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An Effective Analysis of Quality Decompression Based Image Destruction

[1]Dr. G. J. Joyce Mary, [2]A. Ramachandran
[1]Research Guide, PRIST University, Thanjavur, Tamilnadu, India
[2]Ph.D Research Scholar and Assistant Professor, Srinivasan Engineering College, PRIST University, Thanjavur, Tamilnadu, India

Abstract**: In this current digital image compression research is an effective analysis of quality compression and decompression based image destruction. One of the main objectives of image compression is reduce the image volume or size. The storage of images is becoming difficult with number of images growing too million and billions. Hence the image compression becoming absolute necessity in computing field. The Discrete Cosine Transform is widely used in image compression technique. Redundant information in an image needs to be eliminated by adopting intelligent hybrid method. In the current research attempts better quality of compression is observed with the use of Fine Discrete Cosine Transform (FDCT) and Effective Discrete Wavelet Transform (EDWT). In this paper, the proposed system efficient image hybrid compression and decompression algorithm in color image compression. The objective of this color image compression scheme is efficiently reducing the image size and decompression scheme is efficiently factor while preserving the quality of reconstructed image. Experimentation has been carried out on different image formats successfully. The proposed system achieved a good compression ratio and considerable test application for the quality of the reconstructed color image.

Keywords**: image, compression, decompression, quality, FDCT, EDWT.

I. INTRODUCTION

The recent research in image processing the compression technique has stemmed from the ever-increasing need for efficient data transmission, storage and utilization of hardware resources. Uncompressing is a one of the processes in image compression. The uncompressed image data require considerable storage capacity and transmission bandwidth. Despite rapid progress in mass storage density processor speed and digital communication system performance demand for data storage capacity and data transmission bandwidth continues to outstrip the capabilities of available technologies [1]. Compression is reduces the storage requirements, transmission time and bandwidth, which makes the data management more effective and efficient [2], [3]. The current growth of data intensive multimedia based applications has not only sustained the need for more efficient ways to encode image but have made compression of such signal storage and digital communication technology [4].

A. Principle of Image Compression and Decompression

Compressing an image is significantly different from compressing raw binary data. It is certainly the case that general purpose compression programs can be used to compress images, but the result is less than optimal. This is because images have certain statistical properties that can be exploited by encoder specifically designed for them [5]. Lossless compression is involved with compressing data which, when decompressed, will be an exact replica of the original data. In this data when binary data such as executable documents are compressed [6]. The performance to be exactly reproduced when decompressed on the other terms of image need not be reproduced exactly. An approximation of the original image is enough for most purpose, as long as error between the original and the compressed image is tolerable [7].

An ordinary characteristic of most images is that the neighboring pixels are correlated and therefore hold redundant information. The foremost task then is to find out less correlated representation of the image. Two elementary components of compression are redundancy and irrelevancy reduction. Redundancy reduction aims at removing duplication from the signal source image. Irrelevancy reduction omits parts of the signal that is not noticed by the signal receiver, namely the Human Visual System (HVS). In general, three types of redundancy can be identified: (a) Spatial Redundancy or correlation between neighboring pixel values, (b) Spectral Redundancy or correlation between different color planes or spectral bands and (c) Temporal Redundancy or correlation between adjacent frames in a sequence of images especially in video applications. Image compression research aims at reducing the number of bits needed to represent an image by removing the spatial and spectral redundancies as much as possible [8].

An inverse process called decompression (decoding) is applied to the compressed data to get the reconstructed 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. Lossless compression involves with compressing data which, when decompressed, will be an exact replica of the original data. This is the case when binary data such as executables, documents etc. are compressed. They need to be exactly reproduced when decompressed. On the other hand, images need not be reproduced exactly. An approximation of the original image is enough for most purposes, as long as the error between the original and the compressed image is tolerable [8].

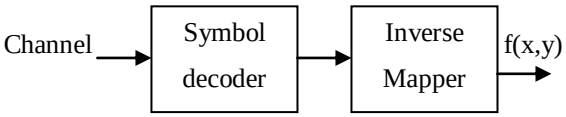

Fig.1: Source Decoder Model

The neighboring pixels in most images are highly correlated and hold redundant information. The foremost task then is to find out less correlated representation of the image. Image compression is actually the reduction of the amount of this redundant data without degrading the quality of the image to an unacceptable level. There are two mainly basic components of image compression redundancy reduction and irrelevancy reduction [9]. In lossless compression scheme, the reconstructed image, after compression, is numerically identical to the original image. However lossless compression can only achieve a modest amount of compression. An image reconstructed is lossy compression contain degradation relative to the original. Often this is because the compression scheme completely discards redundant information. However, lossy schemes are capable of achieving much higher compression. Under normal viewing conditions, no visible loss is perceived (visually lossless) [10].

The recent image compression standard for compression technique of still image use Discrete Cosine Transform (DCT) which represents an image as superposition of cosine functions with different discrete frequencies. The DCT can be regarded as a discrete time version of the Fourier Cosine Series. It is a close relative of Discrete Fourier Transform (DFT), a technique for converting a signal into elementary frequency component. Thus, DCT can be computed with a Fast Fourier Transform (FFT) like algorithm of complexity O(log2n) [11]. The wavelet transform has emerged as a cutting edge technology within the field of image analysis. The wavelet transformation have a wide variety of different applications in computer graphics including radiosity, multi-resolution painting, curve design, mesh optimization, volume visualization, image searching and one of the first applications in computer graphics, image compression [12]. The Discrete Wavelet Transform (DWT) provides adaptive spatial frequency resolution that is well matched to the properties of Human Visual System [13].

II. THE NEWLY PROPOSED COMPRESSION METHOD

The newly proposed image compression method depends on the single level EDWT. The image divided into 8X8 pixels. The image divided into non overlapping blocks of data of 8x8 pixels. The image matrix value is non overlapping block of image pixels it transformed by FDCT matrix values. The image matrix value contains the frequency sub bands and is coded by the image Minimize algorithm while matrix value transformed again by EDWT. The recent research is displayed to decode the matrix values. The sub bands are recomposed by frequency through inverse of EDWT.

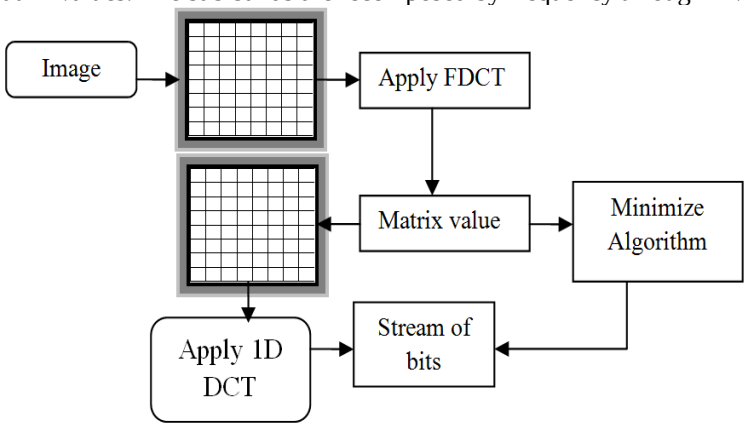

Fig.2: Newly Proposed image Compression Method

A. FDCT Structure

The image is broken into 8X8 block of pixels. Each block of pixels used to image compression. In this kind of broken block of pixels is very difficult. Block of pixels is using to produce high quality of image compression. Each and every block is information about the picture. Splitting of picture block used in compression mechanism and also merging of picture block is used in decompression mechanism. Each dividing blocks are the subdivision of images. Each block is compressed through quantization. The array of compressed block that constitutes the image is stored in a drastically reduced amount of space. The sample FDCT method [14] for described in figure 3. Working from left to right, top to bottom the FDCT is applied to each block. The FDCT fully used for compression standards. This method produces high quality compression. The Fine Cosine Transform has found wide application in transform image coding. The efficacy of FDCT on images is discussed here. This system proposed the new 2D FDCT function.

