International Journal of Scientific Research in Computer Science, Engineering and Information Technology
© 2018 IJSRCSEIT | Volume 3 | Issue 4 | ISSN : 2456-3307

Image Compression Using Lossless and Lossy Technique

Y. lakshmi Narayana[1] ,V Rahamathulla[2]
[1]Department of MCA Sree Vidyanikethan Institute of Management, Sri Venkateswara University, Tirupati, Andhra Pradesh, India
[2]Assistant Professor, Department of MCA, Sree Vidyanikethan Institute of Management, A.Rangampeta, Tirupati, Andhra Pradesh, India

ABSTRACT

Image compression is the way toward diminishing the measure of information required to speak to an image. Image Compression is utilized as a part of the field of Broadcast TV, Remote detecting, Medical Images. Numerous basic document designs are reviewed and the trial consequences of different conditions of lossy and lossless compression algorithms are given. In the proposed strategy, image is compacted by utilizing lossy and lossless strategies for various kinds of images. Here, the lossy compression is finished by the fractal decay code and lossless compression is finished by utilizing the LZW algorithm. LZW is the word reference based algorithm, which is basic and can be utilized for the equipment applications. Fractal compression speaks to the image in a contractive shape. In spite of its lossy nature it can be utilized for the instance of lossless compression. A general correlation is done in light of examining the parameters, for example, Peak Signal to Noise Ratio (PSNR), Mean Square Error(MSE), Image fidelity (IF), Absolute Difference (AD) to the diverse kinds of images.

Keywords : Image compression, LZW, Fractal decomposition, mean square error.

I. INTRODUCTION

In the digitized universe of today, the pretended by PC and its applications are required in every last field. There are numerous fields which have the wide assortment uses of the sound, image and advanced video preparing. So as to deal with more number of information (images, recordings) there is a prerequisite of extensive measure of room and an immense transfer speed for the procedure of transmission. The great answer for this issue is the compression of the images which diminish the excess data and increment the space.

In this paper, LZW algorithm is equipped for delivering compacted images without affecting the nature of the image. This can be effectively achieved by lessening the aggregate number of bits expected to constitute every pixel of an image. In this manner, in progression which limits the memory space expected to store images and transmission should be possible with little measure of time. There are two kinds of image compression. They are lossy and lossless image compression. Contingent upon the application and the level of compression any of the two kinds can be picked. Lossless compression is utilized where the correct imitation of the first image is to be created. Lossy compression can be influenced by the loss of information contrasted with the first image. The change of this write is that it gives an extension to high compression proportions than the lossless compression

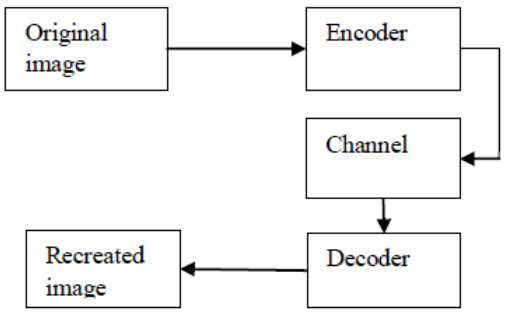

Figure 1. Block diagram of image compression system

The most common characteristics of the images are the nearby pixels are compared and then they have the unwanted information. The first quest is to find reduced number of similar depiction of the image. The two major elements of compression are redundancy and reduction in irrelevancy.

Reduction in redundancies aims in getting rid of the mimeo from the source signal. Reduction in the irrelevancy neglects the part of the signal that is not seen by the receiver or the Human Visual Display System.

II. BLOCK DIAGRAM

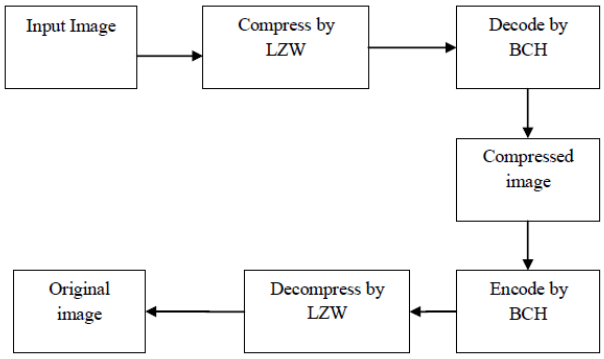

Figure 2. Block diagram for the proposed system

The most widely recognized attributes of the images are the close-by pixels are looked at and afterward they have the undesirable data. The main mission is to discover decreased number of comparable delineation of the image. The two noteworthy components of compression are excess and decrease in superfluity.

Reduction in redundancies points in disposing of the mimeo from the source flag. Decrease in the unimportance disregards the piece of the flag that isn't seen by the recipient or the Human Visual Display System.

III. PROPOSED METHOD

The proposed strategy utilizes a compression system utilizing the two lossless methods LZW alongside Huffman coding and after that the Discrete Cosine Transform (DCT). Next, alongside these lossless procedures the proposed strategy likewise has the lossy algorithm as fractal compression. Fractal compression algorithm expels some data from the information image and the yield given by the fractal technique isn't so clear. DCT algorithm delivers an obscured yield. LZW algorithm delivers the outcome which is same as that of the first image. The LZW algorithm is better than other compression procedures.

LZW Algorithm The LZW algorithm is named after the researchers Lempel, Ziv and Welch. It is a straightforward word reference based algorithm utilized for the lossless compression of images. Lexicon based algorithms are only they are organized as word reference. The algorithm initially looks through the record and afterward it masterminds the dates in arrangements of strings which happen over and over. The LZW algorithm at that point replaces the rehashed content overlooking the approaching content. On the off chance that any of the information is observed to be new then it will add to the lexicon. These words are then spared in the lexicon and the references are included where the information gets rehashed. Each word in the lexicon has a specific code. The rehashed words are supplanted with another code. The length of the code must be a steady one. The LZW algorithm is utilized where the document have more rehashed strings. It s a computationally quick algorithm and is exceptionally compelling, since the decompression

does not require the strings to be passed to the table. LZW encoding depends on the augmentation of the encoded pixels. The guideline includes in building the word reference by substituting the examples for the image given as info. The LZW algorithm can be connected to various kinds of image designs which are utilized to evacuate the rehashed strings. The BCH algorithm utilized alongside the LZW algorithm is to redress the errors or to discover the errors. The measure of the image record which is packed by LZW algorithm alongside BCH expanded in light of the fact that it has monochrome images.

Discrete Cosine Transform DFT has a decent computational productivity yet the planning of DFT is troublesome and has poor vitality compaction. Vitality compaction is only the ability to gather the vitality of the spatial organizes in the recurrence area. Vitality compaction is particularly vital for image compression. Since the DCT does not spare any bits and furthermore does not present any mutilation consequently it can be quantized and utilized as a part of lossless compression.

The DCT functions admirably in isolating the image into various pixels of varying frequencies. So it can be compacted without losing the significant data. The edges and outskirts in the images packed by DCT are obviously unmistakable with no hazy spots and bending. In the preparing of the image by DCT, the image is first broken into 8*8 squares of pixels. At that point from the through and through or left to right DCT is connected to every last piece of pixels. The pieces of pixels are packed by the procedure of quantization. The compacted piece of cluster which has the image is put away in less space than the first image. To acquire the first image is finished by the procedure of decompression which should be possible by Inverse Discrete Cosine Transform (IDCT). DCT and ICDT are symmetric in nature.

Before applying DCT to the image the pixels are to be separated situated operating at a profit and white pixels. The highly contrasting pixels go from 0 to 255. The unadulterated dark pixels are signified by 0 and unadulterated white pixels are given by 255. This is the motivation behind why the image looks like highly contrasting or dim in shading. An image contains a huge number of 8*8 squares in which the compression is done in every last piece. By along these lines every last piece is to be packed and the resultant image is gotten.

IV. FRACTAL DECOMPOSITION ALGORITHM

The Fractal image compression is given by Integrated Function System (IFS). Here in this strategy it has a source image and the assignment image. The source image is known as the attractor. The assignment image is the yield or the reproduced image. At first the image is parceled into little parts which are known as pieces. Those subdivided squares ought not to cover with different pieces. Every goal piece is to be mapped with other square which is gathered after the evacuation of rehashed bits. It has a changing administrator is known as contracting capacity. It changes the packed image yet the visual impact does not change. This point is achieved when the change is done to N focuses in the image which should be possible by rudimentary changes. This has the essential methodologies expected to pack the image known as reaching change. At that point by isolating and reaching the image by a change it is named as fractal change or fractal deterioration. It is beneficial since it portrays the image in a contractive shape. Fractal compression is a current technique on lossy compression in view of the utilization of fractals which debases the likeliness of various parts of an image.

