

SGN-34006 – 3D and Virtual Reality Project Assignment

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	Step	Completed
Mandatory	Step 1: Cost function calculation	X
	Step 2: Cost aggregation based on three methods	X
	Step 3: 'Winner-takes-all' disparity estimates	X
Extra tasks	Step 4: Detection of occlusions	
	Step 5: Computation of confidence values for disparity estimates	
	Step 6: Post-filtering to tackle occlusions and bad pixels	
	Step 7: Implementation of bilateral filter based aggregation	

Read images and display images

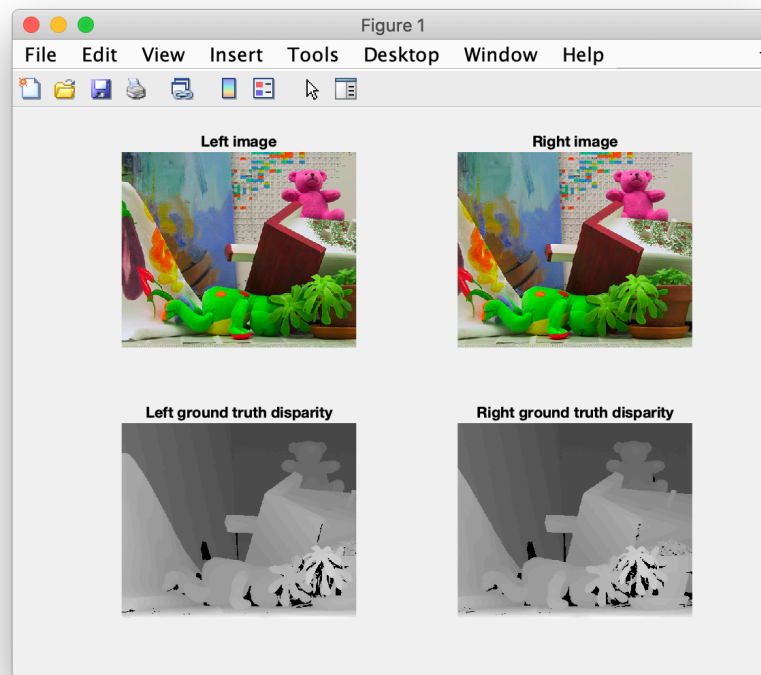


Figure 1. Stereo image data with ground truth

I loaded each left and right image with ground truth disparity. And I displayed them in Figure 1.

Cost calculation and aggregation



Figure 2. Comparison of the estimation result

I calculated the cost volume out of two images using the formula as follows:

$$C_{left}(y, x, d) = |L(y, x) - R(y, x - d)|$$
$$C_{right}(y, x, d) = |R(y, x) - L(y, x + d)|$$

In order to reduce the effect of outliers, I capped the individual cost values in the 3D cost matrices. If they are greater than 150, I set them to 150.

I compared the estimation results after applying the block filter, the Gaussian filter and the local color-weighted filter (guided filter) to the left cost matrix. *fspecial* was used to create the block filter and the Gaussian filter, and the filters were applied to the matrix by *imfilter* and *imguidedfilter*.

The disparity was estimated from the cost volume using the 'Winner-takes-all' approach:

$$D(y, x) = \operatorname{argmin}_d C(y, x, d)$$

When the disparity values differ from the ground truth by more than 1, I defined those pixels as bad pixels and calculated the error percentage.

Draw graphs about effect of window sizes

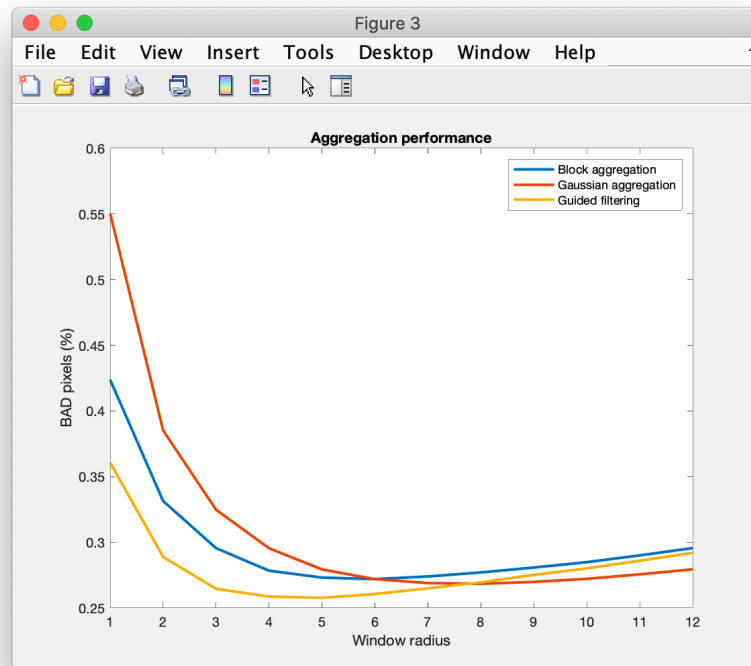


Figure 3. Graph about effect of window sizes comparing different aggregation methods

The graph about effect of window sizes was drawn in Figure 3, comparing 3 different aggregation methods. It shows a change in bad pixels percentage according to the window size.