

Image Processing Assignment - 4 Report

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JPEG Compression

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Contents

Introduction	1
Image to Jpeg (im2jpeg.m)	1
Supplementary	2

Introduction

The objective of this assignment is to implement a jpeg baseline compression implementation. The main goal of Image compression is to reduce the number of bits used to store or transmit information. Jpeg is a lossy compression, meaning it will result in a certain loss of accuracy in exchange for a substantial increase in compression. The jpeg compression we will implement will use Huffman coding. Huffman coding could perform effective data compression by reducing the amount of redundancy in the coding of symbols. Huffman coding [1952] shares most characteristics of Shannon-Fano coding. It has been proven to be the most efficient fixed-length coding method available.

Image to Jpeg (im2jpeg.m)

im2jpeg: compresses image X based on 8 x 8 DCT transforms, coefficient quantization, and Huffman symbol coding.

These results differ from those that would be obtained in a real JPEG baseline coding environment because im2jpeg approximates the JPEG standard's Huffman encoding process. Two principal differences are noteworthy:

(1) In the standard, all runs of coefficient zeros are Huffman coded, while im2jpeg only encodes the terminating run of each block; and (2) the encoder and decoder of the standard are based on a known (default) Huffman code, while im2jpeg carries the information needed to reconstruct the encoding Huffman code words on an image to image basis. Using the standard, the compressions ratios noted above would be approximately doubled.

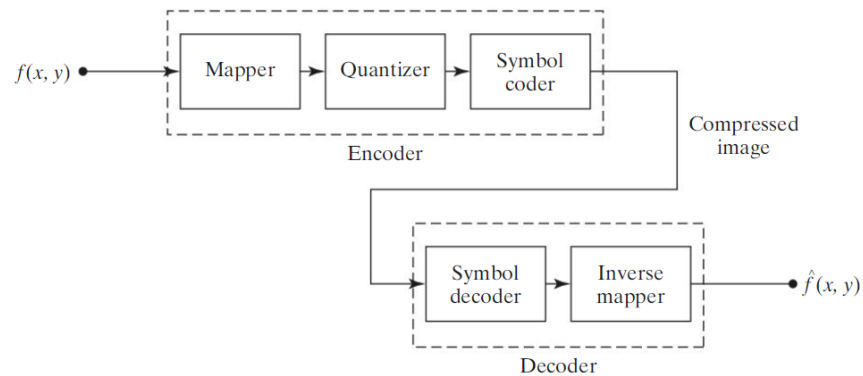


Figure 1. Image compression system block diagram.

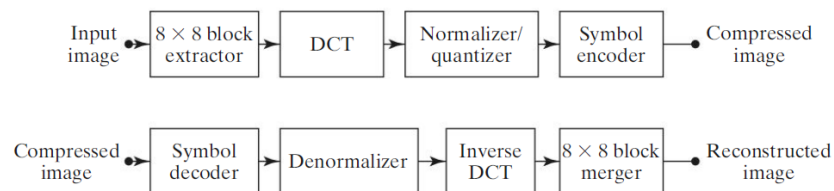


Figure 1. JPEG block diagram.

Huffman codes

When coding the gray levels of an image or the output of a gray-level mapping operation (pixel differences, run-lengths, and so on), Huffman codes contain the smallest possible number of code symbols (e.g., bits) per source symbol (e.g., gray-level value) subject to the constraint that the source symbols are coded one at a time.

Test code:

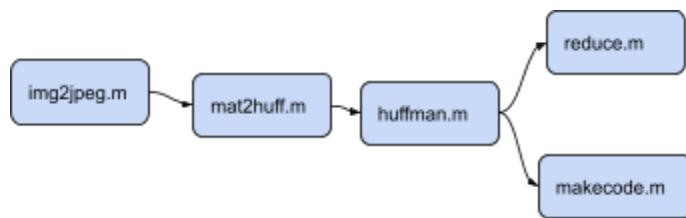
```

f = imread('Data/Chaplin.png');
c1 = im2jpeg(f);
f1 = jpeg2im(c1);
imratio(f, c1)

```

Supplementary

Pipeline



(a) To compile and link unravel on a Windows platform from MATLAB, use the following command line prompt in MATLAB.

```
>> mex unravel.c
```

(b) If you get the error below, then install the appropriate package first (install MinGW-w64 Compiler)

Error using mex. Supported compiler not detected. You can install the freely available MinGW-w64 C/C++ compiler; see [Install MinGW-w64 Compiler](#).

For more options, visit <https://www.mathworks.com/support/compilers>.