that mpre details are missed; like the top part above the doors which seems to have a different depth than the door itself but the graph cut algorithm recognizes it to have the same depth.

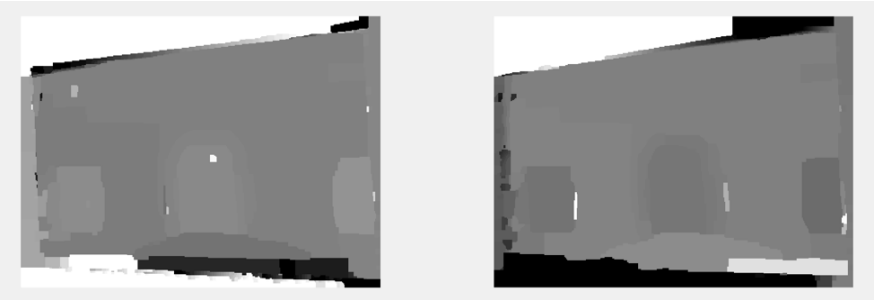

Figure 8: Disparity Computation using graph cut algorithm with window=5.

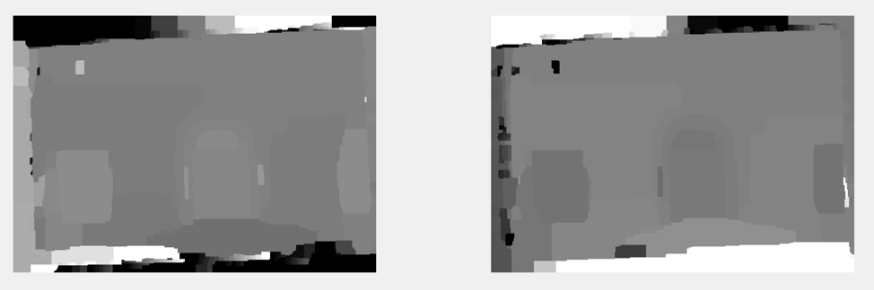

Figure 9: Disparity Computation using graph cut algorithm with window=7.

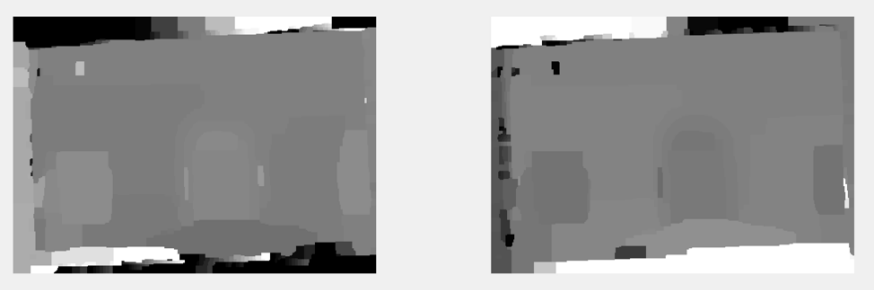

Figure 10: Disparity Computation using graph cut algorithm with window=9.

3 Generating a textured 3D Model

Finally, the 3D points are recovered by generating 3D point clouds from the disparity maps, the results can be seen below. As we can notice that some depths like the doors on the left and right for example are not recognized correctly, but in general the textured 3D model produced from the graph cut seems to be less noisy than the winner takes it all algorithm.

