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Lossless image compression Using Hashing (using collision resolution)

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***Abstract*-Image compression is fundamental to the efficient and cost-effective use of digital medical imaging technology and applications. The Image Compression using hashing is based on collecting the pixels by having subdivision of total image of 640*480 pixels in 8*8 pixels grid. The adjoining pixels carry almost same frequency and color. Stores those pixels in hash table. Which will build hash chain. In result per pixel bit utilization will be reduced. Such process will help in reducing the size of image. Once size will be reduced the transfer cost as well as storage cost will be reduced.**

***Keywords* :pic,bpp.**

1. INTRODUCTION

I. image compression

Image compression is minimizing the size in bytes of a graphics file without degrading the quality of the image to an unacceptable level.. It is a process intended to yield a compact representation of any image, thereby reducing the image storage/transmission requirements. Compression is achieved by the removal of one or more of the three basic data redundancies:

1. Coding Redundancy
2. Interpixel Redundancy
3. Psychovisual Redundancy

Coding redundancy is present when less than optimal code words are used. Interpixel redundancy results from correlations between the pixels of an image. Psychovisual redundancy is due to data that is ignored by the human visual system (i.e. visually non essential information).Image compression techniques reduce the number of bits required to represent an image by taking advantage of these redundancies. An inverse process called decompression (decoding) is applied to the compressed data to get there constructed image. The objective of compression is to reduce the number of bits as much as possible, while keeping the resolution and the visual quality of the reconstructed image as close to the original image as possible. Image compression systems are composed of two distinct structural blocks: an encoder and a decoder.

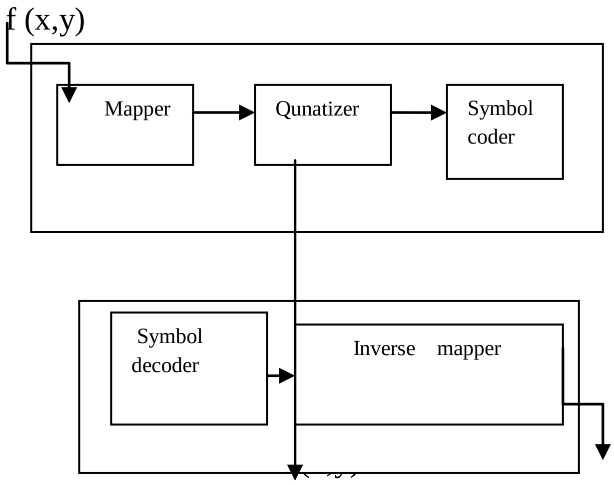


Figure1:- Psychovisual Redundancy

f(x,y) Encoder Compressed image F(x,y) Decoder Image f(x,y) is fed into the encoder, which creates a set of symbols form the input data and uses them to represent the image. If we let n1 and n2 denote the number of information carrying units(usually bits) in the original and encoded images respectively, the compression that is achieved can be quantified numerically via the compression ratio,

CR = n1 /n2

As shown in the figure, the encoder is responsible for reducing the coding, interpixel and psychovisual redundancies of input image. In first stage, the mapper transforms the input image into a format designed to reduce interpixel redundancies. The second stage, quantizer block reduces the accuracy of mapper's output in accordance with a predefined criterion. In third and final stage, a symbol decoder creates a code for quantizer output and maps through in accordance with the code. These blocks perform in reverse order, the inverse operations of the encoder's symbol coder and mapper block. As quantization is irreversible, an inverse quantization is not

2. PROPOSED ALGORITHM

The acronym JPEG stands for joint photographic expert group. The word joint comes from the fact that it is a collaborative effort b/w two standards committee , the CCITT and ISO.
There are four main kinds of JPEG Compression Algorithms.
a) Sequential Encoding: Each image component is encoded in a single, left to right , top to bottom scan.
b) Progressive Encoding**:** Each Image is encoded in multiple scans for applications in which transmission time is long and the viewer prefers to watch the image build and in multiple coarse to clearer passes.
c) lossless encoding**:** the image is encoded to guarantee exact recovery of every source image sample value. It is based on a simple predictive method that is wholly independent of the dct based algorithm**.**
d) hierarchy encoding **:**The image is encoded at multiple resolutions so that the lower resolution versions may be accessed without first having to decompress the image at its full resolution. This is useful in applications where a very high resolution must be accessed by lower resolution display.

3. STEPS

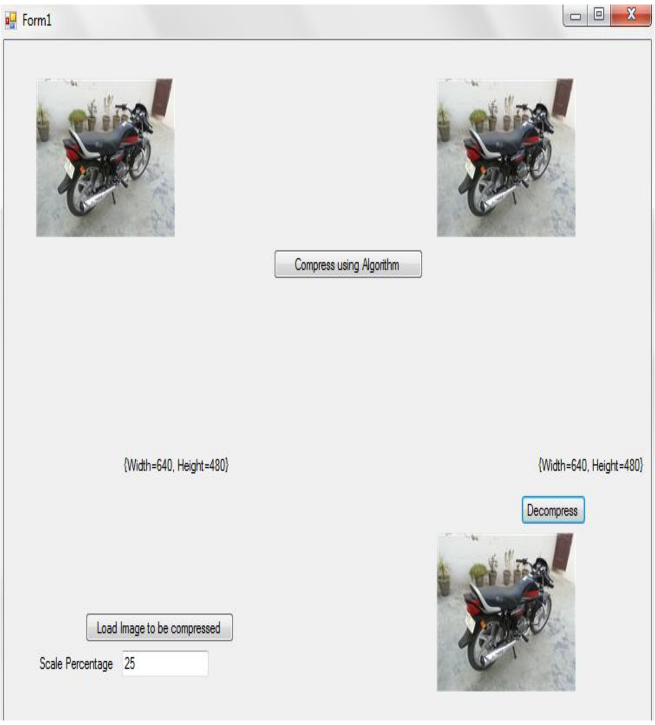
JPEG Compression involves the following process**.**

