Scientific Journal of Impact Factor (SJIF): 4.72

e-ISSN (O): 2348-4470
p-ISSN (P): 2348-6406

International Journal of Advance Engineering and Research Development

Volume 4, Issue 8, August -2017

Improving the Compression Factor in a Color Image Compression

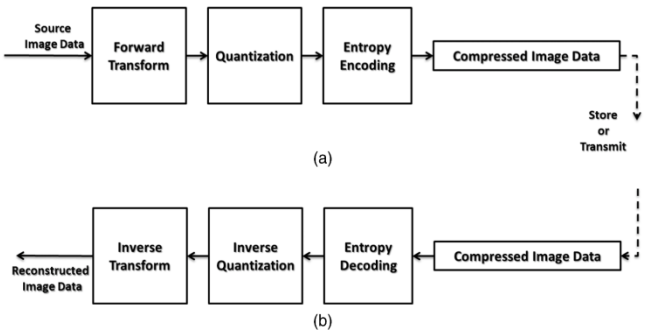
Vikas Goyal, *M.Tech. Student, Vaish College of Engineering, Rohtak, HR*
Dr. Nipin Gupta, *Head of the Deptt. (ECE), Vaish College of Engineering, Rohtak, HR*
Dr. Pankaj Gupta, *Professor, Vaish College of Engineering, Rohtak, HR*
Dr.Deepak Goyal, Associate Professor *Vaish College of Engineering, Rohtak, HR*

Abstract—

Image compression is to reduce the redundancy and irrelevancy present in the image, so that it can be stored and transferred efficiently. The compressed image is represented by less number of bits compared to original. Hence, the required storage size will be reduced, consequently maximum number of images can be stored and it can transferred in faster way to save the time and transmission bandwidth . The main aim of this paper is to convert the color image to gray image and than compress the gray image with Hybrid Image Compression and after decompression perform the colorization on the gray image.

I. INTRODUCTION

Compression of data is a process that reduces the amount of data needed that represents information that is given. A characteristic commonly known for most of the images is that the neighboring pixels tend to be correlated and thus contain superabundant information. There are several techniques for image compression such as DCT (discrete cosine transform), DWT (discrete wavelet transform), PCA (principal component analysis), Hybrid image compression. In our paper for compression we have use all the three methods and on the bases of some parameters we have conclude that Hybrid Image compression is better than the DCT and DWT. Figure below depicts the general flow of image compression and decompression. In this paper Section 2 describe the method and Section 3 shows the result.



II METHODOLGY

The implementation performed in this project will help us to compress the image as well as colorize that compress images. It is seen in previous approaches while using DWT gives better results when compared with DCT. While in our proposed method we will work on advantages of both DCT and DWT know as Hybrid.

Discrete wavelet Transformation:-

Wavelet Transform decomposes a signal into a set of basis functions, these basis functions are called wavelets. Wavelets are mathematical function that separate data into different frequency component with a resolution matched to its scale. DWT transforms a discrete time signal to a discrete wavelet representation.

$$\psi_{j,k}(t) = \frac{1}{\sqrt{2^j}}\psi\left(\frac{t-k2^j}{2^j}\right)$$

In equation ψ is a function called wavelet, a represent another function which measure the degree of compression or scale and b represent translation function which measures the time location of the wavelet. Discrete wavelet transform in 2D function f(x,y) of size M*N is :

$$W_\varphi(j_0,m,n) = \frac{1}{\sqrt{MN}}\sum_{X=0}^{M-1}\sum_{Y=0}^{N-1} f(x,y)\varphi_{j0,m,n}(x,y)$$

Discrete Cosine Transformation:-

The Discrete Cosine Transformation is used for most compression applications. DCT is a technique to convert signal into elementary frequency component. It transforms digital image data from spatial domain to frequency domain. DCT is a fast transform. DCT has excellent compaction for highly correlated data. It give good compromise between information packing ability and computational complexity.

