EE 5356 4/14/2011

Assignment 7

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7. Inverse and Weiner filter:

1. Program :

%%%%%%%%%%%%%%%%%%% assign7.m %%%%%%%%%%%%%%%%%%%

close all;

clear all;

clc;

image = imread('goldhill256.bmp');

[row col] = size(image);

fftImage = fftshift(fft2(image));

k1 = 0.00025;

k2 = 0.0025;

k3 = 0.001;

H1 = zeros(row,col);

H2 = zeros(row,col);

H3 = zeros(row,col);

for u = 1:row

for v = 1:col

H1(u,v) = exp(-k1 .\*((u-row/2)^2 + (v-col/2)^2));

H2(u,v) = exp(-k2 .\*((u-row/2)^2 + (v-col/2)^2));

H3(u,v) = exp(-k3 .\*((u-row/2)^2 + (v-col/2)^2));

end

end

N = randn(row,col);

G1 = (fftImage .\* H1) + N;

G2 = (fftImage .\* H2) + N;

G3 = (fftImage .\* H3) + N;

degImage1 = uint8(real(ifft2(ifftshift(G1))));

degImage2 = uint8(real(ifft2(ifftshift(G2))));

degImage3 = uint8(real(ifft2(ifftshift(G3))));

imshow(degImage1,[]),title('degraded image k=0.00025');

figure,imshow(degImage2,[]),title('degraded image k=0.0025');

figure,imshow(degImage3,[]),title('degraded image k=0.001');

invH1 = zeros(row,col);

invH2 = zeros(row,col);

invH3 = zeros(row,col);

for u = 1:row

for v = 1:col

if(H1(u,v) > 0.001)

invH1(u,v) = 1/H1(u,v);

end

if(H2(u,v) > 0.001)

invH2(u,v) = 1/H2(u,v);

end

if(H3(u,v) > 0.001)

invH3(u,v) = 1/H3(u,v);

end

end

end

recImage1 = uint8(real(ifft2(ifftshift(G1.\*invH1))));

recImage2 = uint8(real(ifft2(ifftshift(G2.\*invH2))));

recImage3 = uint8(real(ifft2(ifftshift(G1.\*invH3))));

figure,imshow(recImage1,[]),title('Inverse filter reconstructed image k=0.00025');

figure,imshow(recImage2,[]),title('Inverse filter reconstructed image k=0.0025');

figure,imshow(recImage3,[]),title('Inverse filter reconstructed image k=0.001');

Ruu1 = xcorr2(double(image), double(image));

Rnn1 = xcorr2(double(N), double(N));

Ruu = Ruu1(256:511,256:511);

Rnn = Rnn1(256:511,256:511);

Suu = fftshift(fft2(Ruu));

Snn = fftshift(fft2(Rnn));

W1 = (conj(H1).\*Suu)./((abs(H1)).^2.\*Suu+Snn);

W2 = (conj(H2).\*Suu)./((abs(H2)).^2.\*Suu+Snn);

W3 = (conj(H3).\*Suu)./((abs(H3)).^2.\*Suu+Snn);

recImage1 = abs(ifft2(ifftshift(W1.\*G1)));

recImage2 = abs(ifft2(ifftshift(W2.\*G2)));

recImage3 = abs(ifft2(ifftshift(W3.\*G3)));

figure,imshow(recImage1,[]),title('Weiner filter reconstructed image k=0.00025');

figure,imshow(recImage2,[]),title('Weiner filter reconstructed image k=0.0025');

figure,imshow(recImage3,[]),title('Weiner filter reconstructed image k=0.001');

1. Images:



