International Journal of Enhanced Research in Management & Computer Applications
ISSN: 2319-7471, Vol. 8 Issue 5, May-2019, Impact Factor: 3.578

Fractal Image Compression in DCT Domain in MATLAB

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ABSTRACT

Digital images are frequently used in numerous domains. Large amount of data is essential to represent the digital images are time consuming and infeasible. Hence the information in the picture is compressed by extracting only the noticeable elements. Normally the image compression technique can reduce the storage and transmission costs. During picture compression the size of a graphics file is summary in bytes without disturbing the quality of the picture beyond on satisfactory level. Numerous techniques such as discrete cosine transformation (DCT), DWT etc. are used for compressing the image. But these method contains some blocking artefacts. In order to overcome this effort and to compress the picture efficiently, a combination of DCT and fractal image compression technique is proposed. Fractal Image Compression (FIC) has been considered as an efficient method. FIC is a lossy compression technique that explores the self like property for natural pictures. In this paper a combination of Discrete Cosine Transformation and fractal with quad tree technique and Run Length Encoding is proposed to compress the image. Implementation result shows the picture is compressed effectively employing the proposed work.

Key Words:– DCT, Image Compression, quantization, fractal image compression, zig-zag scanning, Huffman coading.

1. INTRODUCTION

Numerous techniques such as Discrete Cosine Transform (DCT), DWT, etc. are used for compressing the images. But, these methods contain some blocking artifacts. In order to overcome this difficulty and to compress the image efficiently, a combination of DCT and fractal image compression techniques is proposed. DCT is employed to compress the color picture while the fractal picture compression is employed to evade the repetitive compressions of analogous blocks. Analogous blocks are a proportional analysis is made to prove that our system is capable to compress the images in terms of Peak Signal to Noise Ratio (PSNR), Structural Similarity Index (SSIM) and Universal Image Quality Index (UIQI) measurements.

We found by using the Euclidean distance measure. Here, the given picture is encoded by means of Huffman encoding method. The execution result shows the effectiveness of the proposed structure in compressing the color picture. Also, present a new way to use fractal coding for picture compression, based on the parallel use of a fractal encoder and a DCT encoder. The two encoders are given the balancing roles to capture the info of edge and smooth variation, and the information of detail respectively. Weshow the benefit of employing this hybrid coding scheme over the use of a fractal encoder alone, or a DCT encoder alone. This coding scheme is also the time to demonstrate a new idea of coding by nonlinear feature separation based on regular and uniform algorithms, suitable for real-time VLSI implementation.

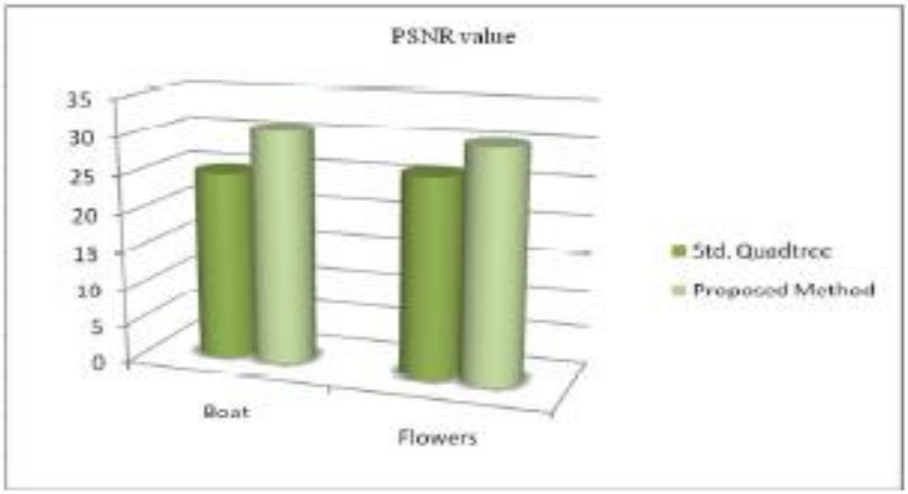


Figure:-comparision of PSNR vaue of std. algo o quadtree technique with proposed metod)

