Experiment 3

Example 1

```
clc;
clear all;
close all;
RGB = imread('len_top.jpg');
I = rgb2gray(RGB);
M = (1/9).*[1 1 1;1 1 1;1 1 1];
C = imfilter (I,M,'conv');
figure
imshow (C);
figure
imshow(I);
```

MCQS

1. Averaging filters is also known as _____ filter.
(a)Low pass (b)High pass (c)Band Pass (d) None of the mentioned

2. What is the undesirable side effects of Averaging filters?
(a) No side effects (b) Blurred edges (c) Blurred image (d) Loss of sharp transitions

3. Which type of enhancement operations are used to modify pixel values according to the value of the pixel's neighbors?

4. Which of the following is best suited for salt-and-pepper noise elimination?
(a) Average filter (b) Max filter (c) Box filter (d) Median filter

5. At which of the following scenarios averaging filters is/are used?
(a) To reduce noise (b)In the reduction of irrelevant details in the image (c) to reduce sharp transition in grey levels (d) All of the mentioned

6. In linear spatial filtering, what is the pixel of the image under mask corresponding to the mask coefficient w (1, -1), assuming a 3*3 mask?
(a) f (x, -y) (b) f (x + 1, y) (c) f (x, y – 1) (d) f (x + 1, y – 1)

Answers: 1) a. Low Pass 2) b. Blurred Edges 3) Filtering 4) (d) Median Filter 5) d. all of the mentioned 6) d. f (x + 1, y – 1)

Example 2

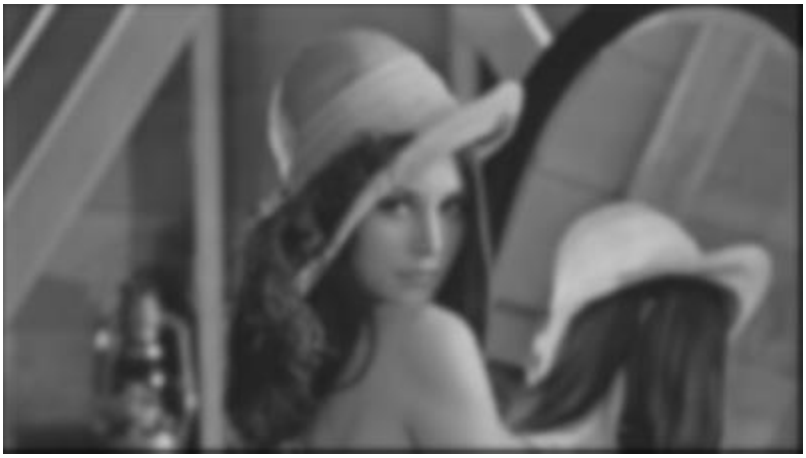
```
clc;
clear all;
close all;
RGB = imread('len_top.jpg');
I = rgb2gray(RGB);
H = fspecial('gaussian',Mask,Gaussian);
C = imfilter(I,H);
figure
imshow(C)
figure
imshow(I)
```

Original

Sigma=0.5, Mask=[3,3]

Sigma =0.5, Mask [20,20]

Sigma = 2, Mask [20,20]



Sigma = 2, Mask [3,3]

Sigma=1, Mask= [3,3]

MCQ's

1. The standard deviation controls _____ of the bell (2-D Gaussian function of bell shape).
(a) Size (b) Curve (c) Tightness (d) None of the Mentioned

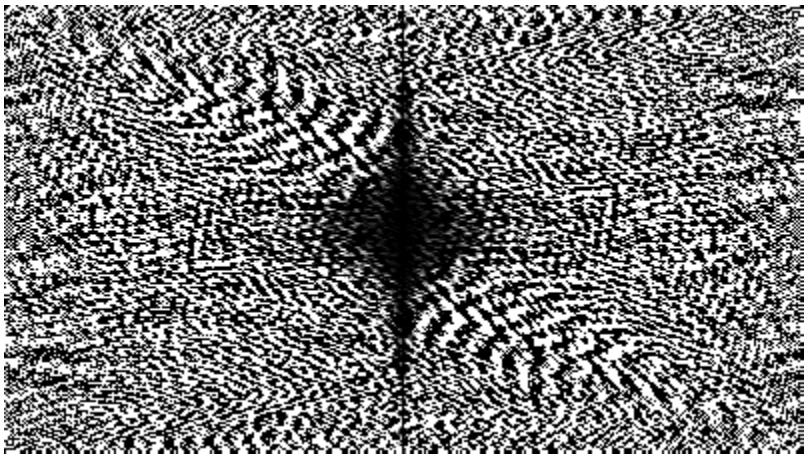
2. An example of a continuous function of two variables is _____
(a) Intensity function (b) Contrast stretching (c) Gaussian function (d) None of the mentioned

3. What is required to generate an M X N linear spatial filter?
(a) MN mask coefficients (b) M+N coordinates (c) MN spatial coefficients (d) None of the mentioned

Answers: Q1 c. Width Q2 c. Gaussian function Q3 a. MN mask Coefficients

Example 3

```
clc;
clear all;
close all;
RGB = imread('len_top.jpg');
I = rgb2gray(RGB);
U = fft2(I);
H = fspecial('gaussian',[225,400],1);
V = fft2(H);
C = U.*V;
Y = ifft2(C);
figure
imshow(I)
figure
imshow(C)
```



MCQs

1) Product of two functions in spatial domain is what, in frequency domain
A. correlation B. convolution C. Fourier transform D. fast Fourier transform

2) High pass filters are used for image
a) contrast b) sharpening c) blurring d) resizing

3) Low pass filters are used for image
a) contrast b) sharpening c) blurring d) resizing

4) To remove "salt-and-pepper" noise without blurring we use

a) Max Filter b) Median Filter c) Min Filter d) Smoothing Filter

5) Edge detection in images is commonly accomplished by performing a spatial ------of the image field. a) Smoothing Filter b) Integration c) Differentiation d) Min Filter

6) Both the -------- and -------- filters are used to enhance horizontal edges (or vertical if transposed).
a) Prewitt and Sobel b) Sobel and Gaussian c) Prewitt and Laplacian d) Sobel and Laplacian

7) One of the following filters is nonlinear
a) Gaussian Filter b) Averaging Filter c) Laplacian Filter d) Median Filter

Answers: Q1 a. Convolution Q2 b. Sharpening Q3 c. Blurring Q4 b. Median Filter Q5 c. Differentiation. Q6 - Q7 d. Median Filter.

Exercise

```
clc;
clear all;
close all;
RGB = imread('len_top.jpg');
I = rgb2gray(RGB);
J = imnoise(I,'salt & pepper');
peaksnr=psnr(I,J)
%Median filter
MD = medfilt2(J);
%Mean filter
W = fspecial('average', [3 3]);
ME = imfilter(J,W);
%Gaussian filter
G = imgaussfilt(J);
mdsnr = psnr (I,MD)
mesnr = psnr (I,ME)
gsnr = psnr (I,G)
H = padarray(2,[2 2]) - fspecial('gaussian' ,[5 5],2); %Create unsharp mask
E = imfilter(I,H);
figure
imshow(I)
figure
imshow(E)
```

peaksnr =

18.3722

mdsnr =

28.8877

mesnr =

24.5174

gsnr =

21.9589