The discrete cosine transform helps to separate the image into ***parts or spectral sub bands of differing importance with respect to*** the images visual quality. The general equation for a 1D (*N* data items) DCT is defined by the following equation:

$$F(u) = \left(\frac{2}{N}\right)^{\frac{1}{2}} \sum_{i=0}^{N-1} \Lambda(i).cos\left[\frac{\pi.u}{2.N}(2i+1)\right] f(i$$

The general equation for a 2D (*N* by *M* image) DCT is defined by the following equation:

$$F(u,v) = \left(\frac{2}{N}\right)^{\frac{1}{2}} \left(\frac{2}{M}\right)^{\frac{1}{2}} \sum_{i=0}^{N-1} \sum_{j=0}^{M-1} \Lambda(i).\Lambda(j).cos\left[\frac{\pi.u}{2.N}(2i+1)\right] cos\left[\frac{\pi.v}{2.M}(2j+1)\right] .f(i,j$$

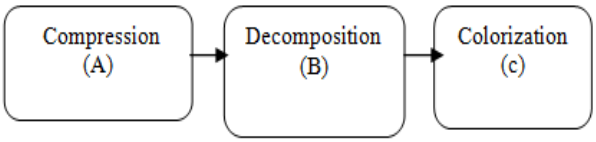


Figure 1 :- Block Diagram Of Methodology

A) Compression Procedure:-

This is the first phase of proposed work in which the compression will perform on Gray Images. Original gray image is used as an input and after that three level DWT Decomposition will performed on the gray images. While taking approximation image as an input for the next decomposition. DCT compression will perform on approximation image and after it quantization and encoding is perform on the DCT compress image.

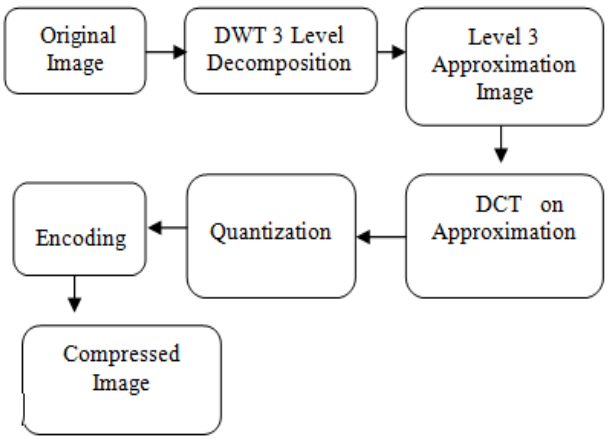


Figure 2 :- Block Diagram for Compression

B) Decompression Procedure:-

Reconstruction of our image begins by decoding the bit stream representing the Quantized matrix. Each element of quantized matrix is then multiplied by the corresponding element of the quantization matrix originally used. The IDCT is applied to the resulted matrix which is rounded to the nearest integer. Final 128 is added to the each element of the matrix to produce the decompressed original image.

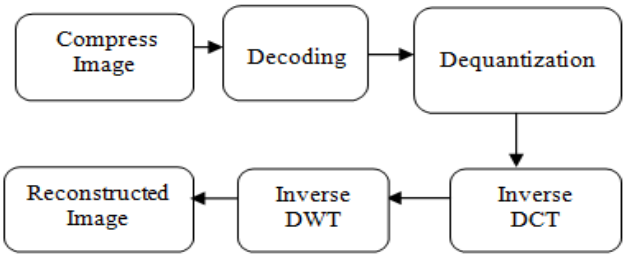


Figure 3 :- Block Diagram for Decompression

We will observe that with increase in the number of zero coefficients the image is compressed more and the number of bits required transmitting decreases with increase in the number of zero coefficients and the PSNR also decreases. we will observe that the resolution of the image is very high, even after sufficient compression and decompression there is very less change in the original and decompressed image.

c) Method For Colorization:-

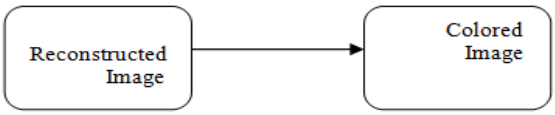


Figure 4 :- Block Diagram for Colorization

This is the next phase of the algorithm. In this part Reconstructed gray Image is used as a Input for the colorization. Colorization will perform on the Decompressed Image. Here we take a reference colored image or source image which is similar in texture to the reconstructed gray scale image, it is not necessary that this image is colorized version of the reconstructed gray scale image, it can be any similar colored image. In this phase Reconstructed Image will use as a target for the colorization.

The quality of output depends on the choice of this reference or source image. We will convert both the target & source images in YCbCr decor related color space, to avoid cross channel artifacts, and divide these images in cluster.

III) RESULTS

In this research, an efficient compression method based on Hybrid is proposed. The algorithm has been implemented in MATLAB 14b.A pair of test images like JPEG is taken to justify the efficiency of the algorithm. Figure Below shows the test images and their corresponding resulting compressed images using JPEG, and the proposed compression methods. The experimental results with the proposed compression method have been arranged in the Table 1 and Table 2 for the different traditional image processing images. It also shows the comparison between DCT and the proposed compression method. From these tables, we find out the compression results

on different JPEG scale images with different resolutions and then finally to find the PSNR and MSE value of images using HUBRID Method. So, the proposed compression technique gives the better results compared to other compression methods.

