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```
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%ENGS 111
%HW 7

%This script does computations associated with a,b,c and d in HW 7 part a.
```

image manipulation

```
filename = 'CT.tif';
im = imread(filename);
[freq,index] = imhist(im);%frequency vs intensity of the histogram
[maxFreq,maxIndex] = max(freq(:));%highest frequency and intensity
[minFreq,minIndex] = min(freq(:));%lowest frequency and intensity
nGrayscale = freq > 0; %# of grayscale values
nGrayscale = sum(nGrayscale(:));

fileinfo = dir(filename);
fileSize = fileinfo.bytes;
imageSize = size(im,1)*size(im,2);
```

RLE

```
xx = reshape(im,1,size(im,1)*size(im,2)); %reshape image into a row
[RLE_Values,RLE_Freq] = RLE(xx);
RLE_Size = prod(size(RLE_Freq))*2; % times 2 for frequency
```

compressed: DCT+Quantization+Entropy+RLE

```
[o,q,r] = compressionHelp(im,1); %quality = 1
```

printing

```
fprintf('a)\n');
fprintf('\n');
fprintf('Image size(pixel) = %d x %d\n',size(im,1),size(im,2));
fprintf('Expected file size = %d bytes \n',imageSize);
fprintf('Actual file size = %d bytes \n', fileSize);
fprintf('\n');
fprintf('Actual file size is bigger than expected file size\n');
fprintf('This is because the actual file stores extra information like\n');
```

```
fprintf('Camera Specification, Quantization table, etc \n');
fprintf('\n');
fprintf('b)\n');
fprintf('\n');
fprintf('# of values represnted: %d\n',nGrayscale);
fprintf('Highest frequency for: %d\n',maxIndex-1);
fprintf('Highest vales in the range of 130-180\n');
fprintf('\n');
fprintf('c)\n');
fprintf('\n');
fprintf('# of bytes originally: %d\n',imageSize);
fprintf('# of bytes after RLE compression: %d\n',RLE_Size);
fprintf('# of bytes saved by RLE: %d\n',imageSize - RLE_Size);
fprintf('\n');
fprintf('d)\n');
fprintf('# of bytes originally: %d\n',o);
fprintf('# of bytes after DCT,entropy coding and RLE compression: %d\n',r);
fprintf('# of bytes saved by total compression: %d\n',o - r);

fprintf('\n');
```

a)

Image size(pixel) = 512 x 512
Expected file size = 262144 bytes
Actual file size = 262750 bytes

Actual file size is bigger than expected file size
This is because the actual file stores extra information like
Camera Specification, Quantization table, etc

b)

# of values represnted: 126
Highest frequency for: 0
Highest vales in the range of 130-180

c)

# of bytes originally: 262144
# of bytes after RLE compression: 179646
# of bytes saved by RLE: 82498

d)
# of bytes originally: 262144
# of bytes after DCT,entropy coding and RLE compression: 112871
# of bytes saved by total compression: 149273

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