EE 8374: Fundamentals of Computer Vision

Homework-4

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Part-I: Blob detection using LoG scale space [65 points]

Original input image:

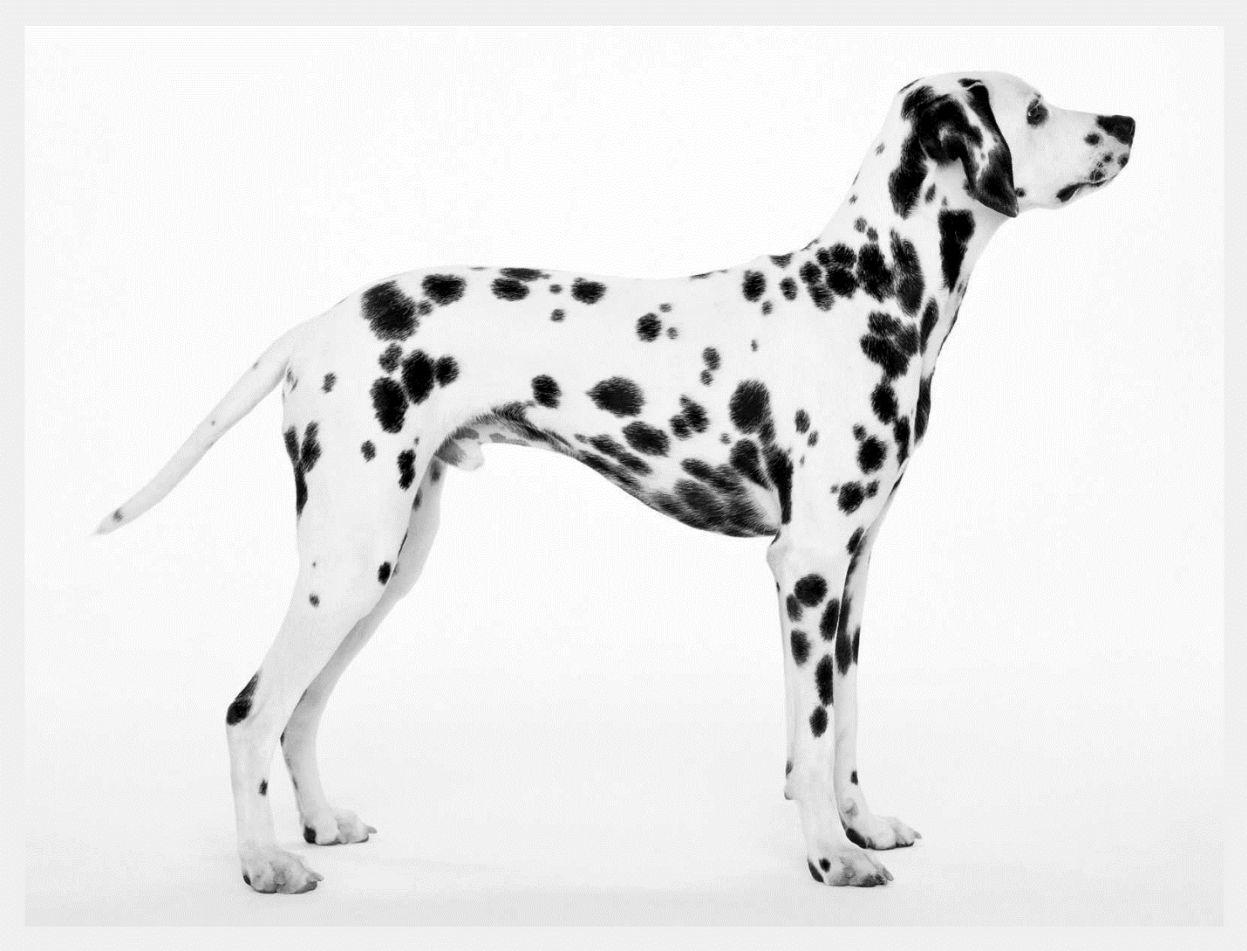
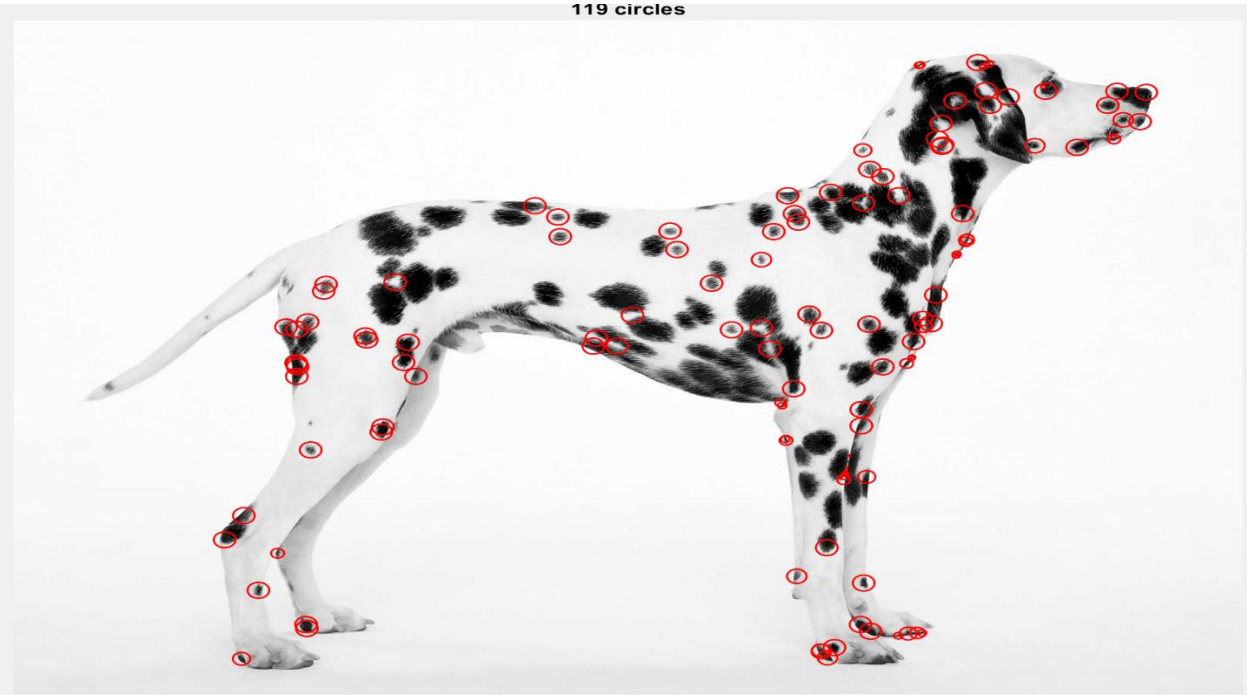