The FDCT function is defined given by

$$FD(u,v) = \frac{2}{n}\alpha(u)\alpha(v)\sum_{x=0}^{M-1}\sum_{y=0}^{N-1} FI(x,y)PXQ \quad \ldots \text{Eqn. 1}$$

Where

$\alpha(u) = \sqrt{\frac{1}{M}}$ for u=0,1,2…N-1

$\alpha(v) = \sqrt{\frac{1}{N}}$ for v=0,1,2…M-1

$$P = \left[cos\sqrt{\frac{(2x+1)u\pi}{2M}}\right]^2$$

$$Q = \left[cos\sqrt{\frac{(2y+1)v\pi}{2N}}\right]^2$$

FD – Fine Discrete Transform
FD(u,v) – FD Function
u, and v – Frequency variable
M and N – Transform function

The 2-D basis functions can be generated by multiplying the horizontally with vertically oriented set of the same function. In the basic function, image pixel for M=8 and N = 8. It can be noted that the basic functions exhibit a progressive increase in frequency and image variable both in the vertical and horizontal direction. The basic transformation functions of results from multiplication of FDC component with its transpose images. Hence, this function assumes a constant value and is referred to as the FDCT coefficient [14].

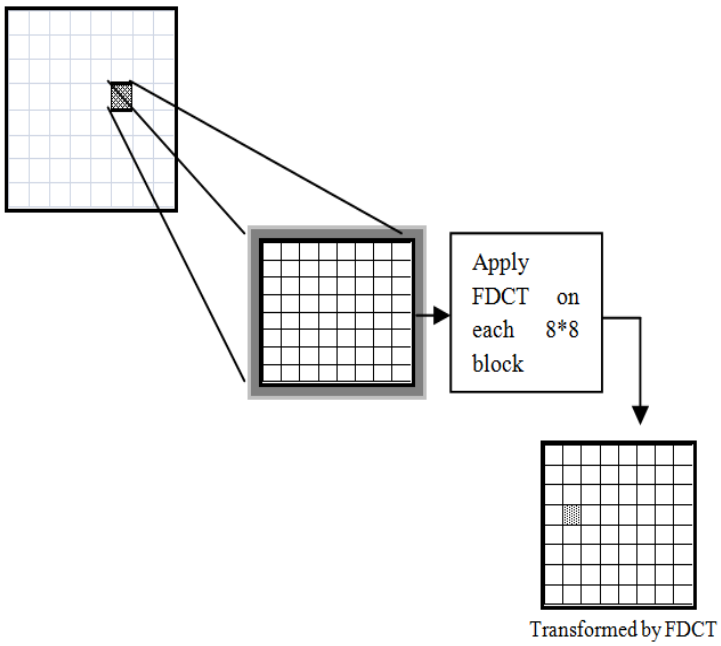

Fig. 3: FDCT Code Form

The plane is divided into blocks of 8X8 sizes and FDCT applied to each block. The FDCT coefficients are compressed through the quantization process using quantize. The FDCT coefficients values become zero. The scanning mechanism is zig zag which means left to right. In this technique which is used to convert matrix into array formats. The encoding is used to convert coefficients into binary value and the same is transmitted [14].

