BASELINE JPEG COMPRESSION

Shruthi Menoth

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INTRODUCTION

JPEG Compression is a lossy form of compression based on the discrete cosine transform (DCT). DCT converts each frame of the video source from the spatial (2D) domain into the frequency domain. Before computing the DCT of the 8×8 block, its values are shifted from a positive range to one centered on zero. For an 8-bit image, each entry in the original block falls in the range [0,255]. The midpoint of the range (here, the value is 128) is subtracted from each entry to produce a data range that is centered on zero, so the modified range is [-128,127]. This step reduces the dynamic range requirements in the DCT processing stage that follows.

After the DCT has been performed on the 8x8 image block, the results are quantized in order to achieve large gains in compression ratio. Quantization refers to the process of representing the actual coefficient values as one of a set of predetermined allowable values, so that the overall data can be encoded in fewer bits. This is followed by taking an inverse DCT to obtain the reconstructed image. Although performing an inverse DCT will not exactly reproduce the original input 8x8 input matrix because of rounding error, the result is usually quite visually acceptable.

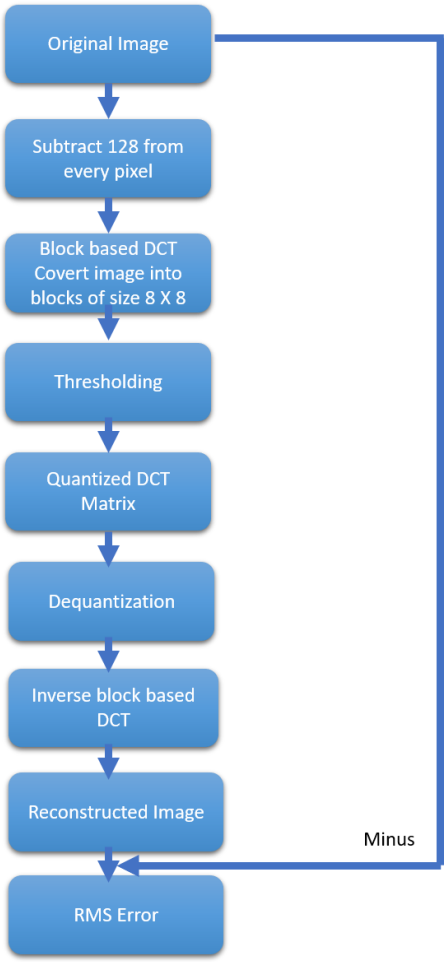

Fig: Image Compression using DCT

Reconstructed Image Results

Retained Coefficients: 4

Reconstructed Image

RMS Error: 23.29

Retained Coefficients: 16

Reconstructed Image

RMS Error: 14.31

Retained Coefficients: 32

Reconstructed Image

RMS Error: 9.76

Retained Coefficients: 64

Reconstructed Image

RMS Error: 8.85