Computer Vision
Spring 2017
Problem Set #3

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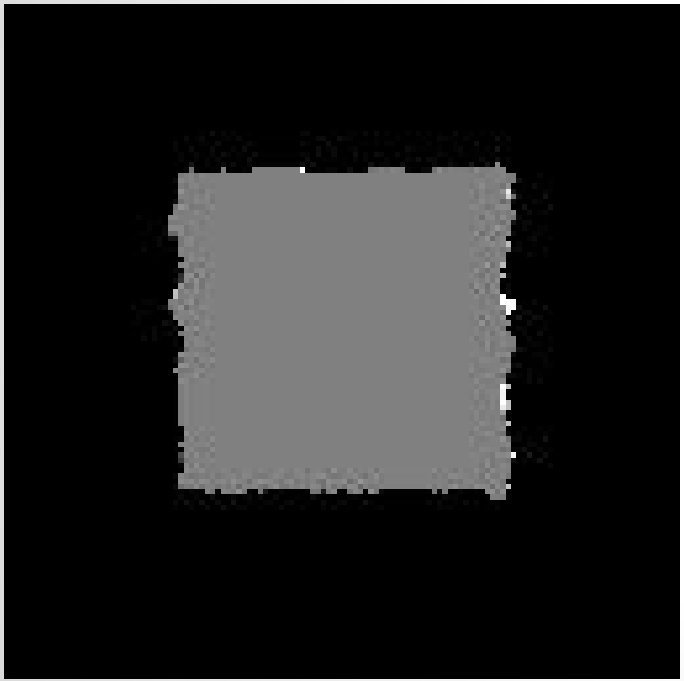
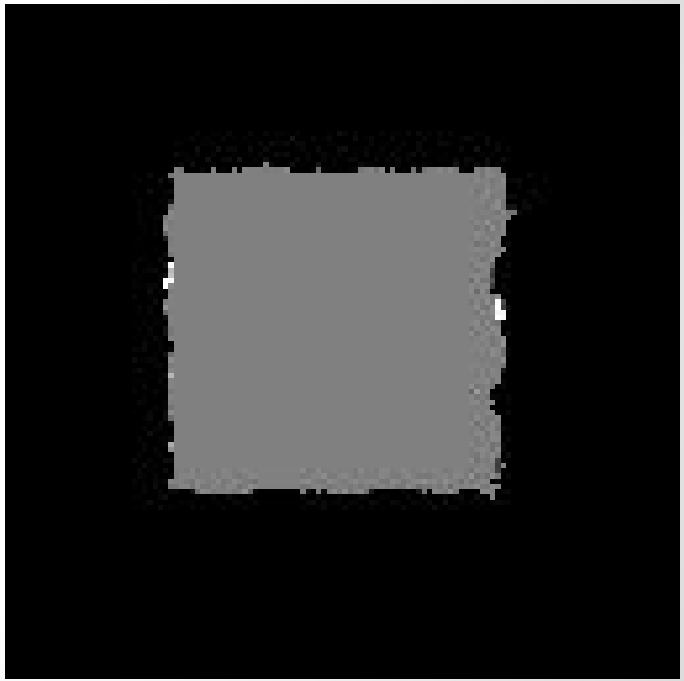
1a: Disparity Images (pair0)



$D_L(y,x)$ [matching from left to right] - **ps3-1-a-1.png**



$D_R(y,x)$ [matching from right to left] - **ps3-1-a-2.png**

1b: Disparity Images (pair1)

$D_L(y,x)$ [matching from left to right] - **ps3-1-b-1.png**

$D_R(y,x)$ [matching from right to left] - **ps3-1-b-2.png**

2a: Disparity Images (pair1 noise)

$D_L(y,x)$ [matching from left to right] - **ps3-2-a-1.png**

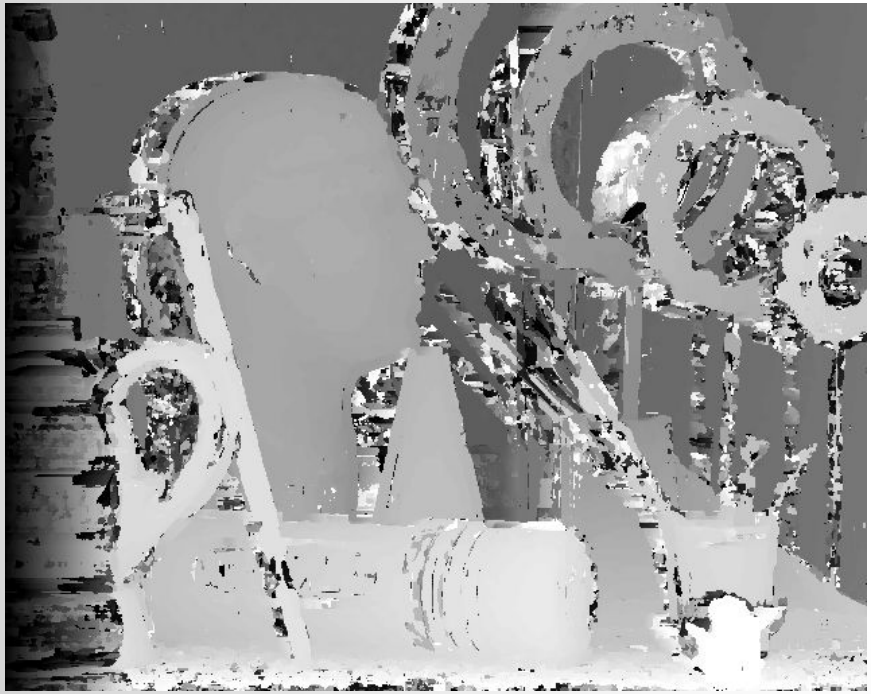
$D_R(y,x)$ [matching from right to left] - **ps3-2-a-2.png**

2b: Disparity Images (pair1 contrast)

$D_L(y,x)$ [matching from left to right] - **ps3-2-b-1.png**

$D_R(y,x)$ [matching from right to left] - **ps3-2-b-2.png**

3a: Disparity Images (pair1 normcorr)



$D_L(y,x)$ [matching from left to right] - **ps3-3-a-1.png**

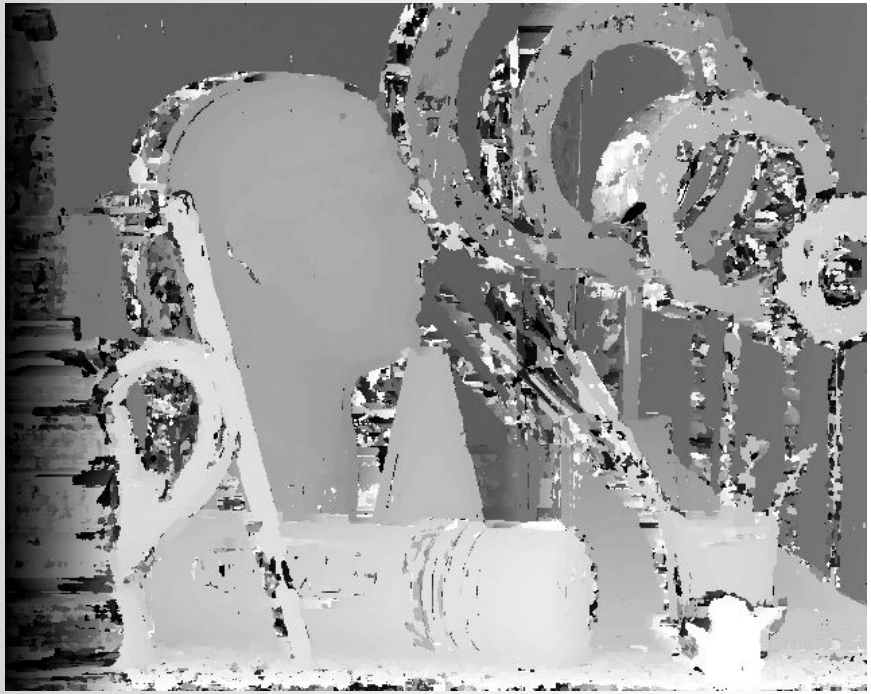
$D_R(y,x)$ [matching from right to left] - **ps3-3-a-2.png**

3b: Disparity Images (pair1 normcorr) using Gaussian noise

$D_L(y,x)$ [matching from left to right] - **ps3-3-b-1.png**

$D_R(y,x)$ [matching from right to left] - **ps3-3-b-2.png**

3b: Disparity Images (pair1 normcorr) using increased contrast



$D_L(y,x)$ [matching from left to right] - **ps3-3-b-3.png**

$D_R(y,x)$ [matching from right to left] - **ps3-3-b-4.png**

4a: Disparity Images (pair2)

$D_L(y,x)$ [matching from left to right] - **ps3-4-a-1.png**

$D_R(y,x)$ [matching from right to left] - **ps3-4-a-2.png**

5: Discussion

Answer the questions below:

a. In the input directory are ground truth disparity images pair1-D_L .png and pair1-D_R .png. Compare your results of the SSD images of 1b and the ground truth. What are the differences that you see?

- ➢ Although we can feel the sense of depth from the SSD image results, they were not exactly as clear as the ground truth. In addition, the SSD image results had the darker left or right edge. This was because that part of the image was only exist on one of the stereo images. The grayscale color appeared different than the ground truth.

5: Discussion

Answer the questions below:

b. Now, compare your results of the noisy SSD images of 2a and the ground truth. What are the differences that you see?

- ➢ The noisy SSD images were a lot different than the ground truth. While we could still see the shape of some objects, the sense of depth was not as clear as the non-noisy images. SSD is sensitive because we squared the difference but it is more susceptible to noise.

5: Discussion

Answer the questions below:

c. How do your normalized correlation image results compare with the SSD image results and with the ground truth? Discuss the differences that you observe.

- ➢ The normalized correlation image results were better and look a lot closer to the ground truth than the SSD image results. Unlike the SSD image results, most of the grayscale appeared in the same color for both normalized correlation image results and the ground truth.

5: Discussion

Answer the questions below:

d. Compare your results of 3a with noisy and contrast-boosted images of 3b. Are there any differences?

- ➢ The normalized correlation worked better for images with increased contrast. However, when we introduce noisy in the stereo images, the normalized correlation did worst compare to the SSD. I tried to do Gaussian blur for noisy images but it did not help at all.

5: Discussion

Answer the questions below:

e. Finally, from this exercise, please discuss what you take away. What it takes to make stereo work using a window based approach.

- ➢ To make stereo work using a window based approach, we need to keep the window size minimum. If the window size is too big, the objects won't be sharp enough. We also need to set larger dmax to be able to get the depth of the objects from the stereo images. While normalized correlation method is definitely better, it is very sensitive to noise.