B. EDWT Structure:

The 8X8 pixels that transformed by Effective Discrete Wavelet Transform (EDWT) procedure it progress producing quantized image matrix value. The Effective Discrete Wavelet Transform (EDWT) producing is high quantized and low quantized image matrix value. The low quantized image matrix contains the low level quantized is coded by the max-min matrix value algorithm. The high quantized is transformed image by another mechanism to be followed. The Effective Discrete Wavelet Transform (EDWT) exploits the spatial correlation of data by dilation method. The frequency correlation as followed by same dilation method. The Effective Discrete Wavelet Transform (EDWT) supports normal image resolution analysis of data. The Effective Discrete Wavelet Transform (EDWT) allows the process of transmission

and enlarges the image without the extra volume of storage because it is supports to multi-resolution process. One of the best features is fast compression process. Another important feature is high compression ratio in the proposed system [15].

$$f(x) = \sum_{k} C_{j_0}(k)\varphi_{j_0,k}(x) + \sum_{j=j_0}^{\infty} \sum_{k} d_j(k)\psi_{j,k}(x) \quad \text{----Eqn-3}$$

f(x) = Wavelet Series
j_0 =arbitrary scaling function
Cj_0 =Scaling Coefficient
Ψ(x) =Relative to Wavelet
φ (x)= Scaling function
dj(k)=Wavelet Coefficient

The image is broken in to NXM block of pixels. Each and every block of pixels is used to image compression process. The block of pixel hides image information. The splitting standard to implement in input image. The EDWT image coefficient values become zero. The EDWT coefficient are compressed through the quantization and encoding standard. The pixel identification or scanning mechanism is from left to right [15].

$$W_{\varphi}(j_0,k) = 2 * \left(\frac{\frac{1}{\sqrt{M}}\sum_x f(x)\varphi_{j_0,k}(x)}{2}\right) \quad \text{---Eqn-4}$$

$$W_{\psi}(j,k) = 2 * \left(\frac{\frac{1}{\sqrt{M}}\sum_x f(x)\psi_{j,k}(x)}{2}\right) \quad \text{---Eqn-5}$$

for $j>=j_0$ and
Effective wavelet f(x)= Eqn4+Eqn5
Effective wavelet f(x)= Eqn4-Eqn5

The proposed system of Effective Wavelet Compression method is effective in coding mechanism. The image is decomposed used filtering process. The output of the filtered image is dividing block, quantized and encoded. Effective Discrete Wavelet Transform (EDWT) divides the information of an image into the value code. The divided information shows the image value of pixel in given digital image. The pixel value is used to identify the given image. The image is compressed with the help of frequency mechanism. The proposed system is used get the original image bytes while compressing the low frequency image. The compression with Discrete Wavelet Transform (EDWT) using compression frequency is high. The Discrete Wavelet Transform (EDWT) used to transform the high frequency coefficient into multiple regions. The proposed system measures in low frequency coefficient into single region. The progress is reduce the image size is half of the original image. The image size is reduced with high compression ratio [15].

III. COMPRESSION ALGORITHM

The newly proposed compression algorithm is a minimize algorithm. In this proposed algorithm is used to reduce the size of the matrix image value and other frequency sub bands. It depends on the RW values (Random Weighted) and remaining coefficients value to calculate and store the image values in a new image array. The minimized algorithm computes the probability of the data for each frequency image matrix. The probability value is used in forth coming process of image decompression. The newly proposed compression algorithm is depends on the arithmetic coding. It takes the stream of bits and converts into dimensional floating point values. The output values are in between zero and one. The decoding is a process reproduces the exact original stream of bits.

Algorithm: Description of Proposed Compression Method

1. Input: Read Original Color Image I=READ_IMAGE (file)
2. for decomposition from I into value of n and m
3. To construct I is cropped
4. CI=I(200:(Cropped Size[0]-1)+200))
5. for ← 0 to 1
*6. CI constructed P*Q pixels P*Q=8*8*
7. Using the BBRA with FI=CONVOL(FLOAT(CI))
8. To construct I is cropped CI=I(200:(cropped size[0]-1]+200))
9. for ← 0 to 1 +200
*10. CI constructed block of pixel=n*m*
{such n,m pixel value}
11. EDWT=WTN(image,20)
12. PS=ABS(EDWT)^2
13. SPS=ALOG10(PS)
14. Output: Received compression image i

