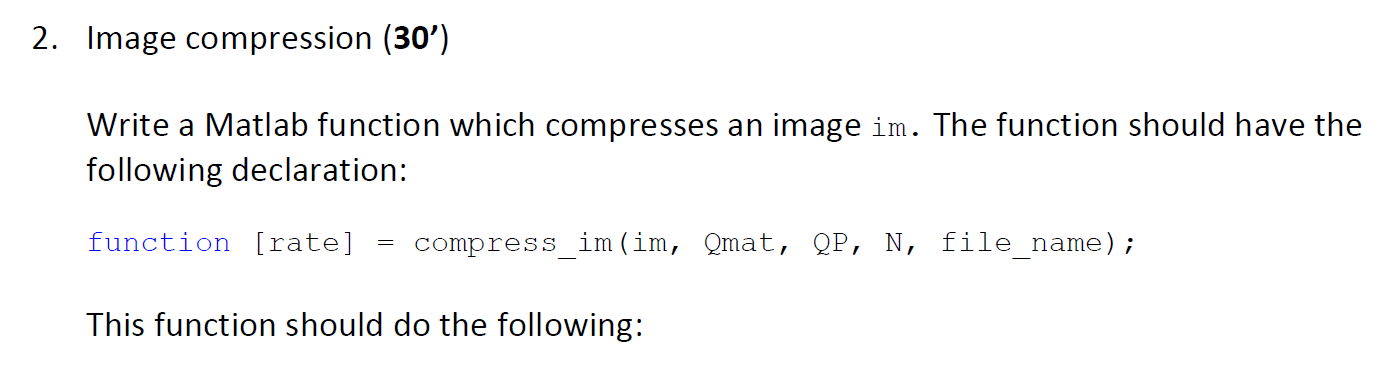
**Image and Video Processing**

EEE412

Lab4 - Report

Name: Cong Yin

ID Number: 1715471

****

function [rate] = compress\_im(im, Qmat, QP, N, file\_name)

[m,n]=size(im);

Qmat=Qmat(1:N,1:N);

if QP>50

S=(100-QP)/50;

else

S=50/QP;

end

for i=1:N:m-(N-1)

for j=1:N:n-(N-1)

im\_new=im(i:i+(N-1),j:j+(N-1));

im\_dct=dct2(im\_new);

im\_quantization(i:i+(N-1),j:j+(N-1))=round(im\_dct./(S\*Qmat));

end

end

[vct\_out] = entropy\_enc(im\_quantization);

csvwrite(file\_name,vct\_out)

size\_f = fsize(file\_name);

rate=(size\_f\*8)/(m\*n);

im=imread('lenna512.bmp');

Qmat=[1,2,2,4,4,4,4,8,8,8,8,8,8,8,8,16;

2,2,2,4,4,4,4,8,8,8,8,8,8,8,8,16;

2,2,2,4,4,4,4,8,8,8,8,8,8,8,8,16;

4,4,4,4,4,4,4,8,8,8,8,8,8,8,8,16;

4,4,4,4,4,4,4,8,8,8,8,8,8,8,8,16;

4,4,4,4,4,4,4,8,8,8,8,8,8,8,8,16;

4,4,4,4,4,4,4,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

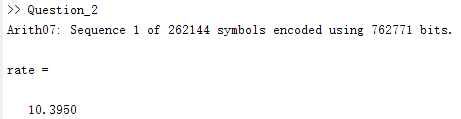
16,16,16,16,16,16,16,16,16,16,16,16,16,16,16,16;];

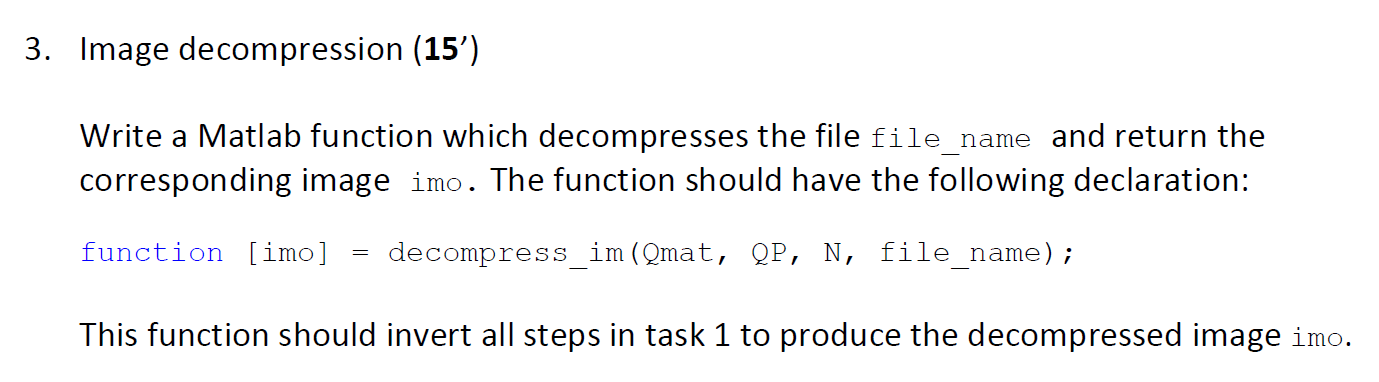
N=8;

QP=50;

file\_name='50.dat';

[rate] = compress\_im(im, Qmat, QP, N, file\_name);

****

****

function [imo] = decompress\_im(Qmat, QP, N, file\_name)

Qmat=Qmat(1:N,1:N);

m=512;

n=512;

vct\_in=csvread(file\_name);

vct\_out= entropy\_dec(vct\_in);

new=reshape(vct\_out,[m n]);

if QP>50

S=(100-QP)/50;

else

S=50/QP;

end

for i=1:N:m-1

for j=1:N:n-1

im\_dec=new(i:i+(N-1),j:j+(N-1));

im\_dec\_q=(S\*Qmat).\*im\_dec;

imo(i:i+(N-1),j:j+(N-1))=idct2(im\_dec\_q);

end

end

imo=uint8(imo);

im=imread('lenna512.bmp');

load('50.dat')

Qmat=[1,2,2,4,4,4,4,8,8,8,8,8,8,8,8,16;

2,2,2,4,4,4,4,8,8,8,8,8,8,8,8,16;

2,2,2,4,4,4,4,8,8,8,8,8,8,8,8,16;

4,4,4,4,4,4,4,8,8,8,8,8,8,8,8,16;

4,4,4,4,4,4,4,8,8,8,8,8,8,8,8,16;

4,4,4,4,4,4,4,8,8,8,8,8,8,8,8,16;

4,4,4,4,4,4,4,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

16,16,16,16,16,16,16,16,16,16,16,16,16,16,16,16;];

N=8;

QP=50;

file\_name='50.dat';

[imo] = decompress\_im(Qmat, QP, N, file\_name);

subplot(1,2,1);imshow(im);title('original')

