H5: Image Compression Based on Discrete Cosine Transform

Due by May 23, 2003 (optional)

This project is to study how much storage space can be reduced on DCT-based JPEG still image compression. You are asked to write or implement a program which takes a 512×512 image as input to do

(1) Partition the image into 4096 8×8 nonoverlapping blocks.

(2) Apply 2D DCT on each block after 128 subtraction from each pixel value to get DCT coefficients.

(3) Quantize the DCT coefficients in (2) using the Quantization table.

(4) Rearrange quantized DCT coefficients in each block according to the zigzag scan order.

(5) For each block, report the intermediate pair for the quantized DC coefficient (QDC) and a triple for each quantized AC coefficient (QAC_j), ended with (0,0) or EOB

(# of bits)(QDC), (Zero runlength, # of bits, QAC_1), (Zero runlength, # of bits, QAC_2), ... , EOB

(7*) Translate the code to **.jpg** file format by either Huffman coding or arithmetic coding.

At least report your results for images *lenna, peppers* on **(5)** with 4096 lines, each represents a block.

16	11	10	16	24	40	51	61
12	12	14	19	26	58	60	55
14	13	16	24	40	57	69	56
14	17	22	29	51	87	80	62
18	22	37	56	68	109	103	77
24	35	55	64	81	104	113	92
49	64	78	87	103	121	120	101
72	92	95	98	112	100	103	99

Table 1: **Quantization Table for DCT Coefficients**