Object :Impliment the Linear filtering using Convolution, Highly selective filters.

clc;

close all;

clear all;

% Read the test image and display it

I1=uigetfile('.jpg','select file');

myimage = imread(I1);

myimage=rgb2gray(myimage);

subplot(3,3,1);

imshow(myimage); title('Original Image');

% The command fspecial() is used to create mask

% The command imfilter() is used to apply the gaussian filter mask to the image

% Create a Gaussian low pass filter of size 3

gaussmask = fspecial('gaussian',3);

filtimg = imfilter(myimage,gaussmask);

subplot(3,3,2);

imshow(filtimg,[]),title('Output of Gaussian filter 3 X 3');

% Generate a lowpass filter of size 7 X 7

% The command conv2 is used the apply the filter

% This is another way of using the filter

avgfilt = [ 1 1 1 1 1 1 1;

1 1 1 1 1 1 1;

1 1 1 1 1 1 1;

1 1 1 1 1 1 1;

1 1 1 1 1 1 1;

1 1 1 1 1 1 1;

1 1 1 1 1 1 1];

avgfiltmask = avgfilt/sum(avgfilt);

convimage= conv2(double(myimage),double(avgfiltmask));

subplot(3,3,3);

imshow(convimage,[]);

title('Average filter with conv2()');

% Add noise to an image

% Display the noisy Image

subplot(3,3,4);

myimage = imread(I1);

myimage=rgb2gray(myimage);

noisyimg = imnoise(myimage,'Salt & Pepper', 0.5);

imshow(noisyimg,[]);

title('Noisy Image');

% generate Median filter of size 3

% The command medianfilt2() is used to filter the image

mymed3img = medfilt2(noisyimg,[3 3]);

subplot(3,3,5);

imshow(mymed3img,[]), title('Output of 3 x 3 Median filter');

% generate Median filter of size 7

% The command medianfilt2() is used to filter the image

mymed7img = medfilt2(noisyimg,[7 7]);

subplot(3,3,6);

imshow(mymed7img,[]), title('Output of 7 x 7 Median filter');

% Generate a high pass filter mask

% The command conv2 is used the apply the filter mask

h = [ 1 -2 -1; -1 5 -1; 1 -2 1];

hpt3 = conv2(double(myimage),double(h));

subplot(3,3,7);

imshow(hpt3/100),title('Output of High pass filter');

% Generate a User defined mask for sharpening

% The command conv2 is used the apply the filter mask

h = [ -1 -1 -1; -1 9 -1; -1 -1 -1];

hpt3 = conv2(double(myimage),double(h));

subplot(3,3,8);

imshow(hpt3/100),title('Sharpening - User defined mask');

% Generate a unsharp filter mask with alpha = 0.3

% The command conv2 is used the apply the filter mask

h = fspecial('unsharp',0.3);

hpt3 = imfilter(myimage,h);

subplot(3,3,9);

imshow(hpt3,[]),title('Output of Unsharp mask filter');

Output:

**Conclusion:** Thus we have concluded from this experiment that image smoothing and sharpening can be done by a spatial filter.