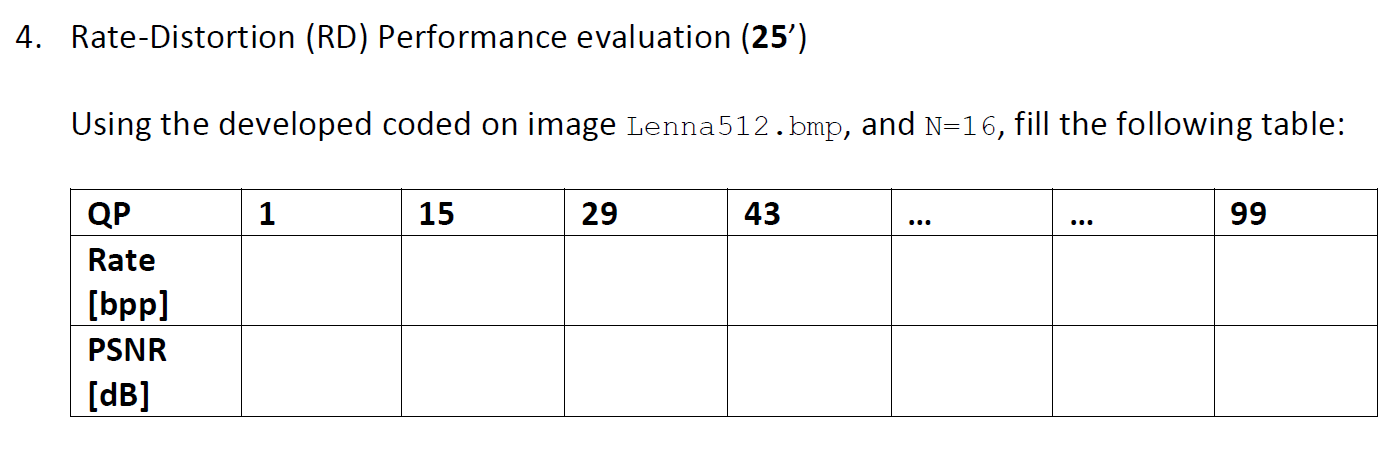
subplot(1,2,2);imshow(uint8(imo));title('decompress')

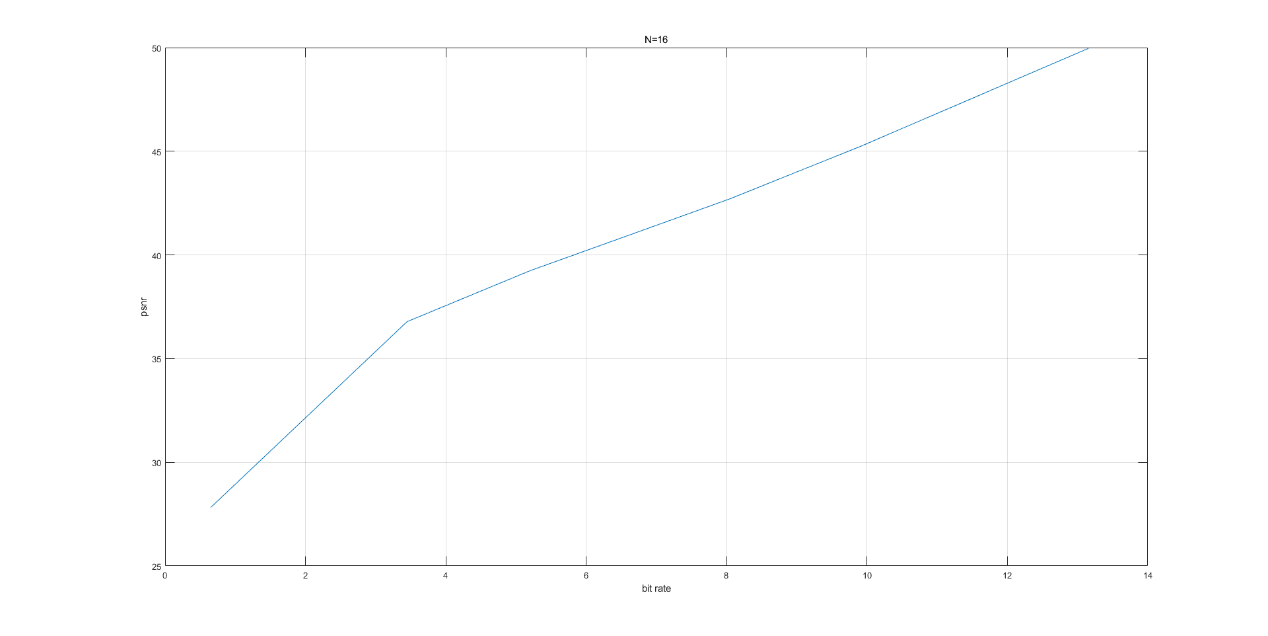
psnr = calculate\_psnr(imo, im);

