Report Blatt 3

Alexander Attinger, Yannic Kilcher

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1 Exercise 1 Edge Detection

As descriped in sheet one for the Laplacian, edges are usually denoted by strong change of intensity over short distances. Thus they can be detected by calculating

1.1 Sobel Edge Detection

The sobel operator is a specific filter convolved with the Image P. It is used to approximate the calculation of the gradient in x and y direction. To compute the gradient G_x in x direction:

$$G_x = \begin{pmatrix} -1 & 0 & 1 \\ -2 & 0 & 2 \\ -1 & 0 & 1 \end{pmatrix} * P$$

is used and for y direction G_y:

$$G_y = \begin{pmatrix} -1 & -2 & -1 \\ 0 & 0 & 0 \\ 1 & 2 & 1 \end{pmatrix} * P$$

is used. OpenCV implements the Sobel function, i.e. it allows to calculate $G_x and G_y$. The gradient magnitude G can be calculated in different ways, we used:

$$G = .5 * |G_x + G_x| \tag{1}$$

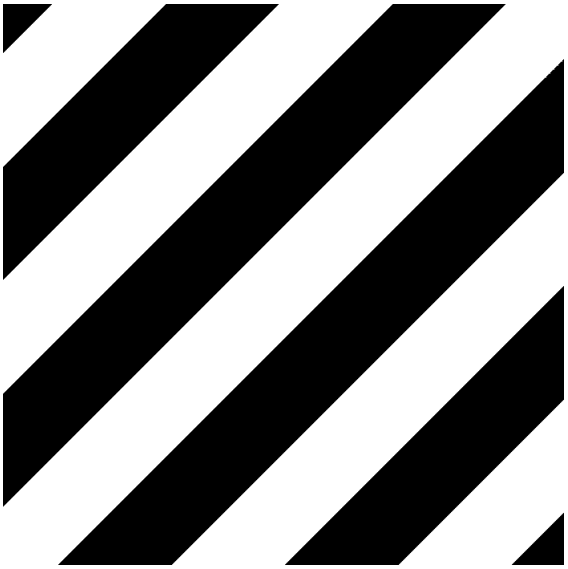
We then implemented a simpel thresholding on G to label pixels as Edge/background. As can be seen in the pictures, the detection works ok, at least for the human eye. Some points:

- Threshold value had to be adjusted for each picture individually
- In all pictures it is also hard to judge by eye, which part actually are edges and which are not

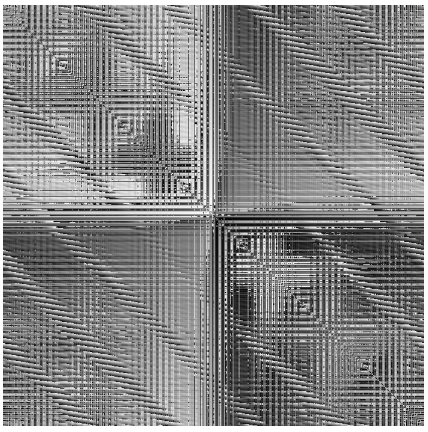
- In images with a clear foreground/background edge detection on the foreground object works fairly well (e.g. Butterfly)
- images with no clear distinction suc

1.2 Canny Edge Detection

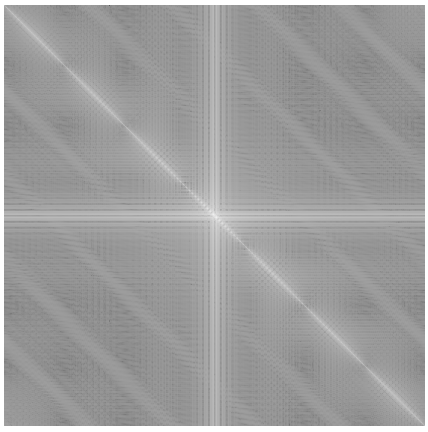
1.3 Comparison



(a) Original Image



(b) Phase Image

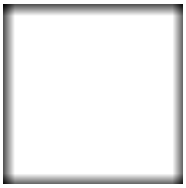


(c) Log Magnitude Image

Figure 1: Fourier transformation of a stripe pattern.

(a) Original Image 1

(b) Original Image 2



(c) Result after convolution

Figure 2: Spatial convolution of two images.

2 Excercise 2