I) Compare Results of DCT, DWT and Hybrid

EXPERIMENTAL RESULTS					
Original Image	Image Resolution	Original Image Size In bytes	Signal-to-noise ratio (PSNR in DB) DCT	Signal-to-noise ratio (PSNR in DB) DWT	Signal-to-noise ratio (PSNR in DB) Hybrid
one.jpg	512*512	21,547	49.5967	41.240	32.6474
two.jpg	512*512	40,274	50.2112	40.6941	30.3307
three.jpg	512*512	63,760	48.0966	36.8221	25.8152

Table 1

II) Results of Colorization

RESULTS					
Original Image (jpg)	Image Resolution	Original Image Size in bytes	Signal-to-noise ratio (PSNR in DB)	MSE	Elapsed time seconds
one	512*512*3	402,648	17.3084	1.2085e+03	20.925709
two	512*512*3	147,331	22.7767	343.0890	22.491916
three	512*512*3	87,749	20.2292	616.8161	20.848595
four	512*512*3	24,510	19.9117	663.6117	25.531142
Five	512*512*3	71,986	14.9487	2.0807e+03	20.079511

Image 1 :- one.jpg

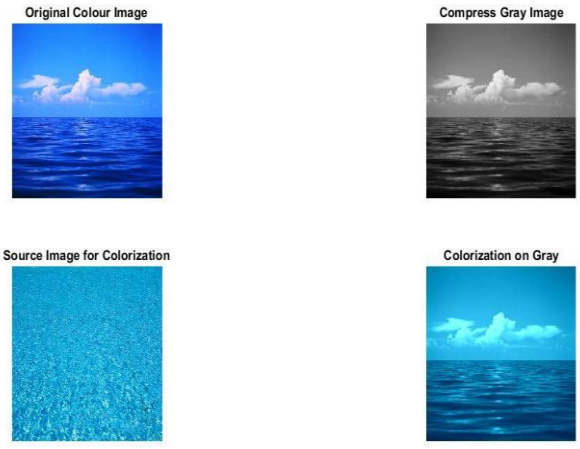


Image 2 :- two.jpg

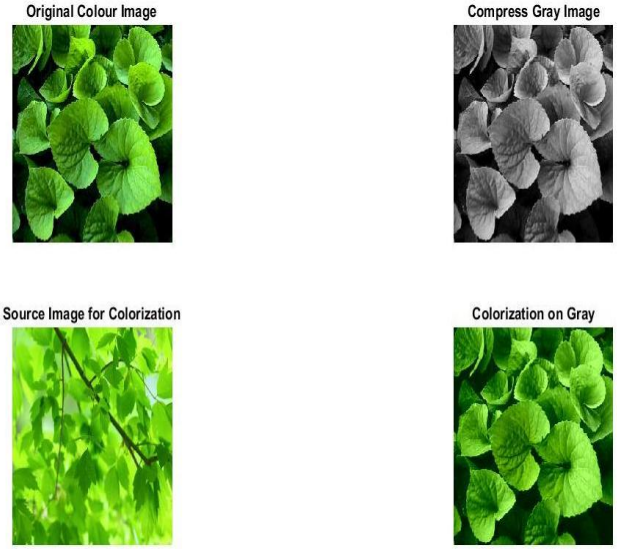
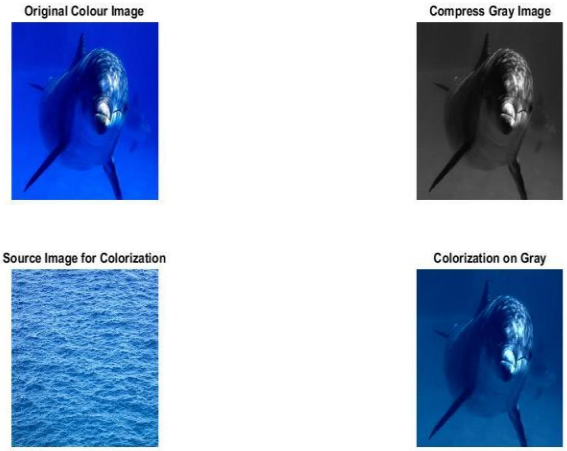


Image 3:- three.jpg

Image 4:- four.jpg

Image 5:- five.jpg



CONCLUSION

Problem of representation of digital images is addressed by Image compression. Image compression is done by removing some basic data redundancies such as coding redundancy, inter pixel redundancy and visual redundancy. Here an attempt has been used to study image compression by using DCT and DWT. It is seen in previous approaches while using DWT gives better results when compared with DCT. While our proposed algorithm works on advantages of both DCT and DWT. The most better feature of using DWT and Inverse DWT is that it will not only enable to compress an image but also will help to maintain the quality of the image as it was in its original form to a large extent, which was hardly possible earlier in other image compression techniques. After receiving the compress image using Hybrid method gives better results, and after colorization process quality of target image is also maintain.