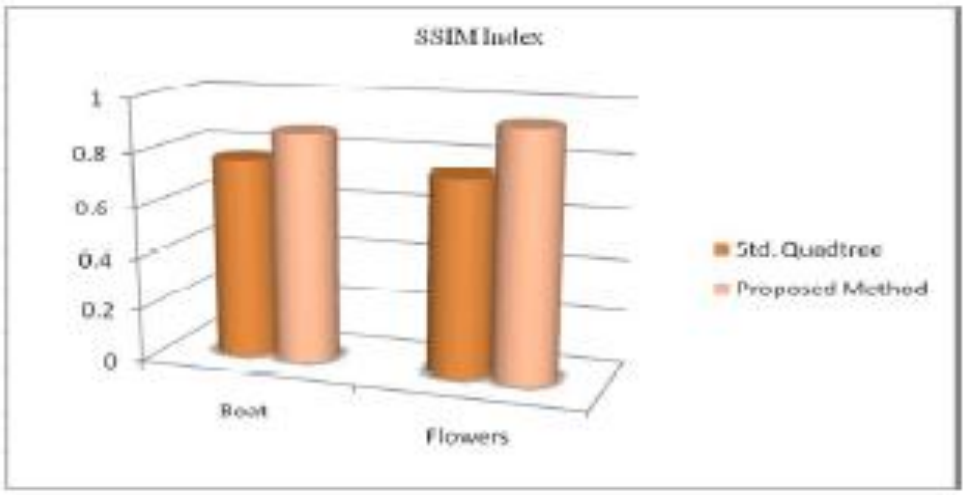


Figure -comparison of SSIM index of std. algo of quad tree technique with proposed method

2. LITERATURE REVIEW

In today's world of high technology, it is not safe to share confidential and important data on any network. Intruders are always in wake of it. So, In order to provide strong security, either cryptography or steganography alone is not sufficient. To provide a tough fight for the hackers and eavesdroppers, structure of the data should first be changed before hiding it behind an image. Image steganography is the most frequently used type of steganography. For hiding information inside images usually Last Significant Bit (LSB) method. In the (LSB) method the 8^{th} bit of every byte of the carrier file is substituted by one bit of the secret information. This method works fine in the image carriers because if the least significant bit is changed from 0 to1 or vice versa thee is hardly any change in the appearance of the color of that pixel. The LSB method usually does not increase the file size but depending on the size of information that is to be hidden inside the file the file can become noticeably distorted. Thus frequently domain based image steganography is more secure than spatial domain based steganography. Some of the previous work in image steganography are-

a) **Clair Bryan-**describe the introduction of steganography which is the science that involves communicating secret data in an appropriate multimedia carrier e.g., images, audio and video files. It comes under the assumption that if the feature is visible, the point of attack is evident, thus the goal here is always to conceal the very existence of the embedded data. Steganography has various useful applications. However like any other science it can be used for ill intentions. It has been propelled to the forefront of current security techniques by the remarkable growth in computational power.

b) **MS. Prajakta Deshmane and Prof.S.R.Jagtap-**described that steganography is the science of concealing the existence of data in another transmission medium. It does not replace cryptography but rather boosts the security using its obscurity features. As proposed method is biometric steganography. In this work biometric feature used to implement steganography is skin tone region of images. Proposed method introduces a new method of embedding secret data within edges of skin of image, as it is not that much sensitive to HVS (Human Visual System). Instead of embedding secret data anywhere in image, it will be embedded in only skin tone region. This skin region provides excellent secure location for data hiding.

c) **Neil F. Johnson and Sushil Jajodia-** described that steganography is the art of passing information in a manner that the very existence of the message is unknown. The goal of steganography is to avoid drawing suspicion to the transmission of a hidden message. If suspicion is raised then tis goal is defeated. Steganalysis is the art of discovering and rendering useless such covert message. In this, we identify characteristics in current steganography softwarethat direct the steganalyst to the existence of a hidden message and introduce the ground work of a tool for automatically detecting the existence of hidden messages in images.

d) **Cachin C**- an information theoretic model for steganography with a passive adversary is proposed. The adversary task of distinguishing between an innocent cover message C and a modified message S containing hidden information is interpreted as a hypothesis testing problem. the security of steganographic system is quantified in terms of the relative entropy

e) **Amritha g. and Meethu Varkey-** steganography is the art of hiding the existence of data I another transmission medium to achieve secret communication. Steganography method used in this paper is based on biometrics .ie biometric steganography and the biometric feature used to implement steganography is skin tone region of images that will provide an excellent secure location for data hiding. Before embedding secret data is needed to be encrypted using stream cipher encryption scheme RC4. Skin color tone detection is performed by using HSV color space DWT is the frequency domain in which this biometric steganography is implemented. Secret data is embedded in one of the high frequency subband by tracing the number of the skin pixels in that band. Different embedding steps are embedded on the cropped region of image ie. Value of this cropped region will act as a key at the decoder side. This study shows that by adopting an object oriented steganography mechanism, we tract skin tone object in image, we get a higher security.

f) **W.Bender, D.Gruhl, N.Morimoto and A.Lu-**Proposed an efficient image steganography technique. In this technique data is firstly preprocessed. This preprocessing reduces the size of the data by a significantly great amount. This preprocessed data Is then embedded into the LSBs of the pixel of the image depending upon the intensity of the pixel values. The proposed algorithm is targeted to achieve very high image embedding capacity into the coverimage and more security of the secret data. It has high PSNR value and low ME value. This preprocessing reduces the size of the secret data by a significant amount and thus permits more data into the same image. This method has good imperceptibility, sufficient payload and has high security. Data security and high embedding capacity is there due to the preprocessing of the data before embedding into the cover image. This method does not require the original image while extracting the secret data from stego image.