V. PERFORMANCE CRITERIA FOR IMAGE COMPRESSION

SNR: The institutionalized amount of estimating the image quality is the flag to-commotion proportion. It is given by proportion of the energy of the flag to the

energy of clamor in the flag. SNR is given in decibels by

$$SNR(db) = 10 \log_{10} \frac{\sigma_x^2}{\text{MSE}}$$

PSNR: The most widely recognized instance of speaking to the photo of the information image is given by the Peak estimation of SNR. It is characterized as the proportion of the most extreme energy of the flag to the energy of the corrupted noise signal.

$$PSNR(db) = 10 \log_{10} \frac{255^2}{MSE}$$

Where the value 255 is the peak in image signal.

MSE: Mean square error is characterized as the measure of normal of square of proportion of estimator yield to the evaluated yield. It is otherwise called the rate of bending in the recovered image. Mean square error is given in decibels by

$$MSE(db) = \frac{1}{xy} \sum_{m=0}^{x-1} \sum_{n=0}^{y-1} X(m,n) - Y(m,n)^2$$

VI. EXPERIMENTAL RESULTS

The performance comparison between lossy and lossless images is finished utilizing MATLAB. The lossy compression is finished by utilizing fractal disintegration technique and lossless compression is finished by two compression algorithms DCT and LZW.

In this paper the info image is of various image designs are taken and stacked into the framework for the compression of the given information image. At first the comparing stacked info image is shown. This stacked image is additionally gone before to the following phase of lossy compression. The following stage gives the packed image by fractal disintegration technique. The stacked information image is changed over to grayscale qualities and afterward the twofold esteems are acquired from it, at that point the paired esteems are changed over to packed image. Next up and coming advance gives; the image which is compacted by the fractal decay strategy is then packed by the lossless compression procedure of DCT algorithm. This gives a superior outcome than the fractal compression strategy. The image which is packed by the DCT algorithm is then compacted by LZW algorithm which is a lossless technique. This gives a superior outcome than the DCT algorithm. Further, image which is compacted by the DCT algorithm is then packed by LZW algorithm which is a lossless strategy. This gives a superior outcome than the DCT algorithm.

This algorithm in view of the combinational technique has the mix of fractal disintegration for lossy strategy and DCT, LZW for the lossless compression. Here in this postulation distinctive image writes, for example, bmp, tif, png, jpg positions are utilized .those image designs are high contrast compose. The given shaded images are prepared as dark scale images as it were.

