Minor Project 1

Presentation 2

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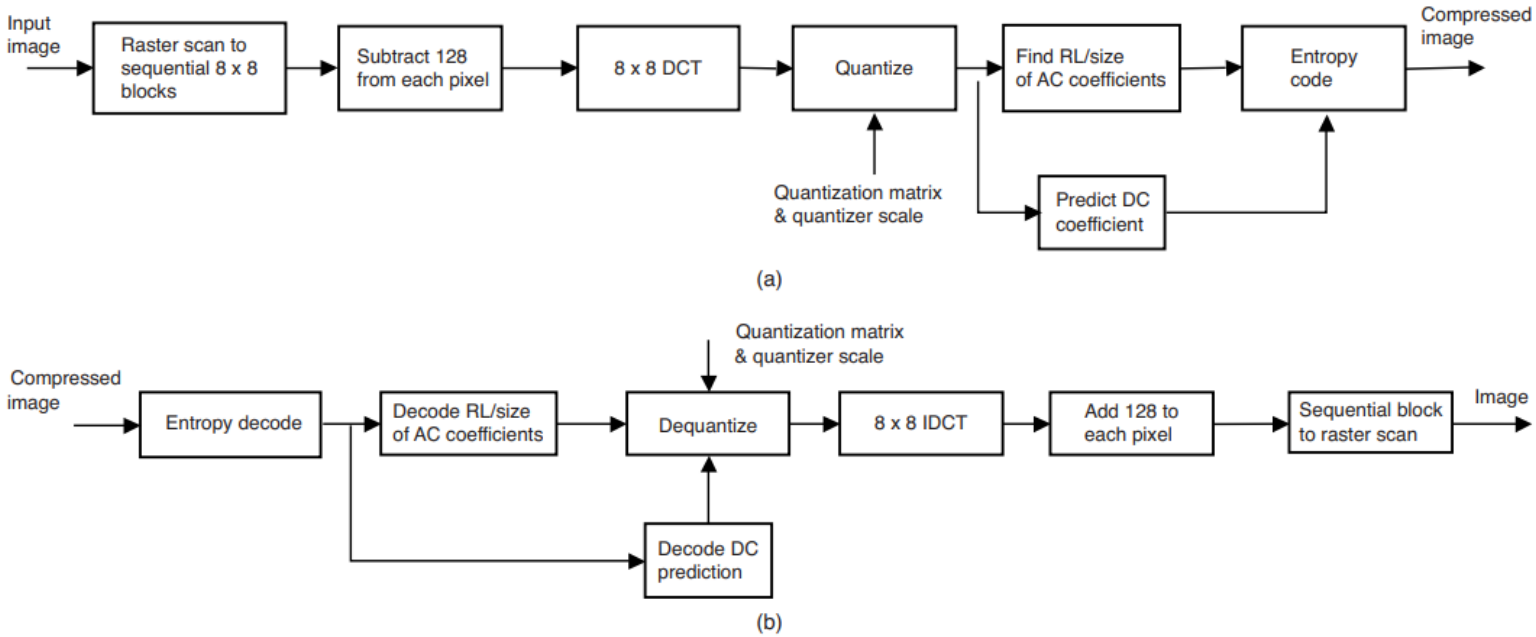
Preveiw

- Explained what is data compression.
- Explained what is image compression
- Presented baseline model of jpeg 2000.
- How we are going to implement it in our project.

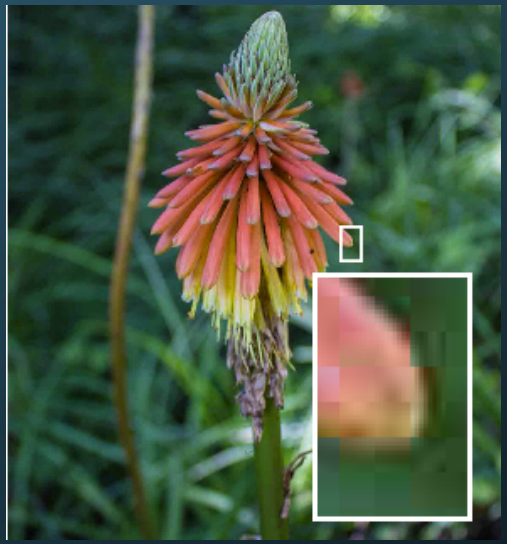
JPEG 2000 Model



We implemented each block of the above model using MatLab to apply algorithm of image compression and make changes to it.

Working

- Color space conversion
- Chrominance downscaling
- Discrete cosine transform
- Quantization
- Run length and huff man encoding



```
I = imread('image.png');
ImageSize = 8*prod(size(I));
Y_d = rgb2ycbcr( I );
% Downsample:
Y_d(:,:,2) = 2*round(Y_d(:,:,2)/2);
Y_d(:,:,3) = 2*round(Y_d(:,:,3)/2);
% DCT compress:
A = zeros(size(Y_d));
B = A;
for channel = 1:3
    for j = 1:8:size(Y_d,1)-7
        for k = 1:8:size(Y_d,2)-7
            II = Y_d(j:j+7,k:k+7,channel);
            freq = chebfun.dct(chebfun.dct(II).').';
            freq = Q.*round(freq./Q);
            A(j:j+7,k:k+7,channel) = freq;
            % do the inverse at the same time:
            B(j:j+7,k:k+7,channel) = chebfun.idct(chebfun.idct(freq).').';
        end
    end
end
b = A(:);
b = b(:);
b(b==0)=[];  %remove zeros.
b = floor(255*(b-min(b))/(max(b)-min(b)));
symbols = unique(b);
prob = histcounts(b,length(symbols))/length(b);
dict = huffmandict(symbols, prob);
enco = huffmanenco(b, dict);
FinalCompressedImage = length(enco);

FinalCompressedImage/ImageSize
```

Code Explained

- Pixel collector
- Downscaling
- DCT compression
- Quantization
- Removing zeroes

Conclusion

This algorithm is trying to make image data consume less space but having a great quality retained till end.

References

- W. K. Pratt, Digital Image Processing, 2nd edition, John Wiley, New York, 6-15, 1991
- A. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, Englewood Cliffs, NJ, 48-54, 1989.
- N. Ahmed, T. Natarajan, and K. R. Rao, “Discrete cosine transform,” Comp., C-23, 90–93, 1974

Thank You