3. OBJECTIVE

The main objective of this work is to improve quality of the stego image and provide security to the secret image by RSA encryption with shift bit method. The algorithm is implemented on MATLAB 7.11 and the quality of the image is analysed on the basis of PSNR and MSE values. The quality of the image must not be distorted after hiding the data in it so that the presence of the images is not recognized to human eye. For this to be achieved PSNR of the stego image to cover image must be high and the MSE must be low.

4. METHODOLOGY

The research methodology is as follows:

1. Refer various journals, research papers and books for attaining adequate knowledge in steganography. Acquire a deep understanding of image steganography.
2. Select a subtype of steganography to work upon. This research work focuses on image steganography.

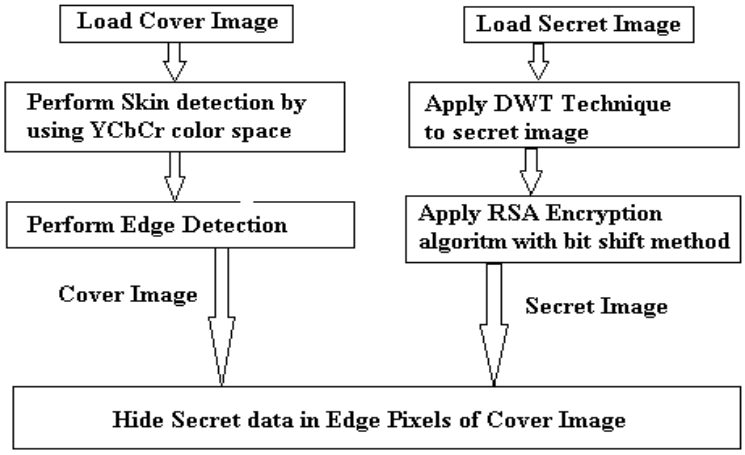
3. Propose an algorithm that will be the basis of future work.
4. Select a tool that will be used to implement the proposed algorithm
5. Implement the algorithm and analyse the result.
6. Compare the results of the proposed algorithm with previous algorithm.

5. IMPLEMENTATION

PROPOSED ALGORITHM

As there are various steps to implement the steganography here.

1. Cover image is loaded & skin color detection is performed.
2. If the image is not biometric then apply canny edge detector algorithm for the non-biometric image.
3. Once the edge of cover image are found then load the secret image.
4. After loading the secret image, DWT technique is applied to compress the secret image will less distort the cover image.
5. Then RSA encryption algorithm with bit shift method is performed.
6. Encrypted message is then embed behind the cover image
7. Stego image with better quality is obtained.



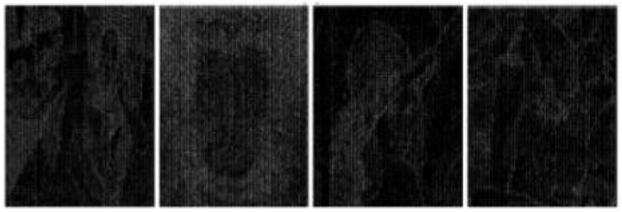
Figure>Flow chart to hide secret data)

6. RESULT AND ANALYSIS

The effectiveness of the proposed hybrid coding scheme in image compression by means of the results obtained from the experimentation, proposed method was implemented in (MATLAB 7.10) and the proposed hybrid coding scheme was evaluated using color images. The test image used in the experiments include: Lena, Barbara, Baboon and Peppers. Quality of the reconstructed images was determined by measuring the PSNR, SSIM and UIQI values and the compression efficiency of the proposed hybrid scheme was determined in terms of the compression ratio, sample output obtained from the proposed hybrid scheme was determined terms of the compression ratio, sample output obtained from the proposed method.

We illustrate the effectiveness of the proposed hybrid coding scheme in image compression by means of the result obtained from the experimentation, proposed method was implemented in Matlab 7.10 and the proposed hybrid coding scheme was evaluated using color images, the test images used the experiments include: Lena, Barbara, Baboon and Peppers. Quality of the reconstructed images was determined by measuring the PSNR, SSIM and UIQI values and the compression efficiency of the proposed hybrid scheme was determined in terms of the compression ratio, sample output obtained from the proposed method as follows:

a) Original images.



b) Corresponding quantized images.

