EN2550 Exercise 5 Blobs and Fitting Basics

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March 8, 2022

Blobs

1. Construct the scale-normalized Laplacian of Gaussian (LoG) with $\sigma = 10$. Choose the window size appropriately. Show this LoG as an image.
2. Filter a 71×71 image of a black circle of radius $r = 14$ with a series of LoG kernels with $\sigma \in [5, 15]$ and find the scale-space extremum. Justify your answer.
3. Match SIFT features between two images in the Graffiti sequence https://www.robots.ox.ac.uk/ vgg/data/affine/.

Fitting Basics

4. The following is a code snippet to generate a noisy line. Use least-squares line fitting to fit a line.

```
m = 2 # Line equation: y = m*x + c. m is the slope. c is the intercept.
c = 1
x = np.arange(1,10, 1)
n = 2.*np.random.randn(len(x))
o = np.zeros(x.shape)
# o[-1] = 20
y = m*x + c + n + o
```

5. Use total least squares to fit a line. Experiment with high values of the gradient m.
6. Use RANSAC to fit a line. Experiment on the effect of outliers.