Frequency Domain Filter

Matlab Code:

% Low Pass Filter

clc;

clear all;

close all;

x=imread('cameraman.tif');

x1=double(x);

x2=imresize(x1,[256 256]);

x3=fft2(x2);

D0=50;

for i=1:1:256

for j=1:1:256

x2(i,j)=sqrt((i-128).^2+(j-128).^2);

if(x2(i,j)>D0)

h(i,j)=0;

else if(x2(i,j)<D0)

h(i,j)=1;

end

end

end

end

x4=fftshift(x3);

x5=x4.\*h;

x6=abs(ifft2(x5));

subplot(1,2,1)

imshow(uint8(x6))

subplot(1,2,2)

imshow(h)

% Butterworth Low Pass Filter

clc;

clear all;

close all;

x=imread('cameraman.tif');

x1=double(x);

x2=imresize(x1,[256 256]);

x3=fft2(x2);

D0=50;

n=2;

for i=1:1:256

for j=1:1:256

x2(i,j)=sqrt((i-128).^2+(j-128).^2);

if(x2(i,j)>D0)

h(i,j)=1./(1+(x2(i,j)./D0).^(2.\*n));

else if(x2(i,j)<D0)

h(i,j)=1;

end

end

end

end

x4=fftshift(x3);

x5=x4.\*h;

x6=abs(ifft2(x5));

subplot(1,2,1)

imshow(uint8(x6))

subplot(1,2,2)

imshow(h)

% gaussian low pass Filter

x=imread('cameraman.tif');

x1=double(x);

x2=imresize(x1,[256 256]);

x3=fft2(x2);

D0=50;

n=2;

for i=1:1:256

for j=1:1:256

x2(i,j)=sqrt((i-128).^2+(j-128).^2);

h(i,j)=exp((-1).\*x2(i,j).^2./(2.\*D0.\*D0));

end

end

x4=fftshift(x3);

x5=x4.\*h;

x6=abs(ifft2(x5));

subplot(1,2,1)

imshow(uint8(x6))

subplot(1,2,2)

imshow(h)

% High Pass Filter

clc;

clear all;

close all;

x=imread('cameraman.tif');

x1=double(x);

x2=imresize(x1,[256 256]);

x3=fft2(x2);

D0=50;

for i=1:1:256

for j=1:1:256

x2(i,j)=sqrt((i-128).^2+(j-128).^2);

if(x2(i,j)>D0)

h(i,j)=1;

else if(x2(i,j)<D0)

h(i,j)=0;

end

end

end

end

x4=fftshift(x3);

x5=x4.\*h;

x6=abs(ifft2(x5));

subplot(1,2,1)

imshow(uint8(x6))

subplot(1,2,2)

imshow(h)

% Butterworth high Pass Filter

clc;

clear all;

close all;

x=imread('cameraman.tif');

x1=double(x);

x2=imresize(x1,[256 256]);

x3=fft2(x2);

D0=50;

n=2;

for i=1:1:256

for j=1:1:256

x2(i,j)=sqrt((i-128).^2+(j-128).^2);

if(x2(i,j)>D0)

h(i,j)=1./(1+(x2(i,j)./D0).^(-2.\*n));

else if(x2(i,j)<D0)

h(i,j)=1;

end

end

end

end

x4=fftshift(x3);

x5=x4.\*h;

x6=abs(ifft2(x5));

subplot(1,2,1)

imshow(uint8(x6))

subplot(1,2,2)

imshow(h)

% gaussian high pass Filter

x=imread('cameraman.tif');

x1=double(x);

x2=imresize(x1,[256 256]);

x3=fft2(x2);

D0=50;

n=2;

for i=1:1:256

for j=1:1:256

x2(i,j)=sqrt((i-128).^2+(j-128).^2);

h(i,j)=1-(exp((-1).\*x2(i,j).^2./(2.\*D0.\*D0)));

end

end

x4=fftshift(x3);

x5=x4.\*h;

x6=abs(ifft2(x5));

subplot(1,2,1)

imshow(uint8(x6))

subplot(1,2,2)

imshow(h)