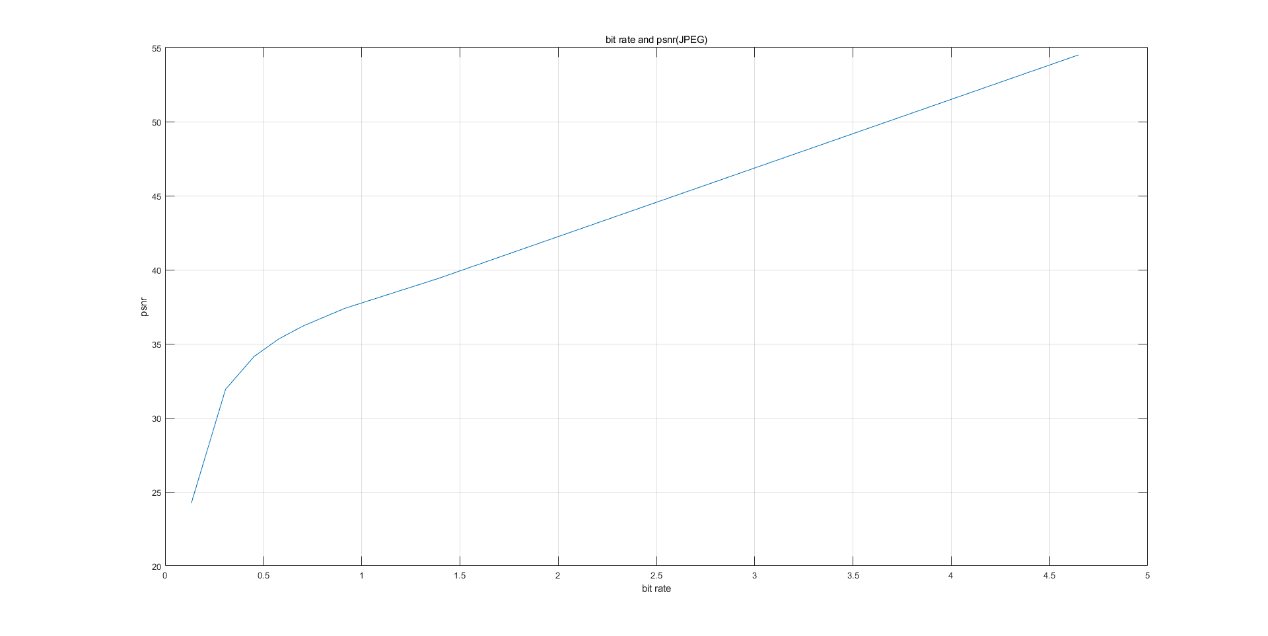
****

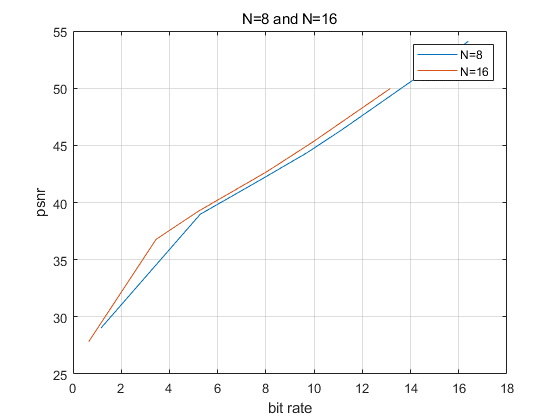
psnr =

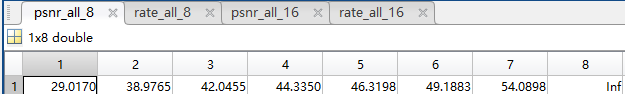
45.2888

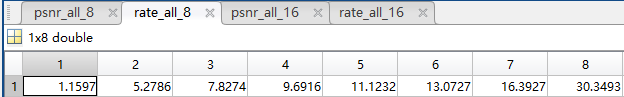
****

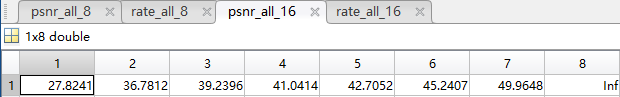
****

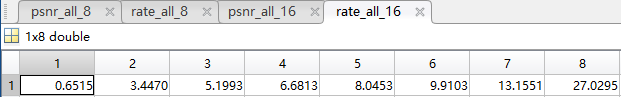
****

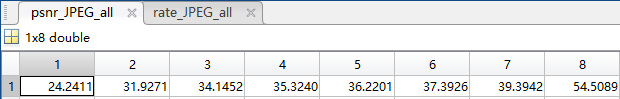
****

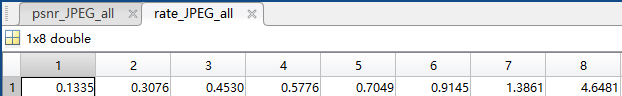
****

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****

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****

im=imread('lenna512.bmp');

Qmat=[1,2,2,4,4,4,4,8,8,8,8,8,8,8,8,16;

2,2,2,4,4,4,4,8,8,8,8,8,8,8,8,16;

2,2,2,4,4,4,4,8,8,8,8,8,8,8,8,16;

4,4,4,4,4,4,4,8,8,8,8,8,8,8,8,16;

4,4,4,4,4,4,4,8,8,8,8,8,8,8,8,16;

4,4,4,4,4,4,4,8,8,8,8,8,8,8,8,16;

4,4,4,4,4,4,4,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,16;

16,16,16,16,16,16,16,16,16,16,16,16,16,16,16,16;];

file\_name\_8='Question4\_2.dat';

file\_name\_16='Question4\_2.dat';

N\_8=8;

N\_16=16;

i=1;

k=1;

for QP\_8=1:14:99

rate\_8 = compress\_im(im, Qmat, QP\_8, N\_8, file\_name\_8);

imo\_8 = decompress\_im(Qmat, QP\_8, N\_8 , file\_name\_8);

psnr\_8 = calculate\_psnr(imo\_8, im);

rate\_all\_8(i)=rate\_8;

psnr\_all\_8(i)=psnr\_8;

i=i+1;

end

for QP\_16=1:14:99

rate\_16 = compress\_im(im, Qmat, QP\_16, N\_16, file\_name\_16);

imo\_16 = decompress\_im(Qmat, QP\_16, N\_16 , file\_name\_16);

psnr\_16 = calculate\_psnr(imo\_16, im);

rate\_all\_16(k)=rate\_16;

psnr\_all\_16(k)=psnr\_16;

k=k+1;

end

plot(rate\_all\_8,psnr\_all\_8,rate\_all\_16,psnr\_all\_16);

legend('N=8','N=16')

xlabel('bit rate');

ylabel('psnr')

title('N=8 and N=16');

grid on;

im=imread('lenna512.bmp');

file\_name\_JPEG='Question4\_JPEG.dat';

i=1;

for QP=1:14:99

imwrite(im,file\_name\_JPEG,'jpeg','Quality',QP);

imo\_JPEG=imread('Question4\_JPEG.dat');

[size\_JPEG]=fsize(file\_name\_JPEG);

rate\_JPEG=(size\_JPEG\*8)/(512^2);

psnr\_JPEG = calculate\_psnr(imo\_JPEG, im);

rate\_JPEG\_all(i)=rate\_JPEG;

psnr\_JPEG\_all(i)=psnr\_JPEG;

i=i+1;

end

figure,plot(rate\_JPEG\_all,psnr\_JPEG\_all);

xlabel('bit rate');

ylabel('psnr');

title('bit rate and psnr(JPEG)');

grid on;