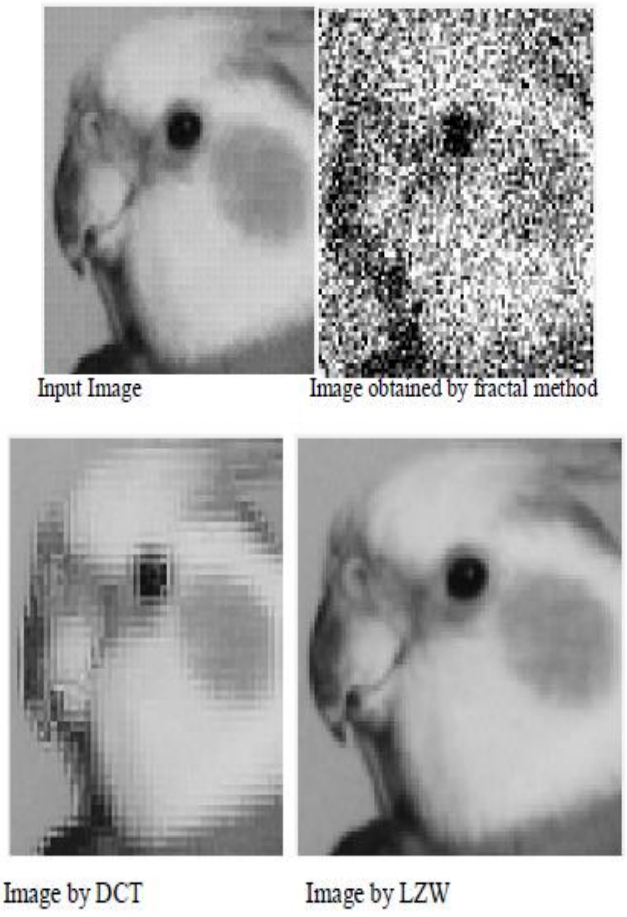

Figure 3. Result of Compressed Image of bmp Type

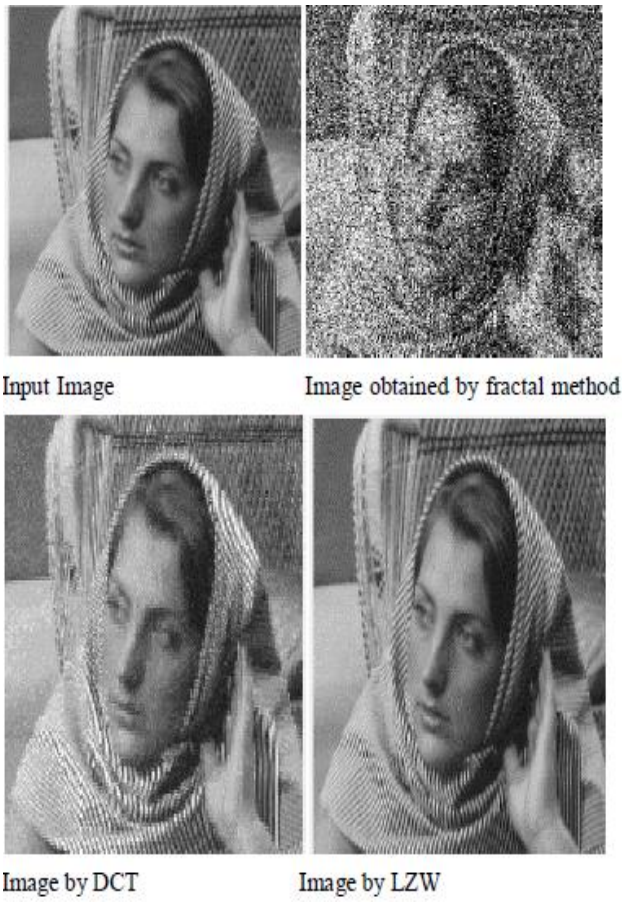

Figure 4. Result of Compressed Image of tif Type

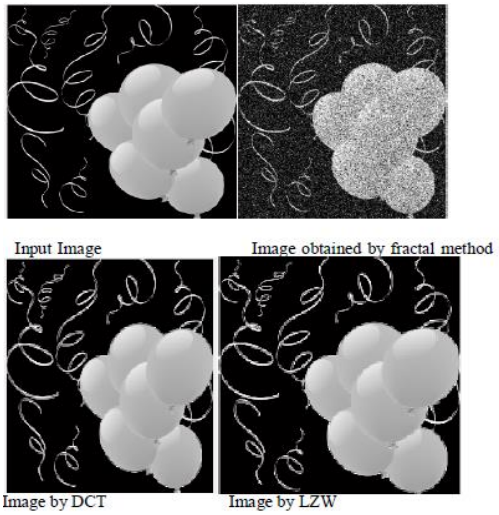

Figure 5. Result of Compressed Image of png Type

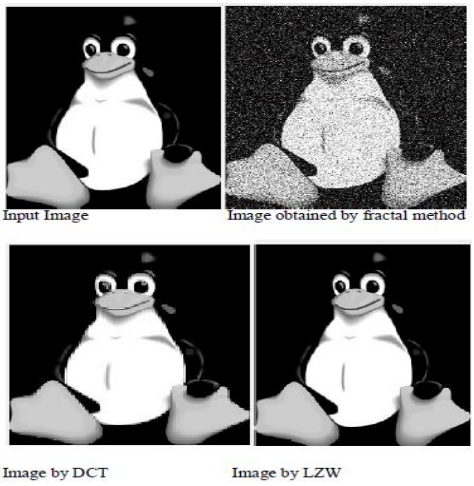

Figure 6. Result of Compressed Image of jpeg Type

VII. CONCLUSION

Hence the compression is a topic which increases much essentialness and it can be utilized as a part of numerous applications. This theory displays the lossy and lossless image compression on various document organizations of images. Various sorts of techniques have been surveyed in record of amount of compression that they offer viability of the strategy utilized and the affectability of error. The viability of the strategy utilized and the affectability to error are sovereign of the element of the gathering of source. The level of the compression accomplished significantly relies upon the source record. It is ended that the higher information excess favors to achieve more compacted image. The proposed strategy has the benefit of LZW algorithm which is joined with the fractal deterioration technique is known for the clearness and quickness. The real objective is to diminish the computational time and limit the space inhabitance.

The tests were carried on the diverse sorts of image sets and their outcomes were surveyed by the clearness and after that by bits per pixel. The demonstrational rating gives that the proposed technique has change while contrasting and other traditional strategies.

VIII. REFERENCES

[1]. M. J. Nadenau, J. Reichel, and M. Kunt, "Wavelet Based Colour Image Compression: Exploiting the Contrast Sensitivity Function," IEEE Transactions Image Processing, Vol. 12, no.1, PP. 58.

