EE5355 DISCRETE TRANSFORMS

ASSIGNMENT 2B) 2D DFT

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1) Apply 2D DFT to the image “goldhill256” .

2), Apply zonal masks g(k,l) for low-pass filtering (LPF), band-pass filtering (BPF), and high-pass filtering(HPF) to the result of step 1. The function g(k,l) is zero outside the region of support shown for the particular filter.

 

3), Apply 2D IDFT to all results of step 2.

4), Calculate MSE between the reconstructed and original images.

5), Calculate the peak signal to noise ratios (PSNR) of the reconstructed images.

The block diagram of this project is shown below:



PROGRAM:

clc;

close all;

clear all;

I2=imread('C:\Users\PAVAI ARCHIMEDES\Desktop\goldhill256.BMP','BMP');

I=im2double(I2);

figure (1);

subplot(2,3,1);

imshow(I);

title('Original Goldhill');

Ft=fft2(I);

subplot(2,3,2);

imshow(abs(Ft),[0 255]);

title('Magnitude spectrum');

m\_l=filter\_mask(256,31); % function to create a low pass filter

subplot(2,3,3);

imshow(m\_l);

title('Low pass filter');

Z\_h=~(filter\_mask(256,60));

subplot(2,3,4);

imshow(Z\_h);

title('High pass filter');

Z\_band=(filter\_mask(256,61)-filter\_mask(256,30));

subplot(2,3,5);

imshow(Z\_band);

title('Band pass filter');

L\_out=F\_T.\*mloww;

H\_out=F\_T.\*Z\_high;

B\_out=F\_T.\*Z\_band;

L\_out\_inv=ifft2(L\_out);

H\_out\_inv=ifft2(H\_out);

B\_out\_inv=ifft2(B\_out);

figure (2);

subplot(2,3,1);

imshow(abs(L\_out),[0 255]);

title('low pass output');

subplot(2,3,2);

imshow(abs(H\_out),[0 255]);

title('high pass output');

subplot(2,3,3);

imshow(abs(B\_out),[0 255]);

title('Band pass output');

subplot(2,3,4);

imshow(abs(L\_out\_inv),[0 255]);

title('After low Ifft mage');

subplot(2,3,5);

imshow(abs(H\_out\_inv),[0 255]);

title('After high Ifft mage');

subplot(2,3,6);

imshow(abs(B\_out\_inv),[0 255]);

title('After band Ifft mage');

msl=mse\_cal(I,L\_out\_inv);

msh=mse\_cal(I,H\_out\_inv);

mse\_band=mse\_cal(I,B\_out\_inv);

psnr\_low=20\*log10(255 / sqrt(msl));

psnr\_high=20\*log10(255 / sqrt(msh));

psnr\_band=20\*log10(255 / sqrt(mse\_band));

MSE\_cal Function 1:

function [ mse ] = mse\_cal(I\_org,I\_re)

sum=0;

for i=1:1:256

for j=1:1:256

sum=sum+double(I\_org(i,j)-abs(I\_re(i,j)))^2;

end

end

mse=sum/65536;

end

Filter\_mask Function 2:

function [ Z ] = filter\_mask(M,f\_cut\_off)

Z=zeros(M);

for i=1:1:M;

for j=1:1:M;

rad=(sqrt(i^2+j^2));

if(rad<=f\_cut\_off+1)

Z(i,j)=1;

Z(257-i,257-j)=1;

Z(257-i,j)=1;

Z(i,257-j)=1;

end

end

end

end

OUTPUT:



