Spatial Domain Filter

Matlab Code:

clc;

close all;

clear all;

%low pass filter

a=imread('cameraman.tif');

w1=ones(3)/9;

w2=[1 2 1;2 12 2; 1 2 1]/24;

[m n]=size (a);

e=zeros(m,n);

l=zeros(m,n);

for i=2:m-1

for j=2:n-1

e(i,j)=sum(sum(w1.\*double(a(i-1:i+1,j-1:j+1))));

l(i,j)=sum(sum(w2.\*double(a(i-1:i+1,j-1:j+1))));

end

end

subplot(2,2,1);

imshow(a);

title('Original Image');

subplot(2,2,2);

imshow(uint8(e));

title('Low pass with 3x3 mask(all 1s)');

subplot(2,2,3);

imshow(uint8(l));

title('Low pass with weighted 3x3 mask');

w3=ones(5)/25;

h=zeros(m,n);

for i=3:m-2

for j=3:n-2

h(i,j)=sum(sum(w3.\*double(a(i-2:i+2,j-2:j+2))));

end

end

subplot(2,2,4);

imshow(uint8(h));

title('Low pass with 5x5 mask (all 1s)');

%high pass filter

a=imread('cameraman.tif');

w=[-1 -1 -1;-1 8 -1; -1 -1 -1]/9;

[m n]=size (a);

e=zeros(m,n);

for i=2:m-1

for j=2:n-1

e(i,j)=sum(sum(w.\*double(a(i-1:i+1,j-1:j+1))));

end

end

subplot(1,2,1);

imshow(a);

title('Original Image');

subplot(1,2,2);

imshow(uint8(e));

title('High pass with 3x3 mask');

%median filter

a=imread('cameraman.tif');

d=0.05;

b=imnoise(a,'salt & pepper',d);

[m n]=size (b);

e=zeros(m,n);

for i=2:m-1

for j=2:n-1

e(i,j)=median(median(b(i-1:i+1,j-1:j+1)));

end

end

subplot(2,2,1);

imshow(a);

title('Original Image');

subplot(2,2,2);

imshow(b);

title('Image with salt and pepper noise');

subplot(2,2,3);

imshow(uint8(e));

title('Low pass median filtered image');

%high boost filter

a=imread('cameraman.tif');

w=[-1 -1 -1;-1 8 -1; -1 -1 -1]/9;

[m n]=size (a);

e=zeros(m,n);

hb=zeros(m,n);

for i=2:m-1

for j=2:n-1

e(i,j)=sum(sum(w.\*double(a(i-1:i+1,j-1:j+1))));

end

end

subplot(1,2,1);

imshow(a);

title('Original Image');

A=3;

for i=2:m-1

for j=2:n-1

hb(i,j)=(A-1).\*a(i,j)+e(i,j);

end

end

subplot(1,2,2);

imshow(uint8(hb));

title('High boost filtered image');