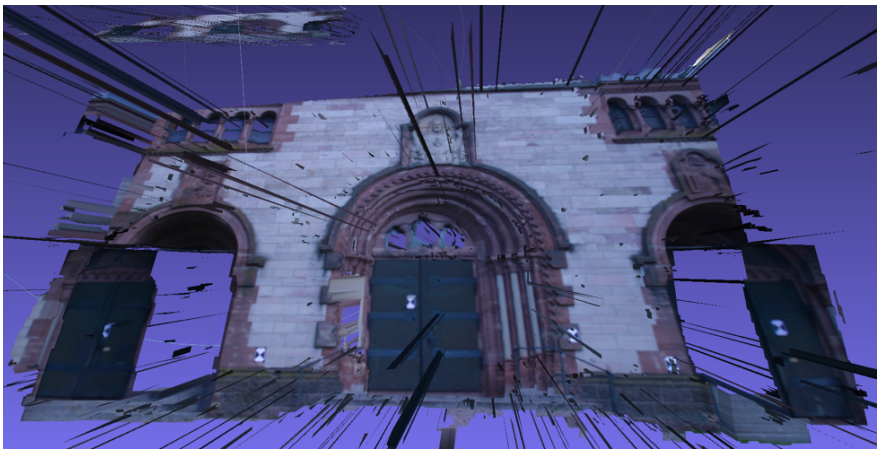

Figure 11: Generated textured 3D model using the disparity map obtained from winner takes all algorithm.

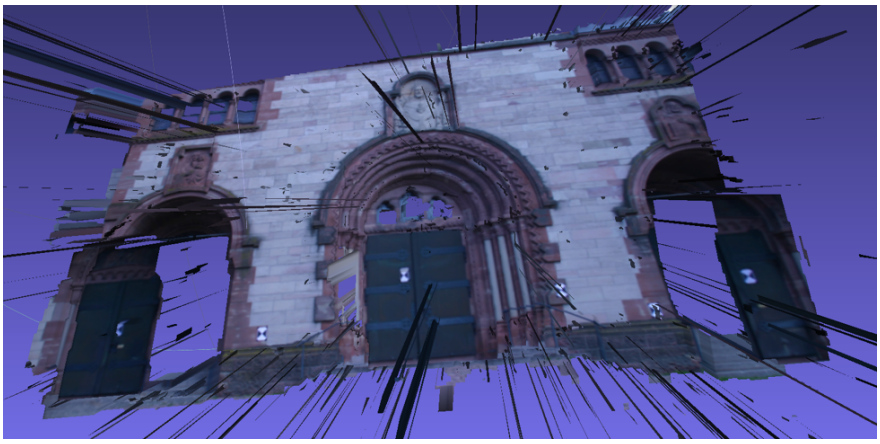

Figure 12: Generated textured 3D model using the disparity map obtained from graph cut algorithm.

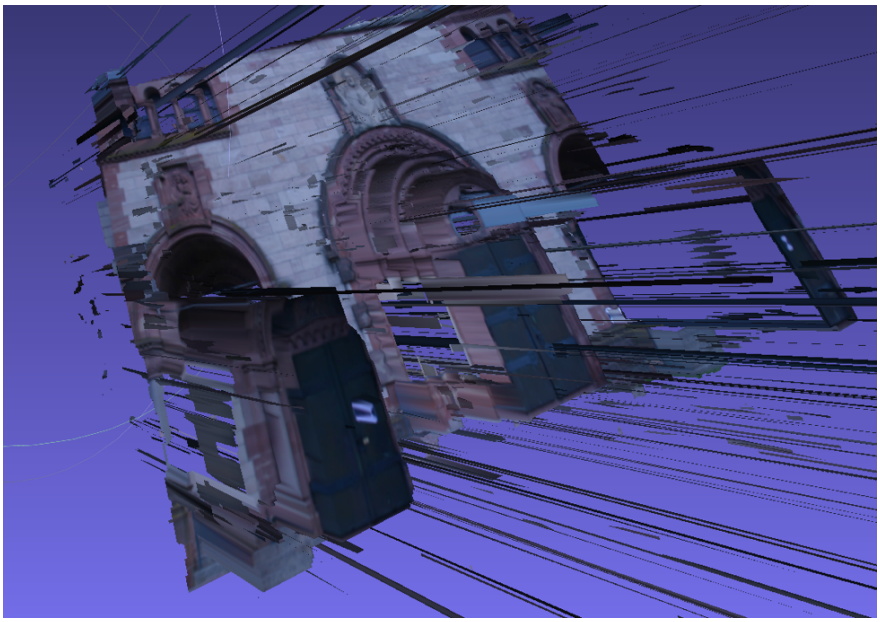

Figure 13: Generated textured 3D model using the disparity map obtained from graph cut algorithm.