1. The image is broken into blocks of 8*8 .
2. Each block is transformed using the forward Discrete cosine transform and hash value of each.
3. The resulting 64 coefficients are quantize to finite set of values. The degree of rounding depends upon the specific coefficients.
4. The DC coefficient is a measure of the average value of the 64 pixels with in the specific image block. Because there is usually strong correlation b/w the DC coefficient of adjacent 8*8 blocks, the quantized. Dc Coefficient is encoded as difference from DC term of the previous block in scan order.
5. The remaining 63 quantized co-efficient are scanned in zig-zag sequence .this ordering helps in facilitate entropy encoding by placing a low frequency coefficients, before the high frequency coefficient.
6. Ordered coefficients are run length encoded.
7 the data length is entropy encoded by means of arithmetic or huffman coding**.**

4. RESULTS AND DISCUSSION

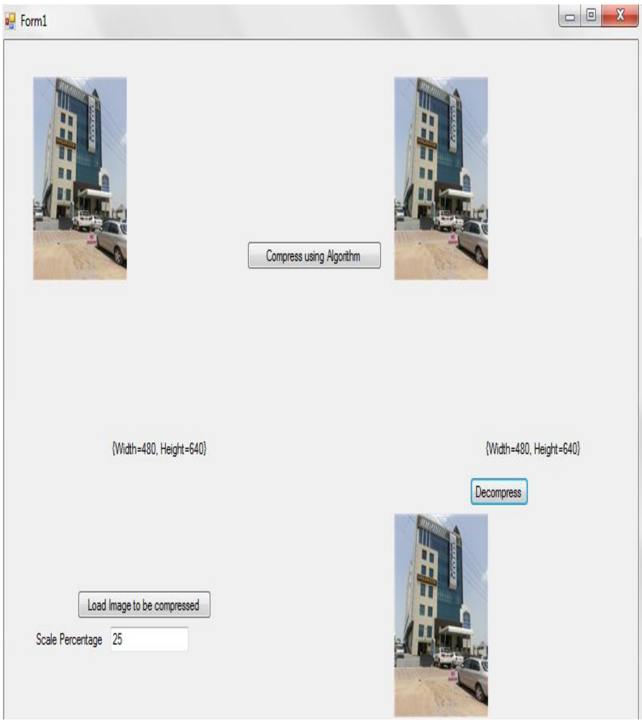
Using the hashing the evaluation of the reconstructed image was calculated. Signal to noise-ratio measure are estimates of the quality of a reconstructed image compared with the original image.SNR measures do not equate with human subjective perception typical PSNR values range between 20 DB and 40 DB. In this Study it was found that for JPEG compression, the PSNR was between 32DB to 54 DB, whereas for wavelet it was between 35 DB to 48 DB. The actual value of PSNR is not meaningful, but the comparison between the two values of different reconstructed images gives a measure of quality. The difference between the compressed image and the original image was also calculated. Table 2 represents the results for MAE, MSE, SNR, RMSE, and PSNR for chest x-ray image by using JPEG wizard software. These results illustrate that, as compression ratio increases the MSE and RMSE will also increase whereas the PSNR decreases.

Results in snapshots



Snapshot 1 motercycle

Snapshot 2 lake



Snapshot 3 gold gym

Snapshot 4 fields

Result table

S no.	Input image	Resolution Size(KBs)	Compression using PDT			Compressed using Hashing			Compression Ratio Using PDT	Compression Ratio Using Hashing
	Original Images	Original sizes	Resolution	pixel	Size(bits)	Resolution	Pixel	Size(bits)	Bpp (bits per pixel)	Bpp (bits per pixel)
1	Motercycle	138 KB (640*480)	255*255	65536	165478.4	640*480	307200	470220.8	2.525	1.530
2	Lake	129 KB (640*480)	255*255	65536	92569.6	640*480	307200	403046.4	1.412	1.312
3	Gold gym	159 KB (640*480)	255*255	65536	164659.2	640*480	307200	583270.4	2.512	1.898
4	Fields	165 KB (640*480)	255*255	65536	174489.6	640*480	307200	719257.6	2.662	2.341

5. CONCLUSION

Image compression is fundamental to the efficient and cost-effective use of digital medical imaging technology and applications. The Image Compression using hashing is based on collecting the pixels by having subdivision of total image of 640*480 pixels in 8*8 pixels grid. The adjoining pixels carry almost same frequency and color. Stores those pixels in hash table. Which will build hash chain. In result per pixel bit utilization will be reduced. Such process will help in reducing the size of image. Once size will be reduced the transfer cost as well as storage cost will be reduced. Using the hashing the evaluation of the reconstructed image was calculated. Signal to noise-ratio measure are estimates of the quality of a reconstructed image compared with the original image.SNR measures do not equate with human subjective perception typical PSNR values range between 20 DB and 40 DB.

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