Image with Corresponding blobs with sigma=2, number of scales=10 and threshold 0.35:

Now we change initial sigma to 4, and the image is following:

And sigma is 1:



Now we change the number of scales to 13, with sigma=2, threshold = 0.35

Now we change the number of scales to 15

Now we change to threshold to 0.25, with sigma=2, number of scales=10:

Finally we change threshold to 0.20:

Comments:

Sigma will affect the results of LoG, to this image, set sigma=2 will detect more blobs result, with the change of sigma, the different size of blob will be detected.

Number of levels will affect the accuracy of blobs detected, more level will increase the accuracy.

Threshold will affect the number of blobs to display, the less threshold be set, the more blobs will be display.

Part-II: SIFT using VLfeat [35 points]

Screenshot of image using VLfeat to identify the SIFT keypoints and the associated descriptor as following:

If we set the peak selection threshold by 10, the image will show as following:

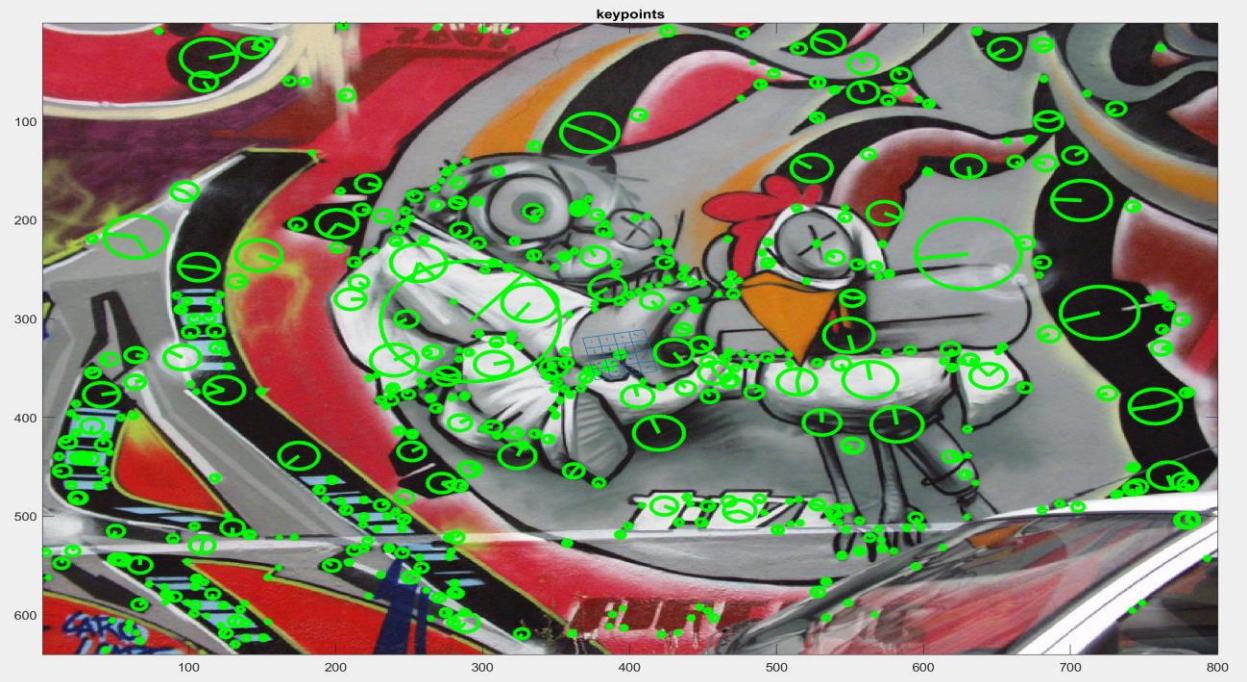


Image of robustness to brightness change:

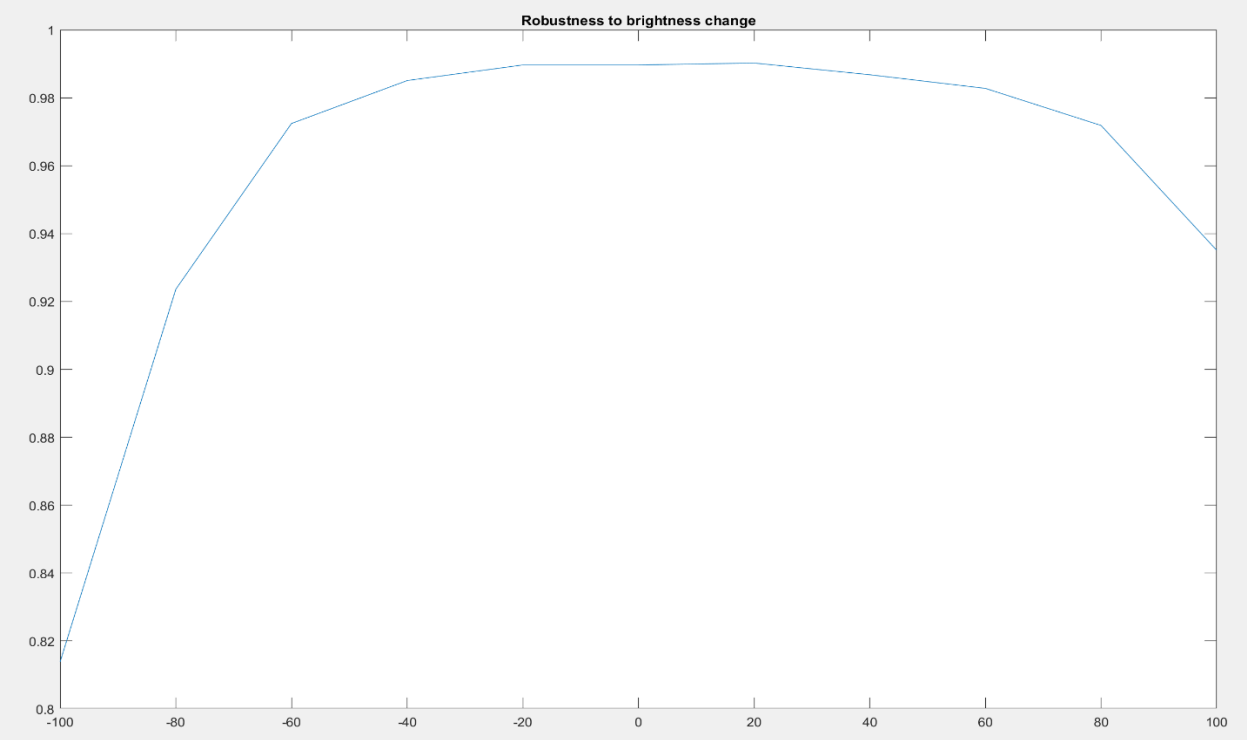


Image of robustness to contrast change:

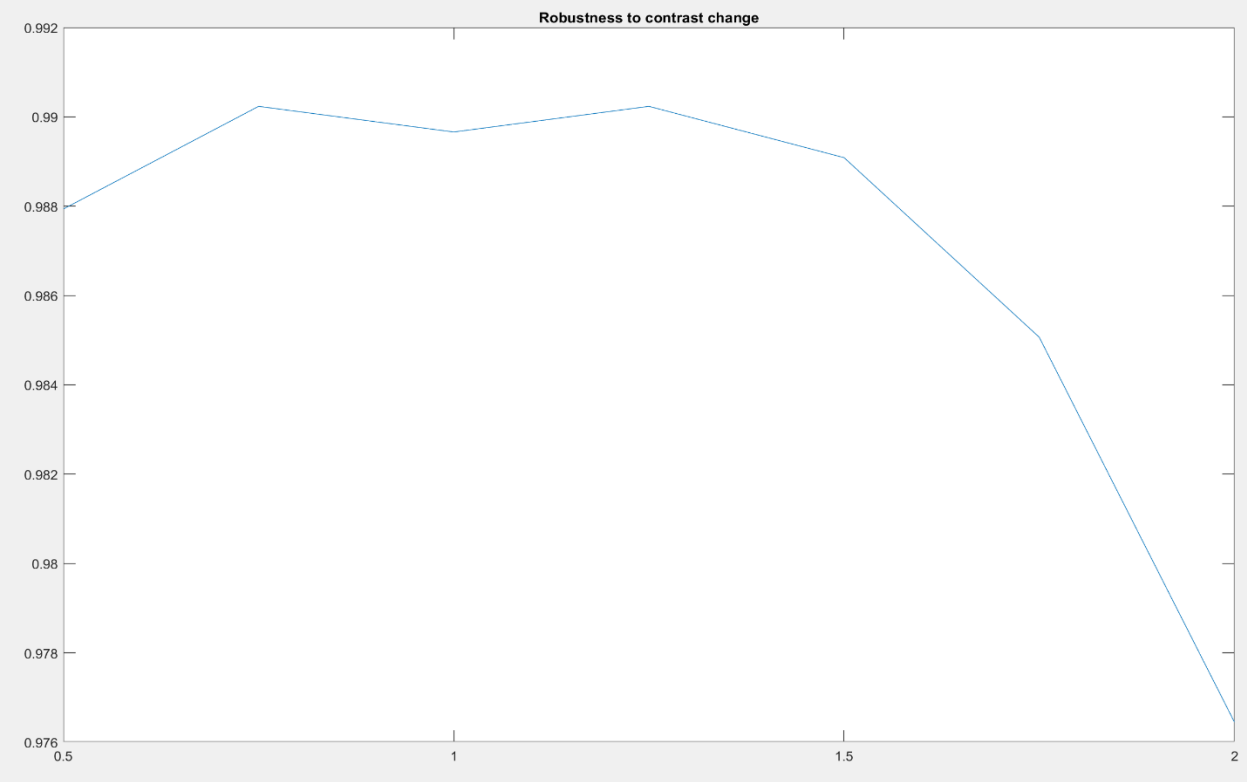
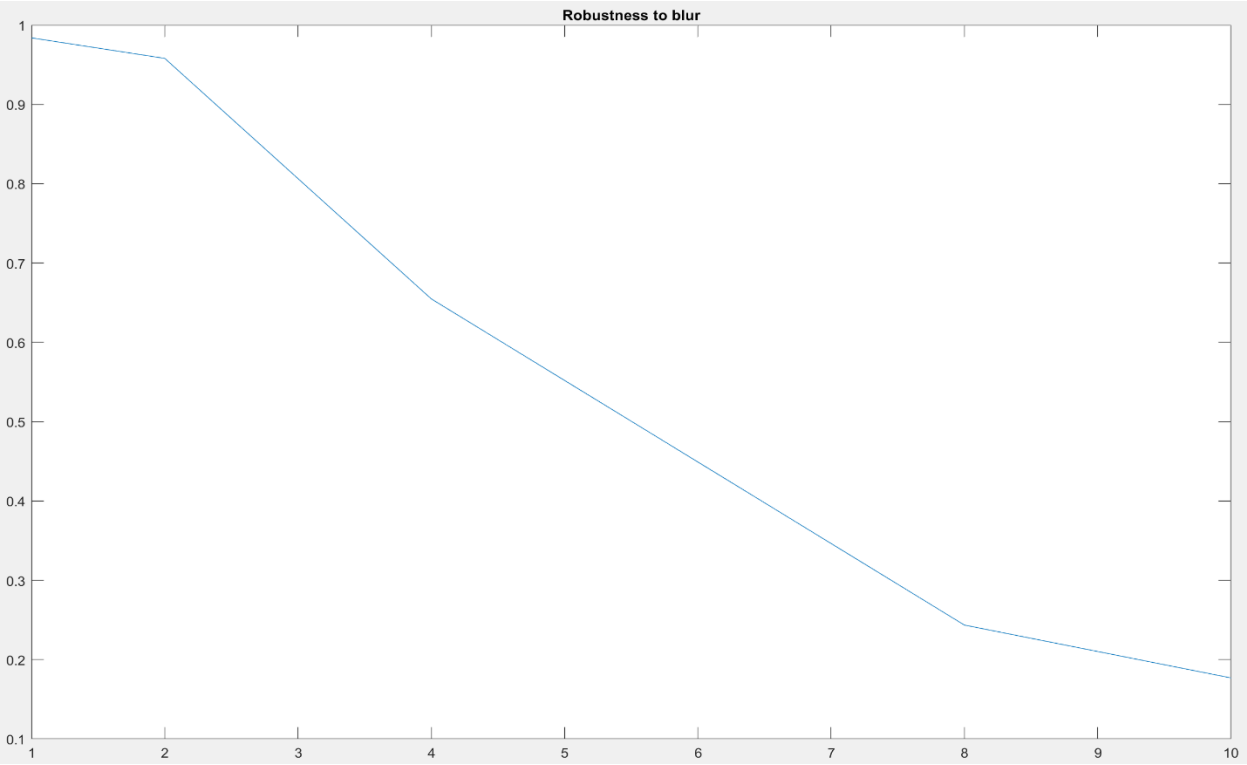


Image of robustness to blur:



Comments:

SIFT descriptor has good robustness to change in brightness with middle and high brightness, but in low brightness, the repeatability will decrease.

SIFT descriptor has good robustness to change in contrast with low and middle contrast, but in high contrast, the repeatability will decrease.

SIFT descriptor has bad robustness to change in blurring, the repeatability will decrease rapidly with the blurring increasing.