[2]. H.B. Kekre, Tanuja Sarode, Sudeep Thepade, "Inception of Hybrid Wavelet Transform using Two Orthogonal Transforms and It"s use For Image Compression", International Journal of Computer Science and Information Security(IJCSIS),Vol. 9, No. 6, 2011, pp. 80- 87.

[3]. K. Prasanthi Jasmine, Dr. P. Rajesh Kumar and K. Naga Prakash, An Effective Technique To Compress Images Through Hybrid WaveletRidgelet Transformation, International Journal of Engineering Research and Applications (IJERA) (ISSN: 2248-9622) Vol. 2, Issue4, July-August 2012,pp.1949-1954

[4]. Indrit Enesi, Wavelet Image Compression Method Combined With the GPCA, International Journal of Video & Image Processing and Network Security IJVIPNS-IJENS Vol: 12 No: 05 10 (2012)

[5]. Sriram M.B and Thiyagarajan.S, Hybrid Transformation Technique For Image Compression, Journal of Theoretical and Applied Information Technology (ISSN: 1992-8645 Vol. 41 No.2)31st July 2012

[6]. Moh'd Ali Moustafa Alsayyh and Prof. Dr. Dzulkifli Mohamad, Image Compression Using Hybrid Technique, Information and Knowledge Management (ISSN 2224-5758 (Paper) ISSN 2224-896X (Online) Vol 2, No.7)2012

[7]. E. Praveen Kumar and Dr. M. G. Sumithra, Medical Image Compression Using Integer Multi Wavelet Transform for Telemedicine Applications, International Journal Of Engineering And Computer Science (ISSN: 2319-7242) Volume 2 Issue 5 May, 2013 Page No. 1663-1669

[8]. Meenakshi Chaudhary and Anupma Dhamija, Compression of Medical Images using Hybrid Wavelet Decomposition Technique, International Journal of Science and Research (IJSR), Volume 2 Issue 6, June 2013

[9]. Aree Ali Mohammed and Jamal Ali Hussein, Efficient Hybrid Transform Scheme for Medical Image Compression International Journal of Computer Applications (0975 – 8887) Volume 27– No.7, August 2011.

[10]. S.Parveen Banu and Dr.Y.Venkataramani, An Efficient Hybrid Image Compression Scheme based on Correlation of Pixels for Storage and Transmission of Images, International Journal of Computer Applications (0975 – 8887) Volume 18– No.3, March 2011

[11]. S. Anila, Dr. N. Devrajan, "The Usage of Peak Transform for Image Compression", International Journal of Engineering Science and Technology (IJEST), Vol. 2, No. 11, 2010, pp. 6308-6316.

[12]. H.B.Kekre, Archana Athawle, "Information Hiding using LSB Technique with Increased Capacity", International Journal of Cryptography and Security, Vol.1, No. 2, Oct 2008.

[13]. H.B. Kekre, Dr, Tanuja Sarode, Prachi Natu, "Performance Comparison of face Recognition using DCT and Walsh Transform with Full and Partial Feature Vector Against KFCG VQ Algorithm", In proc. of 2nd International Conference and workshop on Emerging Trends in Technology (ICWET) 2011 published in International Journal of Computer Applications (IJCA), 2011, pp.22-30.

[14]. H. B. Kekre, Dr, Tanuja Sarode, Prachi Natu, "Speaker identification using 2D DCT, Walsh and Haar on full and block Spectrograms", International Journal of Computer Science and Engineering, (IJCSE)Volume 2, Issue 5, 2010.

[15]. H. B. Kekre, Tanuja K. Sarode and Rekha Vig, "Kekre Transform over Row Mean, Column Mean and Both Using Image Tiling for Image

Retrieval" International Journal of Computer and Electrical Engineering, (IJCEE), Vol.2, No.6, December 2010, pp. 964-971.

[16]. H. B. Kekre, Kavita Patil, "WALSH Transform over color distribution of Rows and Columns of Images for CBIR", International Conference on Content Based Image Retrieval (ICCBIR) PES Institute of Technology, Bangalore on 16- 18 July 2008.

About Authors:

Mr. .Y Lakshmi Narayana is currently pursuing his Master of Computer Applications, Sree Vidyanikethan Institute of Management, Tirupati, A.P. He received her Master of Computer Applications from Sri Venkateswara University, Tirupati.

Mr. V Rahamathulla is currently working as an Assistant professor in Master of Computer Applications Department, Sree Vidyanikethan institute of Management, Tirupati, A.P.