After applying DCT to each block in the image, quantize the DCT coefficients. Finally, the image is encoded by using the Huffman encoding scheme. Figure describes the original and the decompressed images

CONCLUSION & FUTURE SCOPE

In the proposed technique, the color images are compressed effectively using DCT. Generally the DCT based compression technique produce some blocking artifacts. Here the artifacts were removed by utilizing the fractal image compression method. Also, the self-similarities between the analogous blocks were found by using the Euclidean distance measure. So, this eliminates the continual compression of analogous blocks. From the implementation results, we have proved that the proposed system was efficient in compressing the images, also, when compared to JPEG with image quality, we have concluded that our proposed technique has successfully compressed the image compressed the images with high PSNR value, SSIM index and the UIQI value.

In future, this technique may be modified by pre-processing the data in different way. A different compression algorithm like DCT (Discrete Cosine Transform), Vector Quantization, Huffman coding, RLE (Run Length Encoding), string-able compression, LZW (Lempel Ziff Welch) can be used according to the efficiency required steganography has a wide area of uses. And for data encryption different algorithm like AES, DES can be used for more security. For example, it can be used for the digital watermarking, e-commerce and the transport of sensitive data. Digital watermarking involves embedding hidden watermarks, identification tokens into an image or file to show ownership. This is useful for copyrighting digital files that e-commerce allows for an interesting use of steganography.

REFERENCES

[1] Clair Bryan, "Steganography: How to send a secret message," 8 Nov. 2001.
[2] Popa R.,(1998) "An Analysis os Steganographic System". The "Politechnia" University of Timisora, Faculty of Automatics and Computers, Department of Computer Science and Engineering, may 25, 1998.
[3] Miss Prajakta Deshmane and Prof. S.R.Jagtap. "Skin Tone Steganography for Real Time Images" in International Jornals of Engineering Research and Applications. Vol. 3, Issues 2, March –April 2013, pp.1246-1249
[4] N.Johnson and S. Jajodia, "Steganalysis: The investigation of hidden information", Proc. Of the 1998 IEEE Information Technology Conference, 1998.
[5] Cachin C. "An Information Workshop. Vol. 1525,pp. 306-318, 1998.
[6] Cachin C., An Information Theoretic, "Model for Steganography", in proceeding 2nd Information Hiding Workshop, vol.1525, pp. 306-318,1998.
[7] Nosrati, Masoud, Ronak, Karimi, Hamed, Nosrati and Maryam Karimi "An introduction to steganography methods", World Applied Programming, Vol. 1, No 1, pp. 37-41, Apr. 2011.
[8] Amritha. G, Meethu Varkey, "Biometric Steganographic Technique Using DWT and Encryption " in International Jourans of Advanced Research in Computer Science and Software Engineering, vol. 3, Issue 3, March 2013.
[9] W. Bender, D. Gruhl, N.Morimoto and A.Lu. "Techniques for Data Hiding", I.B.M. System Journal, Vol. 35(3-4): pp. 313-316, 1996
[10] T.Morkel. J. Eloff and M. Olivier, "An overview of image steganography", in Proc. Of the 5th Annual Information Security South Africa Conference, Sandton, South Africa, Jun/Jul.2005.
[11] H. Wang and S. Wang, "Cyber Warfare: Steganography vs. Steaganalysis", Communication of the ACM 47, No. 1, pp. 76-82, Oct. 2004.
[12] Atul Kahate, "Cryptographic Techniques,"in Computer and Network Security, 2nd edition, Tata McGraw-Hill, Ch.2, sec.2.5,pp. 42, 1996.
[13] Beenish Mehboob and Rashid Aziz Faruqui "A Steganography Implementation" Biometrics and Security Technologies, ISBAST 2008, International Symposium, pp.1-5, 2008.
[14] L. Davidson and P. Goutam, "Locating secret message in images", in ACM SIGKDD International Conference on Knowledge discovery and data mining, Seattle, Washington, 22-25 Aug. 2004, ACM 1-58113-888-1.
[15] Provos, N. and Honeyman, P. (2003) "Hide and Seek: An Introduction to Steganograpy" IEEE Security and Privacy, vol. 01(3), pp. 32-44, 2003.
[16] Akram, M. Zeki, Azizah A. Manaf and Shayma S. Mahmod "High Watermarking Capacity Based on Spatial Domain Technique", Information Technology Journal, Vol. 10, pp. 1367-1373,2011