IV. DECOMPRESSION ALGORITHM

The newly proposed decompression algorithm is the inverse process of newly proposed compression. The image decode is the minimized image array value by arithmetic decoding. The newly proposed algorithm is used to decode each sub band image values. The newly proposed algorithm depends on the only limited data image array values. The limited data image array value is used to identify the image stream values. The limited data set value pointing to the pointers in the image array. The pointer value is easy to point the limited data matrix value. The pointer values are calculated only three values. These values are incremented one by one. The newly proposed decompression algorithm is to apply the addition between two values in the image values is decoded to return the original image values.

Algorithm: Description of Proposed Decompression Method

1. *Input: Compressed Image I=INPUT_IMAGE(i)*
2. *Reconstruct the Color Cropped Image CI*
3. *for decomposition from I into value of n and m*
4. *CI constructed block of pixel=n*m*

{such n,m pixel value}

5. *Reconstruct the pixel component P*Q*
6. *Compose the value of n and m in I*
7. *CONGRID(-1>FIX(FI/50)<1,dispalysize[I]*
8. *Output: Reconstructed quality Color Image I.*

V. SAMPLE OUTPUT

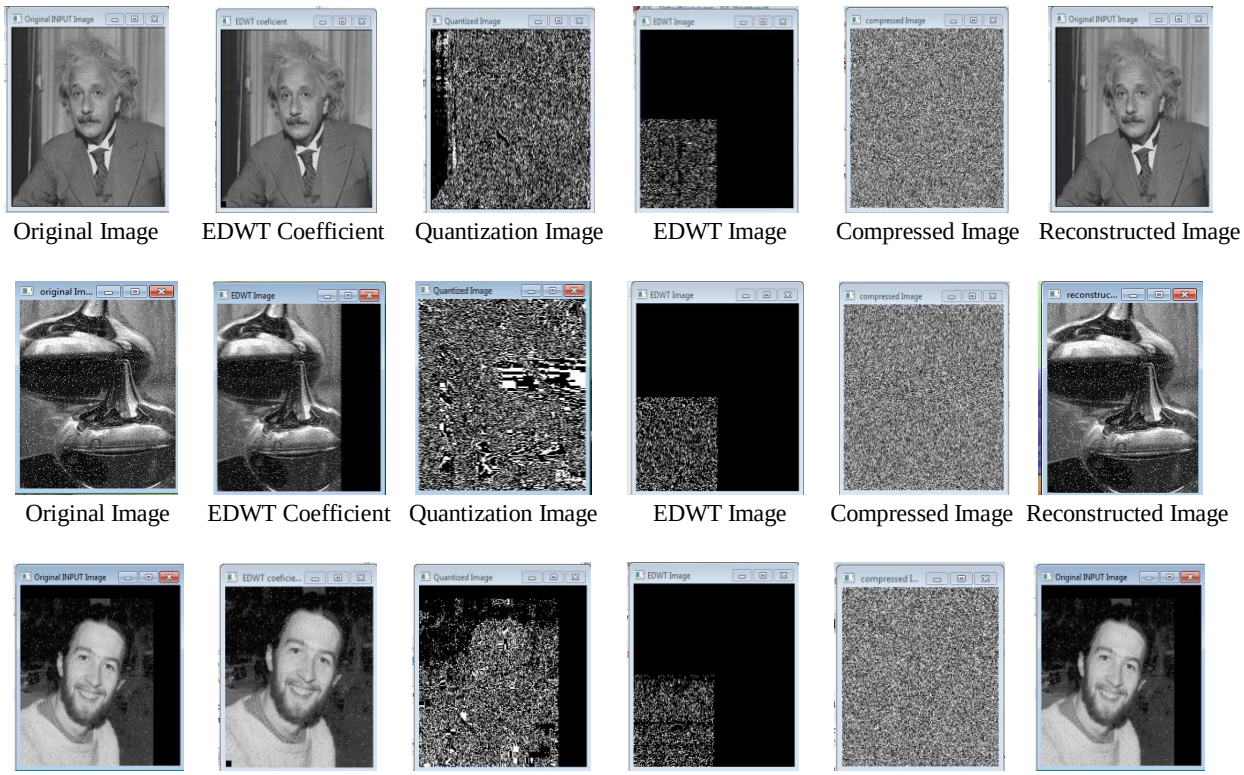

Fig.4: Image Compression

The sample output is displaying image compression with various images. The input image is original image. The original image is applying EDWT coefficient methodology. The coefficient image is converting to standardized quantization image. The quantized image is applying to the EDWT system. The conclusion of image compression is produced quality of compressed image. The compressed image size is reduced without loss of quality.

VI. EXPERIMENTAL RESULT

The experimentation about the proposed method has been done. Here the FDCT and EDWT transform coding applied on test image compression. Now for checking clarity, quality, and performances of transforms applied on each image process done evaluation between actual image (input image) and compression image using each transforms. Following sample images are the compression by FDCT and EDWT. In this original image is compression and reconstruction process is getting the quality output image.

Table 1:

Type of Image	Original Image Size in Byte	Existing Compression Image Size in Byte (DWT & DCT)	Proposed Compression Image Size in Byte (FDCT & EDWT)	Decompression Image Size in Byte
.jpg	131072	75536	65536	131070
.bmp	92160	56080	46080	92158
.tif	100962	60481	50481	100960

