Matlab Code required for Implementation

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**Images Used:**

**Dog**



**Car**



**Tree**



**Portrait**



**Cup**



**Matlab codes:**

**Read Images:**

>> dog = imread('E:\Books and Academic\Image Processing\Research Paper 2\Dog.jpg');

>> car = imread('E:\Books and Academic\Image Processing\Research Paper 2\Car.jpg');

>> cup = imread('E:\Books and Academic\Image Processing\Research Paper 2\Cup.jpg');

>> tree = imread('E:\Books and Academic\Image Processing\Research Paper 2\Tree.jpg');

>> portrait = imread('E:\Books and Academic\Image Processing\Research Paper 2\Portrait.jpg');

**Run Length Encoding**

**Script:**

function[rle]=rlemain(image)

I=imread(image);

level=graythresh(I);

bw=im2bw(I,level);

figure;

imshow(bw);

title('binary image');

a=bw';

a=a(:);

a=a';

a=double(a);

rle(1)=a(1);

m=2;

rle(m)=1;

for i=1:length(a)-1

if a(i)==a(i+1)

rle(m)=rle(m)+1;

else

m=m+1; rle(m)=1;

end

end

display(rle);

**Command Window:**

>> rlemain('E:\Books and Academic\Image Processing\Research Paper 2\Car.jpg');

>> rlemain('E:\Books and Academic\Image Processing\Research Paper 2\Tree.jpg');

>> rlemain('E:\Books and Academic\Image Processing\Research Paper 2\Dog.jpg');

>> rlemain('E:\Books and Academic\Image Processing\Research Paper 2\Cup.jpg');

>> rlemain('E:\Books and Academic\Image Processing\Research Paper 2\Portrait.jpg');

**Huffman encoding**

**Script:**

function[rle]=Huffman(image)

a=imread(image);

figure,imshow(a)

[I, colormap] = rgb2ind(a, 256);

[m,n]=size(I);

Totalcount=m\*n;

cnt=1;

sigma=0;

for i=0:255

k=I==i;

count(cnt)=sum(k(:));

pro(cnt)=count(cnt)/Totalcount;

sigma=sigma+pro(cnt);

cumpro(cnt)=sigma;

cnt=cnt+1;

end

symbols = [0:255];

[dict, avglen] = huffmandict(symbols,pro);

entropy = - sum (pro .\* log10(pro)/log10(2))

disp(['Entropy: ' num2str(entropy)]);

disp(['Average Length: ' num2str(avglen)])

vec\_size = 1;

for p = 1:m

for q = 1:n

newvec(vec\_size) = I(p,q);

vec\_size = vec\_size+1;

end

end

hcode = huffmanenco(newvec,dict);

dhsig1 = huffmandeco(hcode,dict);

dhsig = uint8(dhsig1);

dec\_row=sqrt(length(dhsig));

dec\_col=dec\_row;

arr\_row = 1;

arr\_col = 1;

vec\_si = 1;

for x = 1:m

for y = 1:n

back(x,y)=dhsig(vec\_si);

arr\_col = arr\_col+1;

vec\_si = vec\_si + 1;

end

arr\_row = arr\_row+1;

end

RGB = ind2rgb(back, colormap);

figure,imshow(RGB)

**Command Window:**

>> Huffman('E:\Books and Academic\Image Processing\Research Paper 2\Car.jpg');

>> Huffman ('E:\Books and Academic\Image Processing\Research Paper 2\Tree.jpg');

>> Huffman ('E:\Books and Academic\Image Processing\Research Paper 2\Dog.jpg');

>> Huffman ('E:\Books and Academic\Image Processing\Research Paper 2\Cup.jpg');

>> Huffman ('E:\Books and Academic\Image Processing\Research Paper 2\Portrait.jpg');

**DCT %/ perfrom these on all images**

I = im2double(car);

T = dctmtx(8);

dct = @(block\_struct) T \* block\_struct.data \* T';

B = blockproc(I,[8 8],dct);

Mask = [ 1 1 1 1 0 0 0 0

1 1 1 0 0 0 0 0

1 1 0 0 0 0 0 0

0 0 0 0 0 0 0 0

0 0 0 0 0 0 0 0

0 0 0 0 0 0 0 0

0 0 0 0 0 0 0 0];

B2 = blockproc(B,[8 8],@(block\_struct) mask .\* block\_struct.data);

invdct = @(block\_struct) T' \* block\_struct.data \* T;

I2 = blockproc(B2,[8 8],invdct);

figure

imagesc(I2)

figure

imshow(I2)

**DWT %/ perfrom these on all images**

X = tree;

[cA,cH,cV,cD] = dwt2(X,'sym4','mode','per');

imagesc(cV)

title('Vertical Detail Coefficients')

imagesc(cA)

title('Approximation Coefficients')

**References:**

[**https://www.mathworks.com/matlabcentral/fileexchange/19561-image-compression-using-run-length-ecoding**](https://www.mathworks.com/matlabcentral/fileexchange/19561-image-compression-using-run-length-ecoding)

[**https://www.mathworks.com/matlabcentral/answers/675968-this-is-a-code-for-image-compression-using-huffman-coding-could-someone-tell-me-why-am-i-not-able-t**](https://www.mathworks.com/matlabcentral/answers/675968-this-is-a-code-for-image-compression-using-huffman-coding-could-someone-tell-me-why-am-i-not-able-t)

[**https://www.mathworks.com/help/images/discrete-cosine-transform.html**](https://www.mathworks.com/help/images/discrete-cosine-transform.html)

[**https://www.mathworks.com/help/wavelet/ref/dwt2.html#d123e27468**](https://www.mathworks.com/help/wavelet/ref/dwt2.html#d123e27468)