clc;

clear all;

close all;

a=imread('doc.bmp');

s=rgb2gray(a);

z=imresize(s,[256 256]);

N=256;

sigma = 0.1\*255;

noise = randn(N) \* sigma;

zz =double(z)+ noise;

[cA(:,:,1) cA(:,:,2) cA(:,:,3) cA(:,:,4)]=dwt2(z,'haar');

fun1=@fft2;

fun2=@ifft;

fun3=@fft;

fun4=@ifft2;

for j=1:4

x(:,:,j)=blkproc(cA(:,:,j),[8 8],fun1);

y(:,:,j)=blkproc(x(:,:,j),[8 8],fun2);

y1=y(:,:,j);

% figure,

% imshow(y1);

y2=y1(:)';

[cA1(:,:,j) cD1(:,:,j)]=dwt(y2,'haar');

% figure,

% imshow(cD1(:,:,j));

re\_y2=idwt(cA1(:,:,j),cD1(:,:,j),'haar');

for i=1:128

re\_y1(1:128,i)=re\_y2(((i-1)\*128+1:i\*128));

end

re\_y(:,:,j)=re\_y1;

re\_x(:,:,j)=blkproc(re\_y(:,:,j),[8 8],fun3);

re\_cA1(:,:,j)=blkproc(re\_x(:,:,j),[8 8],fun4);

end

re\_c=idwt2(re\_cA1(:,:,1),re\_cA1(:,:,2),re\_cA1(:,:,3),re\_cA1(:,:,4),'haar');

se = strel('square',1);

re\_ccc=imopen(re\_c,se);

re\_cccc=imclose(re\_ccc,se);

figure,

subplot(2,2,1);imshow(zz,[]);title('Input Image');

subplot(2,2,2);imshow(re\_c,[]);title('Reconstructed Image');

subplot(2,2,3);imshow(re\_cccc,[]);title('Enhanced Image');

z1=double(z);

re\_cc=double(re\_c);

cl\_cc=double(re\_cccc);

mse2= sum((z1(:)-cl\_cc(:)).^2) / prod(size(z1));

psnr2= 10\*log10(255\*255/mse2);

disp('PSNR of Enhanced Image');

disp(psnr2);