In graphical representation is displayed image compression system is compared with exiting system. The original image size, existing system compare with proposed image compression standard. The image size is represented by byte format. Different image formats like bmp, png and tif are used for testing and compression ratio is compared. The newly proposed system observes that, the newly proposed method is much lesser than that of existing method. The proposed compression method is producing the compressed image. The image size is reduced with same quality of input image. Table 1 reveals that the measurement of existing and newly proposed method is acceptable. In this newly proposed method greater beneficial in terms of saving storage, reducing the image noise as well as effective reconstructed the color image. It is equally important to conserve the important uniqueness of an image after compression and reconstruction.

VII. CONCLUSION

In this paper, system proposed reduces the size in color image compression. Experimentation has been carried out on different image format successfully. The newly proposed method is simple. A good compression has been achieved with good quality of reconstructed image. Image compression techniques reduce the number of bits required to represent an image. This research paper has explained and demonstrated a new method for image compression FDCT and EDWT. The method is based on the transformations FDCT and EDWT. The proposed minimize algorithm is based FDCT and EDWT. The result shows that newly proposed approach introduce the better image quality at equal to the input image. The most important aspects of the compression methods are providing without loss of data in the process. Here the hybrid transform technique is used to best compression mechanism. This transform has shown around 50% of improvement in time of compressed image as compared of existing one. The FDCT and EDWT transform have shown around 70% of improvement in the time of compressed image and reconstruct image.

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BIBLIOGRAPHY

Dr.G.J.Joyce Mary completed her Ph.D in the area of Parallel Computing. Now she is a Research supervisor, PRIST University, Thanjavur, Tamilnadu, India. Her area of interest includes Parallel Computing, Digital Image Processing and Webservice.

A.Ramachandran received the M.Tech degree in Computer and Information Technology from Manonmaniam Sundaranar University, Tirunelvelli, Tamilnadu, India. He is a Research scholar in the Department of Computer Science Engineering, Center for Research and Development, PRIST University, Vallam, Thanjavur, Tamilnadu, India. He is working as Assistant Professor in the Department of Computer Science and Engineering, Srinivasan Engineering College, Perambalur, Tamilnadu, India. His current research interest includes image segmentation, image compression, image reconstruction, image noise removal, image restoration and enhancement.

