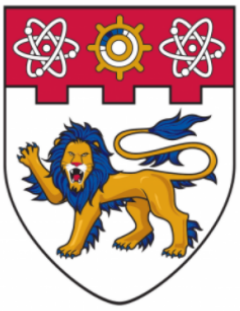

NANYANG TECHNOLOGICAL UNIVERSITY
SINGAPORE

Assignment ON
EE4478 Digital video processing
Tutorial 2-11

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EEE

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1 Assignment 5 Discrete Cosine Transform (DCT)

I use RGB 3 layer to calculate.

```
clear all;
close all;
clc;
raw_input_img=imread('lena512c.jpg');
redChannel = dct2(raw_input_img(:, :, 1));
greenChannel = dct2(raw_input_img(:, :, 2));
blueChannel = dct2(raw_input_img(:, :, 3));
input_img = cat(3, redChannel, greenChannel, blueChannel);
QP=10;
quantized_img=round(input_img./QP);
rec_img=quantized_img.*QP;
n_img = cat(3,idct2(rec_img(:, :, 1)),idct2(rec_img(:, :, 2)),idct2(rec_img(:, :, 3)));
error= double(raw_input_img) - n_img;
subplot(1,4,1);
imshow(raw_input_img);
title('Original image');
subplot(1,4,2);
imshow(uint8(n_img));
title(['Reconstructed image (QP=' num2str(QP) ')']);
subplot(1,4,3);
imshow(error);
title('quantization error')
```

The output shown in below and I find that the higher the quant level the quality of the imgae will drop and more color appear in error. And quantiztion error contain all the high frequent infomation.

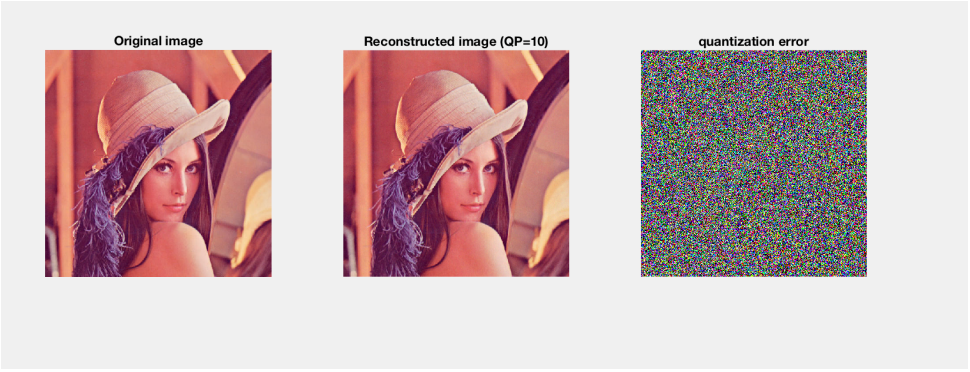

Figure 1: Quantization

2 Assignment 9 Motion estimation

2.1 Apply quantization error on MC prediction error

```
pf(r:r+N-1,c:c+N-1) = B1(r+N:r+N2-1,c+N:c+N2-1)-A1(r+N+y1:r+y1+N2-1,c+N+x1:c+x1+N2-1);
temp = pf(r:r+N-1,c:c+N-1);
TemP = dct2(temp); % DCT of difference
s = sign(TemP); % extract the coefficient sign
TemP = s .* round(abs(TemP)/8)*8; % quantize/dequantize DCT
temp = idct2(TemP); % IDCT
Br_quant(r:r+N-1,c:c+N-1) = A1(r+N+y1:r+y1+N2-1,c+N+x1:c+x1+N2-1)+ temp;
```

2.2 Question a

```
   x = int16(zeros(Height/N,Width/N));% x-component of motion vector
y = int16(zeros(Height/N,Width/N));% y-component of motion vector
x(rblk,cblk) = v; y(rblk,cblk) = u;
```

x stores x coordinate of motion vector, y stores y coordinate of motion vector.

2.3 Question b

The size of image is 176 * 144 So the total number of motion vector will be:

$$\frac{176}{8} \times \frac{144}{8} = 22 \times 18 = 396$$

2.4 Question c

The motion compensated frame stoed in Pr which abstract out the best match block in reference frame.

```
pf(r:r+N-1,c:c+N-1) = B1(r+N:r+N2-1,c+N:c+N2-1)-A1(r+N+y1:r+y1+N2-1,c+N+x1:c+x1+N2-1);
```

3 Assignment 10

1. Uncomment % A=transpose(A); line 26
2. Uncomment % B=transpose(B); line 63
3. The image size normaliztion is incorrect.

```
% Make image size divisible by 16
[X,Y] = size(A);
if mod(X,16)~=0
    Height = floor(X/16)*16;
else
    Height = X;
end
if mod(Y,16)~=0
    Width = floor(Y/16)*16;
else
    Width = Y;
end
```

change to 8 as

```
% Make image size divisible by 8
[X,Y] = size(A);
if mod(X,8)~=0
    Height = floor(X/16)*16;
else
    Height = X;
end
if mod(Y,8)~=0
    Width = floor(Y/16)*16;
else
    Width = Y;
end
```

line 23

1. change inFile1='table$_{40.raw}$'; to 'table$_{39.raw}$' line 23
2. change F = int16(41:43); to F = int16(40:43); line 50
3. change legend('MC','No MC', 0) to legend('MC','No MC', 'best') line 114
4. change legend('MC','No MC', 0) to legend('MC','No MC', 'best') line 118

4 Assignment 11 Stereo Imaging

The larger the factor the lower offset generate for red and blue image.

Original : D = round(Y2{nf}/2); %adjust depth factor '2'

Modify To : D = round(Y2{nf}/5);