Hands-on 18.05.2018 of the Computer Vision course at the University of Helsinki in May, 2018

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1 Hands on

1.1 Disparity map

The first task of this hands-on was to create a disparity map for two images, which are supposed to be captured from left and right camera of some stereo set-up. The disparity of pixels was checked first with using a detector created with *StereoBM_create*. This methods takes two parameters, which defined the way how the disparity is detected: *numDisparities* and *blockSize*. A set of experiments was conducted with different values of these parameters. Result disparity map is presented at a grayscale image together with left original image. Red pixels depict cases, where disparity could not be calculated.

Experiments showed, that for large block sizes too many the algorithm can not calculate disparity for a large share of pixels. For very large block sizes the whole map is painted with red. With decreasing of block size result disparity map looks less smooth but it is possible to see contours of objects. Varying numDisparsities has an important effect. When this parameter has a quite large value (160) there is an area at the left side, where disparity can not be calculated. It seems, that as search range for disparity is large, the method is not able to find any matching pixels lying in that area. If the parameter's value has the smallest value (16), this area is significantly diminished.
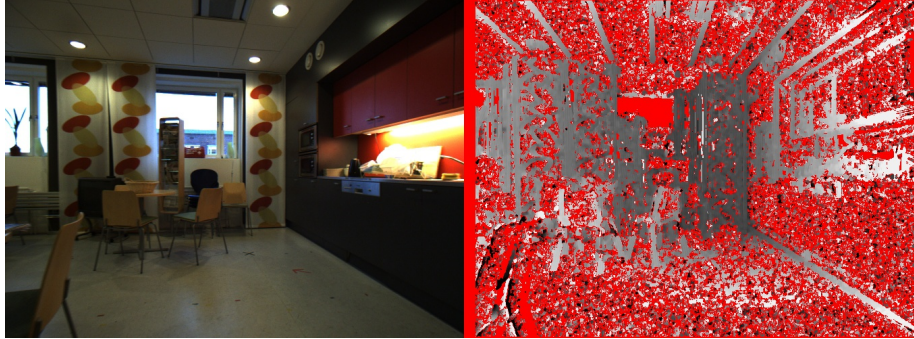
Figure 1: numDisparsities:16, blockSize:5

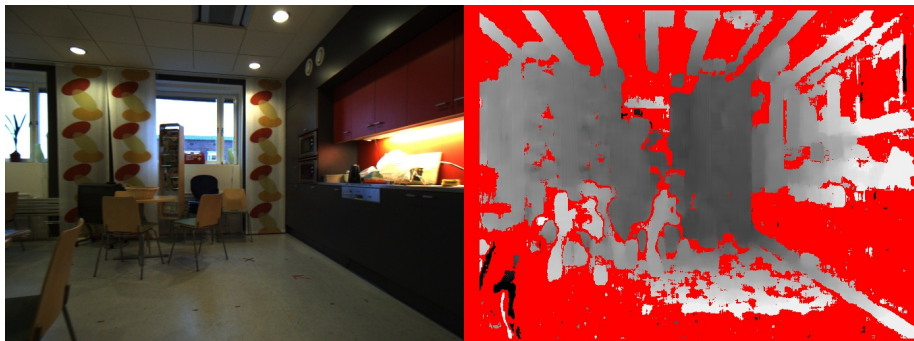Figure 2: numDisparsities:16, blockSize:17

Figure 3: numDisparsities:16, blockSize:51

Figure 4: numDisparsities:160, blockSize:17

After that the algorithm SBGM was tested with different parameters. It detects more matching points. It also produce better objects' contours at result figure. For the figure, where cameras look at lift's wall SBGM allows to calculate disparity for more pixels. Table 1 shows the set of parameters, which was used (the set was found in the internet and then tuned for this set of frames). An area with negative results on the left side of image exists regardless of SBGM settings (at least those settings, which were tested).

| Parameter	Value	Comment
numDisparsities	32	
blockSize	17	
P1	200	Increasing of this parameter increases amount of negative results
P2	500	
disp12MaxDiff	20	Increasing this parameter's value reduce amount of negative results. But there was no much sense to set it larger, than 20, as gain was indistinguishable
preFilterCap	20	
uniquenessRatio	1	
speckleWindowSize	0	
speckleRange	0	
mode	STEREO_SGBM_MODE_SGBM_3WAY	SGBM 3Way version

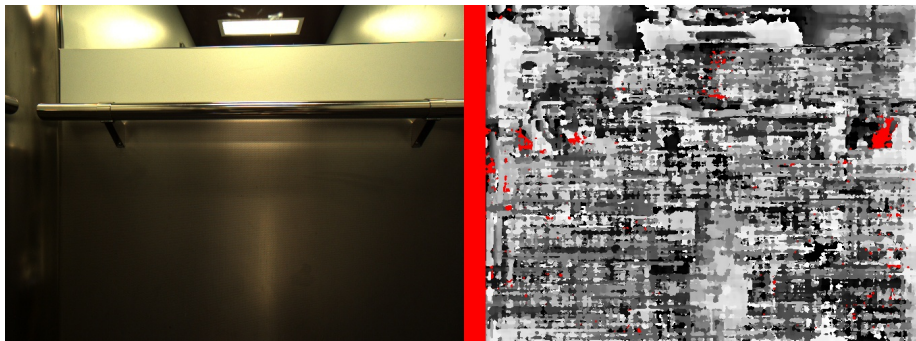Figure 5: Corridor with stairs
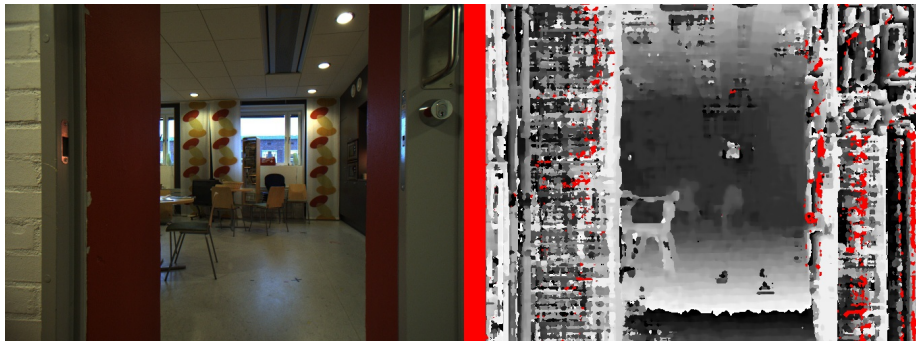
Figure 6: Entrance to a room

Figure 7: Lift's wall