TFW-HW5

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**[main.m]****=====================================================**

clc

clear all

close all

x=imread('lena.bmp');

figure;

imshow(x);

title('Lena','Fontsize',12);

x=double(x);

y=wavelet8D\_iwavelet8D(x);

y=uint8(y);

imwrite(y,'Lena\_recon.bmp','BMP');

x\_recon=imread('Lena\_recon.bmp');

figure;

imshow(x\_recon);

title('Lena recon','Fontsize',12);

**[wavelet8D\_iwavelet8D.m]========================================**

function y=wavelet8D\_iwavelet8D(x)

g=[-0.0106 0.0329 0.0308 -0.1870 -0.0280 0.6309 0.7148 0.2304];

h=[ 0.2304 -0.7148 0.6309 0.0280 -0.1870 -0.0308 0.0329 0.0106];

g1=[0.2304 0.7148 0.6309 -0.0280 -0.1870 0.0308 0.0329 -0.0106];

h1=[0.0106 0.0329 -0.0308 -0.1870 0.0280 0.6309 -0.7148 0.2304];

%wavelet8D===================================================

%first compression

for m=1:size(x,1)

x\_along\_n = x(m,1:2:size(x,2));

v\_1L(m,:) = conv(x\_along\_n,g);

v\_1H(m,:) = conv(x\_along\_n,h);

end

%second compression

for n=1:size(v\_1L,2)

x\_along\_m1 = v\_1L(1:2:size(v\_1L,1),n);

x\_1L(:,n) = conv(x\_along\_m1,g);

x\_H1(:,n) = conv(x\_along\_m1,h);

end

for n=1:size(v\_1H,2)

x\_along\_m2 = v\_1H(1:2:size(v\_1H,1),n);

x\_H2(:,n) = conv(x\_along\_m2,g);

x\_H3(:,n) = conv(x\_along\_m2,h);

end

%show Lena wavelet photo

y\_wavelet=[x\_1L(:,:),x\_H1(:,:);x\_H2(:,:),x\_H3(:,:)];

y\_wavelet=uint8(y\_wavelet);

imwrite(y\_wavelet,'Lena\_wavelet.bmp','BMP');

x\_wavelet=imread('Lena\_wavelet.bmp');

figure;

imshow(x\_wavelet);

title('Lena wavelet','Fontsize',12);

%iwavelet8D==================================================

%first reconstruction

for m=1:2\*size(x\_1L,1)

for n=1:size(x\_1L,2)

if mod(m,2)==1

x\_along\_m1\_r(m,n) = 0;

else

x\_along\_m1\_r(m,n) = x\_1L(m/2,n);

end

end

end

for m=1:2\*size(x\_1L,1)

x\_1L\_r(m,:) = conv(x\_along\_m1\_r(m,:),g1);

x\_H1\_r(m,:) = conv(x\_along\_m1\_r(m,:),h1);

end

v\_1L\_r=x\_1L\_r+x\_H1\_r;

for m=1:2\*size(x\_H2,1)

for n=1:size(x\_H2,2)

if mod(m,2)==1

x\_along\_m2\_r(m,n) = 0;

else

x\_along\_m2\_r(m,n) = x\_H2(m/2,n);

end

end

end

for m=1:2\*size(x\_H2,1)

x\_H2\_r(m,:) = conv(x\_along\_m2\_r(m,:),g1);

x\_H3\_r(m,:) = conv(x\_along\_m2\_r(m,:),h1);

end

v\_1H\_r=x\_H2\_r+x\_H3\_r;

%second reconstruction

for n=1:2\*size(v\_1L\_r,2)

for m=1:size(v\_1L\_r,1)

if mod(n,2)==1

x\_along\_n1\_r(m,n) = 0;

else

x\_along\_n1\_r(m,n) = v\_1L\_r(m,n/2);

end

end

end

for n=1:2\*size(v\_1L\_r,2)

x\_r1(:,n) = conv(x\_along\_n1\_r(:,n),g1);

end

for n=1:2\*size(v\_1H\_r,2)

for m=1:size(v\_1H\_r,1)

if mod(n,2)==1

x\_along\_n2\_r(m,n) = 0;

else

x\_along\_n2\_r(m,n) = v\_1H\_r(m,n/2);

end

end

end

for n=1:2\*size(v\_1H\_r,2)

x\_r2(:,n) = conv(x\_along\_n2\_r(:,n),h1);

end

%remove border parts

y\_r=x\_r1+x\_r2;

for m=1:size(y\_r,1)-28

for n=1:size(y\_r,2)-28

y(m,n)=y\_r(m+14,n+14);

end

end

end

**執行結果**



Fig. 1. Lena.bmp



Fig. 2. Lena\_wavelet.bmp



Fig. 3. Lena\_recon.bmp