LAB - 10

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Subject	Image Processing

Aim: Perform following Image Restoration tasks.

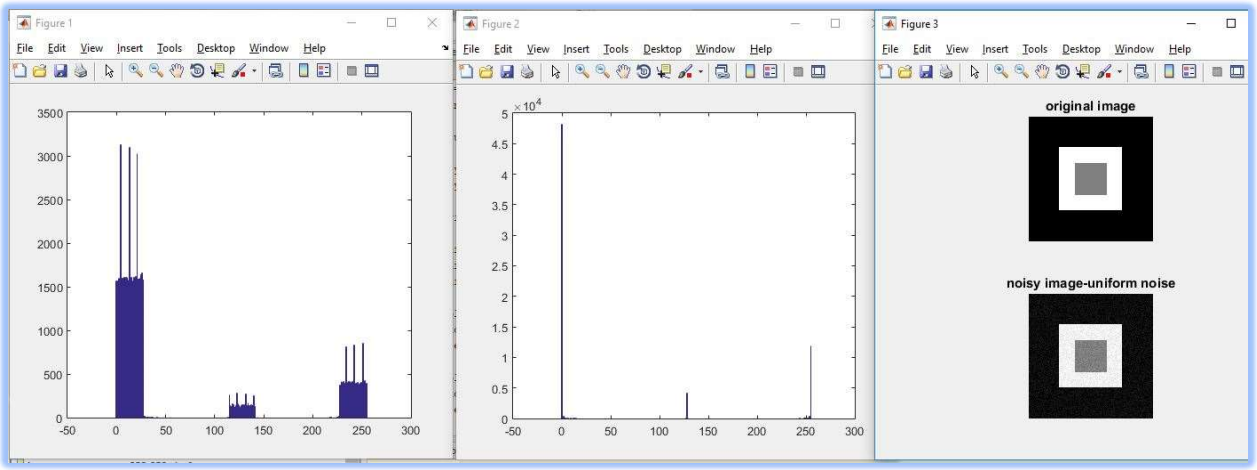
Q. 1: Add Uniform Noise into the image and plot histogram of noisy image. Use 'randi' function to generate uniformly distributed noise matrix.

- **Code:**

```
Editor - C:\Users\user1\Desktop\CE046_IP_LAB10\a_1.m
a_1.m | a_2.m | a_3.m | a_4.m | a_4_1.m

 1 -    img = imread('Test_Image.jpg');
 2 -    [m, n] = size(img);
 3
 4 -    z = uint8(randi([10, 40], m, n));
 5
 6 -    noisy_img = double(img) + double(z);
 7 -    noisy = imhist(mat2gray(noisy_img));
 8
 9 -    original = imhist((img));
10
11 -    figure(1), bar(0:255, noisy);
12 -    figure(2) , bar(0:255, original);
13 -    figure(3);
14
15 -    subplot(2,1,1);
16 -    imshow(img)
17 -    title('original image');
18
19 -    subplot(2,1,2)
20 -    imshow(mat2gray(noisy_img))
21 -    title('noisy image-uniform noise');
```

❖ Output:



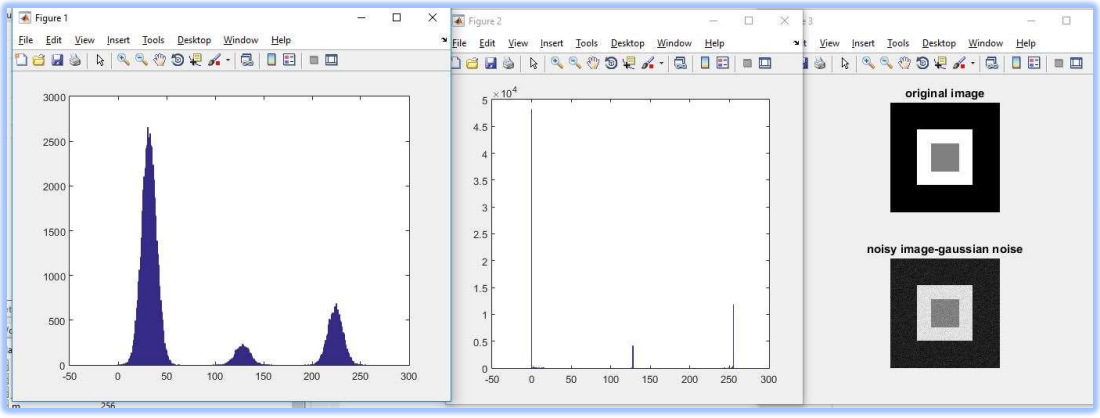
Q. 2: Add Gaussian (Normal) Noise into the image and plot histogram of noisy image. Use 'randn' function to generate Gaussian (Normal) distributed noise matrix with mean 1 and standard deviation 2.

❖ **Code:**

a_1.m | a_2.m | a_3.m | a_4.m | a_4_1.m

```
1 -  img = imread('Test_Image.jpg');
2 -  [m, n] = size(img);
3
4 -  mean_img = 1;
5 -  standard_deviation = 10;
6
7 -  z = mean_img + standard_deviation.*randn(m, n);
8
9 -  noisy_img = double(img) + double(z);
10 - noisy = imhist(mat2gray(noisy_img));
11
12 - original = imhist((img));
13
14 - figure(1), bar(0:255, noisy);
15 - figure(2) , bar(0:255, original);
16 - figure(3);
17
18 - subplot(2,1,1);
19 - imshow(img);
20 - title('original image');
21
22 - subplot(2, 1 ,2);
23 - imshow(mat2gray(noisy_img))
24 - title('noisy image-gaussian noise');
25
```

❖ **Output:**



Q. 3: Using imnoise function to add 'Salt and Pepper' Noise.

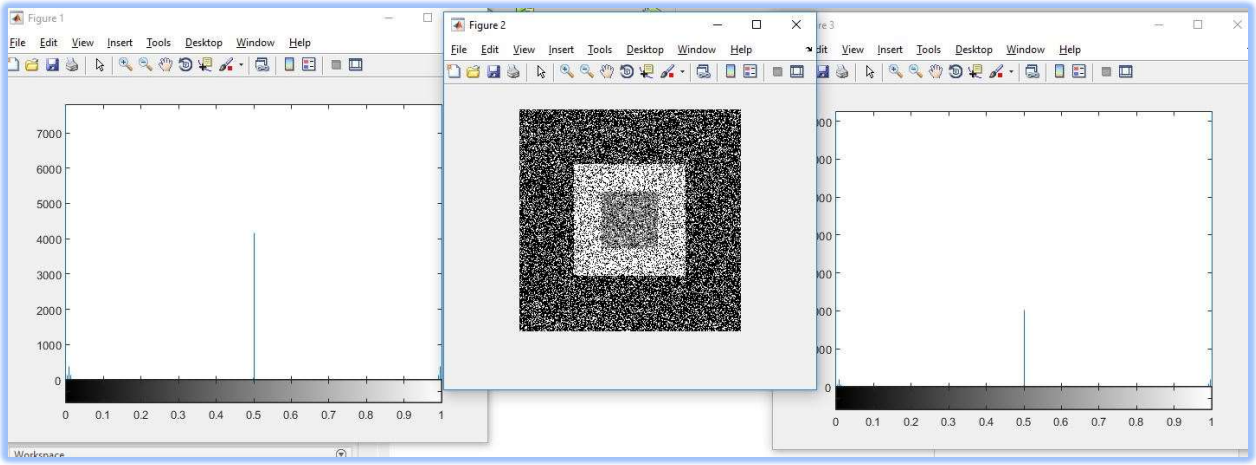
❖ Code:

Editor - C:\Users\user1\Desktop\CE046_IP_LAB10\a_3.m

a_1.m | a_2.m | a_3.m | a_4.m | a_4_1.m

```
1 -    clear all;
2 -    img = imread('Test_Image.jpg');
3 -    img = double(img);
4 -    img = mat2gray(img);
5
6 -    imhist(img);
7
8 -    noise = imnoise(img, 'Salt & Pepper', 0.5);
9 -    figure,imshow (noise);
10 -   figure, imhist(noise);
```

❖ Output:



Q. 4: Implement order statistics filters : Max, Min and Median. Compare your results with inbuilt function 'ordfilt2'.

❖ **Code using ordflit2:**

a_1.m | a_2.m | a_3.m | a_4.m | a_4_1.m

```
clear all;

img = imread('Test_Image.jpg');
[m, n] = size(img);

noise = imnoise(img, 'Salt & Pepper', 0.02);

max_img = ordfilt2(noise, 9, true(3));
min_img = ordfilt2(noise, 1, true(3));
median_img = ordfilt2(noise, 5, true(3));

subplot(2, 2, 1);
imshow(img);
title('Original Image');

subplot(2, 2, 2);
imshow(max_img);
title('Max Filterred Image');

subplot(2, 2, 3);
imshow(min_img);
title('Min Filterred Image');

subplot(2, 2, 4);
imshow(median_img);
title('Median Filterred Image');

```

❖ **Output:**

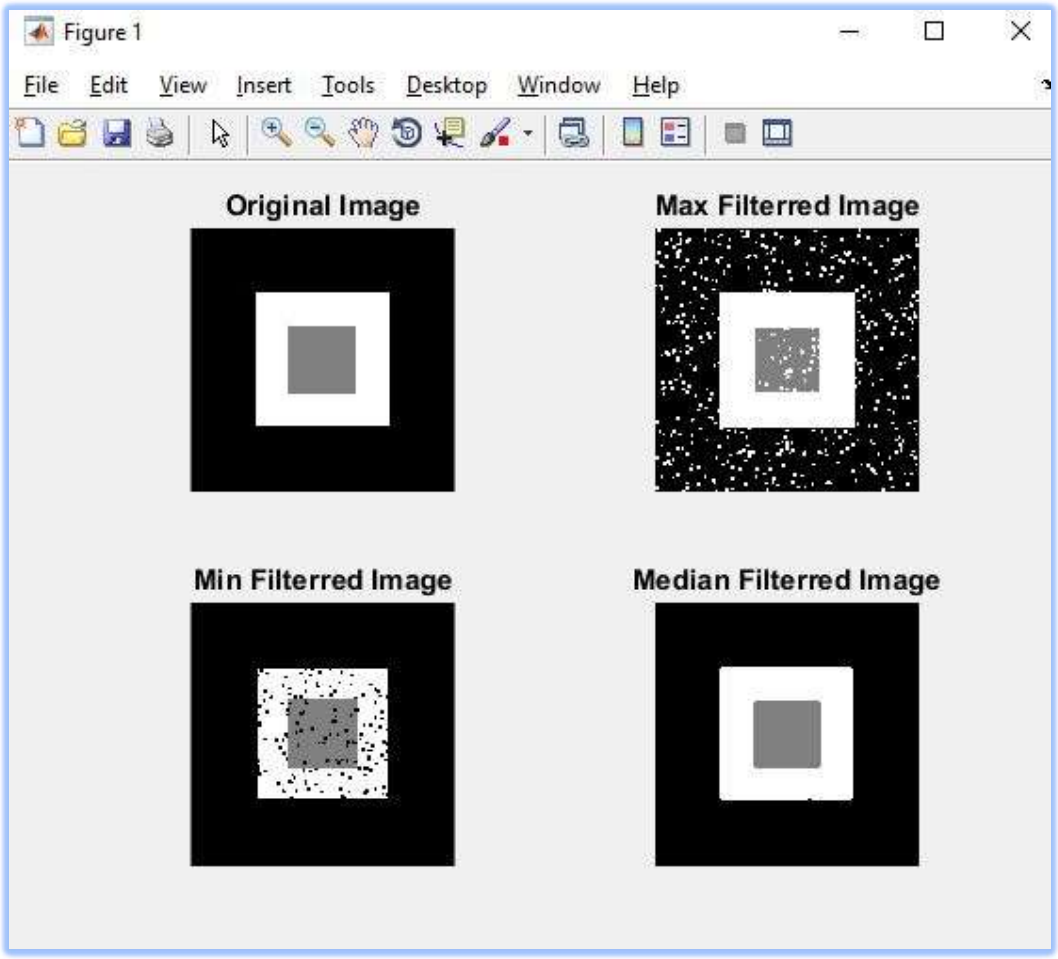


Figure 1
File Edit View Insert Tools Desktop Window Help
Original Image
Max Filterred Image
Min Filterred Image
Median Filterred Image

❖ Code using manual implementation:

a_1.m | a_2.m | a_3.m | a_4.m | a_4_1.m

```
clear all;
img = imread('Test_Image.jpg');
[m, n] = size(img);
noise = imnoise(img, 'Salt & Pepper', 0.02);
radius = floor(3 / 2);
img = padarray(img, [radius, radius], 0, 'both');

for i = radius + 1 : m - radius
    for j = radius + 1 : n - radius
        subimg = noise((i - radius):(i + radius), (j - radius):(j + radius));
        max_img(i, j) = max(max(subimg));
        min_img(i, j) = min(min(subimg));
        median_img(i, j) = median(median(subimg));
    end
end

subplot(2, 2, 1);
imshow(img);
title('Original Image');
subplot(2, 2, 2);
imshow(max_img);
title('Max Filterred Image');
subplot(2, 2, 3);
imshow(min_img);
title('Min Filterred Image');
subplot(2, 2, 4);
imshow(median_img);
title('Median Filterred Image');
```

❖ **Output:**

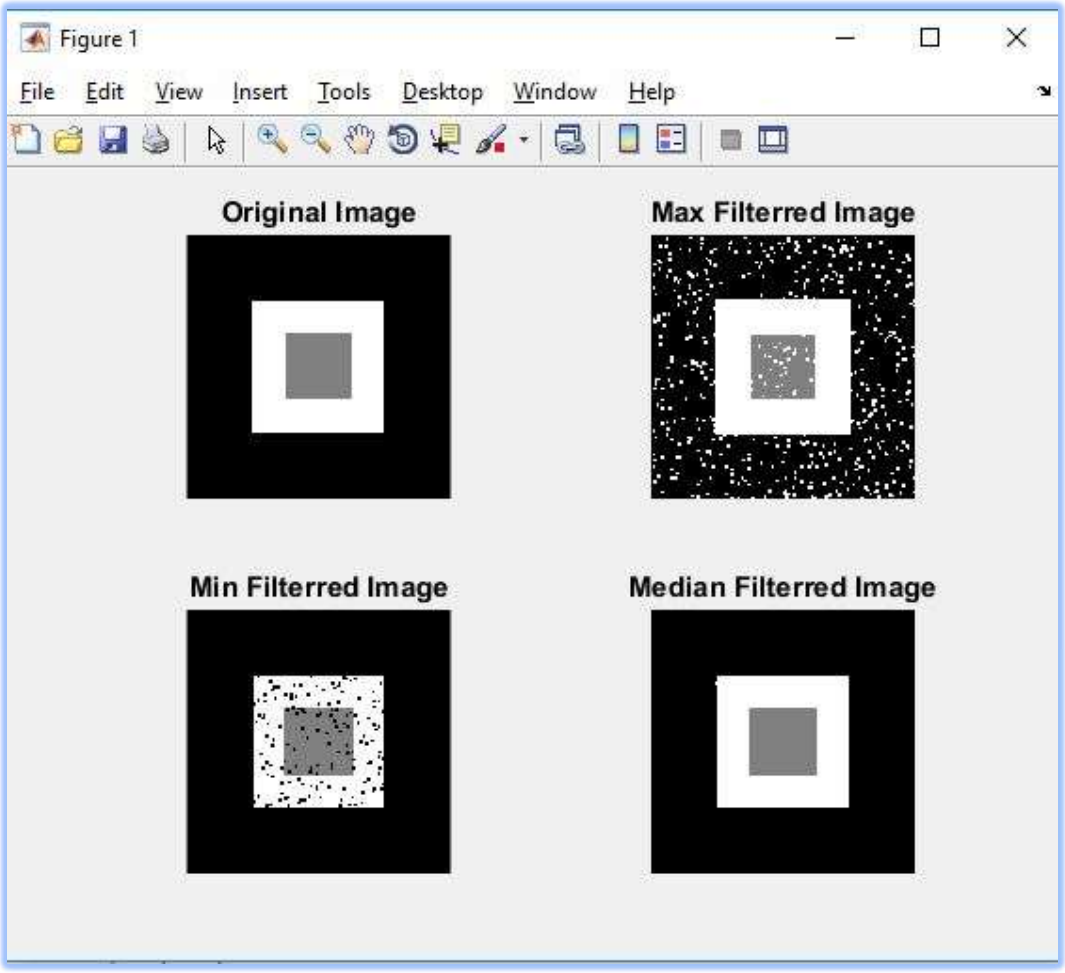


Figure 1
File Edit View Insert Tools Desktop Window Help
Original Image
Max Filterred Image
Min Filterred Image
Median Filterred Image