REFRENCES

[1] An Approach for Color Image Compression of JPEG and PNG Images using DCT And DWT 2014 Sixth International Conference on Computational Intelligence and Communication Networks

[2] Gray Image Colorization in YCbCr Color Space 2012 1st International Conference on Emerging Technology Trends in Electronics, Communication and Networking

[3] M.M.Chowdhury,and A.Khatun,"Image Compression using Discrete Wavelet Transform",International Journal of Computer Science Issues, Vol. 9,Issue 4, No.1, July, 2012, pp. 327-330.

[4] Y.Sukanya,and J.Preeti,"Analysis of image compression Algorithm using Wavelet Transform with GUI in Matlab", IJERT, eISSN:2319-1163,pISSN:2321-7308, Vol. 2, Issue:10, oct, 2013.

[5]A.Averbuch,D.Lazer,and M.Israeli,"Image Compressi" on using Wavelet Transform and Multiresolution deco mposition",IEEE Transactions on Image Processing,Vol.5,No.1,January,1996.

[6] K.H.Talukder, and K. Harada,"Haar Wavelet Based Approach for Image Compression and Quality Assessment of Compressed Image", IAENG International Journal of Applied Mathematics,36:1,IJAM_36_1_9, Advance Online Publication:1 February,2007.

[7] N.Ahmed,T.Natarajan, and K.R. Rao,"Discrete Cosine Transform",IEEE Transactions on Computers, January, 1974, pp.90-93.

[8] R.C.Gonzalez,R.E.Woods,Digital Image Processing,2nd Edition,Chapter 7,"Wavelet and Multiresolution Processing",pp.372-386.

[9] B.Nilesh,S.Sachin,N.Pradip, and D.B.Rane,"Image Compression using DWT",ISSN: 2249-3433, IJCTEE,Volume3,Special Issue,March-April 2013.

[10] F.Z. Qureshi,"Image Compression Using Wavelet Transform",Computational Vision Project, University of Toronto, http://citeseer.ni.nec.com/425270.html

[11] S.Anandanarayanan, and S.K.Srivatsa, "A High Performance Novel Image Compression Technique Using Huffman Coding With Edge Dection", International Journal Of Computer Engineering & Technology (IJCET), ISSN 0976 – 6367(Print),ISSN 0976 – 6375(Online), Volume 4, Issue 2, March –2013.

[12] Semary N. A., "Texture recognition techniques for natural gray images", *Radio Science Conférence, 2007. NRSC 2007.* April, 2007.

[13] Gonzalez R. C., Woods R. E., and Eddins, S. L., "Digital Image Processing Using Matlab.", Pearson Education , New Delhi (India), Edition No. 1 (Reprint), 2004.

[14] Solomon C., Breckon T., "Fundamentals of Digital Image Processing.", Wiley – Blackwel , UK, Edition No. 1, 2011.

[15] Daniel L. Ruderman, Thomas W. Cronin and Chuan-Chin Chiao, "Statistics of cone responses to natural images: implications for visual coding", *J. Opt. Soc. Am. A/ Vol. 15, pp. 8,* August, 1998.

[16] D.R.J. Laming, Sensory Analysis, *Academic Press, London, 1986.*

[17] Shaoyuan Sun, Jing Z., Liu G., Li Z., "Transfer Color to Night Vision Images.", Chinese Optics Letters, Vol.3.(8), August, 2005.

[18] Weiss, Y., "Segmentation using eigenvectors: A unifying view", *In Proc. IEEE Intl. Conf. Computer Vision, Vol. 2, Corfu, Greece, pp. 975–982, 1999.*

[19] http://www.mathworks.fr/matlabcentral/Image Quality Measures

[20] Smriti Kumar, Ayush Swarnkar, "Colorization of Gray Scale Images in *Laß Color Space using Mean and Standard Deviation"* IEEE SCEECS, 2012, MANIT, Bhopal (India), IEEE Conference Publication, March 2012.

