Lab. Practice #3

Berk ARSLAN

Non-linear Spatial Filtering

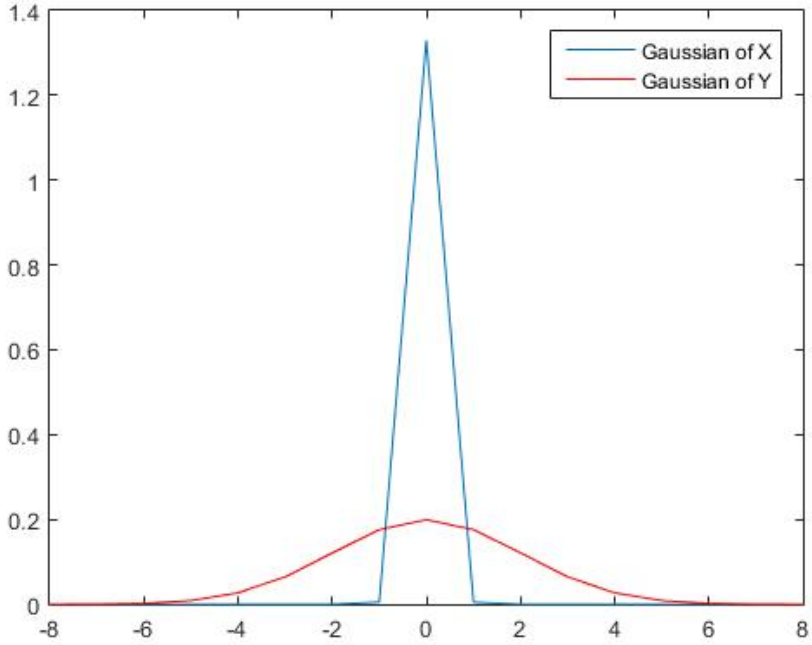
Exercise 3-3

The first step is reading the image than to implament the filter using colfilt function. The geometric mean function written by me, is used as filter in confilt function than the filtered image is turned to unsigned integer image as grayscale.

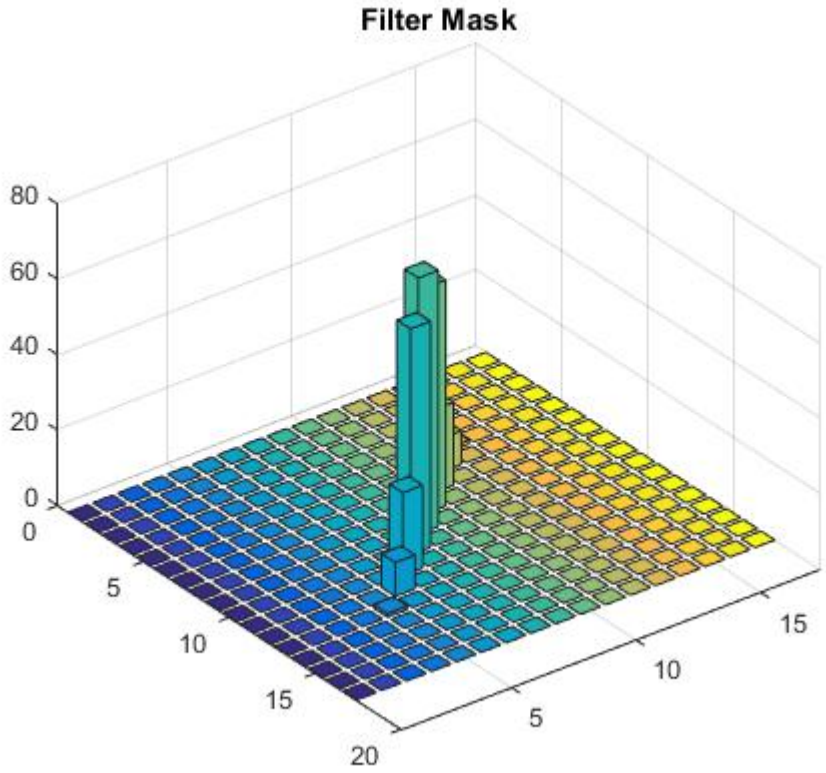
Gaussian Filter

Problem 3-1

First of all, the user inputs are described in the script as deviations of X and Y, filter sizes and filter's rotation then padding size and length of filter from center is calculated and they are implemented as two different gaussian distirbution functions where mu equals to zero.



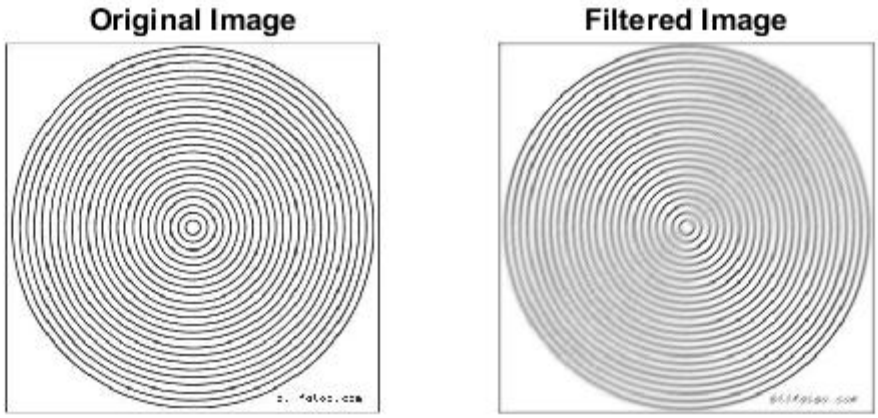
Secondly, the padded image is crated before calculating the filter matrix and to rotate with the imrotate function.



The im2col and col2im functions are used instead of the colfilt function because the filter is implemented in the script and colfilt function does not accept internal functions.

The filter and the padded image are shifted to coloumns than summation of transpose of filter multiplied by image diveded to summation of filter's values and the output is rounded.

The final step is to extrude the filtered image with col2im function and print the original and filtered images.



LoG and DoG

```
      deviationX = 0.3;%deviation of X
deviationY = 1;%deviation of Y
%filter sizes
filterX = 15;
filterY = 15;

%+/- filter limits
expandX = filterX/2-0.5;
expandY = filterY/2-0.5;

%defination of gaussian of X
sigmax = deviationX;%sigma value
mu = 0;
xofX = linspace(-expandX,expandX,100);%x values from -filter limit to +filter
limit into 100 pieces
yofX = 1/(sqrt(2*pi)*sigmax)*exp(-(xofX-mu).^2/(2*sigmax^2));%calculation of
gaussian distirbution function
```

```
%defination of gaussian of Y
sigmay = deviationY;%sigma value
mu = 0;
xofY =  linspace(-expandY,expandY,100);%x values from -filter limit to +filter
limit into 100 pieces
yofY =  1/(sqrt(2*pi)*sigmay)*exp(-(xofY-mu).^2/(2*sigmay^2));%calculation of
gaussian distirbution function

figure
plot(xofX,yofX)%first Gaussian plotted in blue
hold%plot on same figure
plot(xofY,yofY,'r')%second gaussian plotted in red
plot(xofX,(yofX-yofY),'k')%Differance of Gaussians
legend('Gaussian of X','Gaussian of Y','DoG')

figure%new figure
plot(xofX,(yofX-yofY),'k')%Differance of Gaussians
hold%plot on same figure
fspecial('log',size(xofX),1.1),plot(xofX,-ans);%Laplacian of Gaussian
legend('DoG','LoG')
```