ISSN: 2581-3404 (Online)
International Journal of Innovative Research in Technology and Management (IJIRTM), Volume-3, Issue-6, 2019

Quality Assessment of Compressed Images

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ABSTRACT

The digital image compression is vital research field in the area of communication and storage. The size of multimedia data acquired more space and more bandwidth during transmission and storage. In the process of size reduction and utilization of bandwidth used various image compression techniques. Some compression technique based on lossy technique and some compression technique based on lossless technique. In this paper we present the comparative experimental study for the image compression and assess the image quality on various parameters such as the peak signal noise ration, compression ratio etc, Our proposed method simulated with the input image on matlab and gives better results than the previous approach.

Keywords: Image compression, **I**mage quality assessment, Compression ratio, PSNR.

INTRODUCTION

Image storage and transmission has become an important part in modern wireless data services such as mobile multimedia, email, internet access, mobile commerce, mobile data sensing in sensor networks, home and medical monitoring services and mobile conferencing. There is a growing demand for rich content cellular data communication, including voice, text, image and video. One of the major challenges in enabling mobile multimedia data services is the need to efficiently process and wirelessly transmit very large volume of this rich content data. However, this imposes severe demands on the battery life, resources and memory of multimedia mobile appliances as well as the bandwidth of the network.

The computer is becoming more and more powerful day by day. As a result, the use of digital images is increasing rapidly. Along with this increasing use of digital images comes the serious issue of storing and transferring the huge volume of data representing the images because the uncompressed multimedia (graphics, audio and video) data requires considerable storage capacity and transmission bandwidth. Though there is a rapid progress in mass storage density, speed of the processor and the performance of the digital communication systems, the demand for data storage capacity and data transmission bandwidth continues to exceed the capabilities of on hand technologies. Besides, the latest growth of data intensive multimedia based web applications has put much pressure on the researchers to find the way of using the images in the web applications more effectively. Internet teleconferencing, High Definition Television (HDTV), satellite communications and digital storage of movies are not feasible without a high degree of compression. Compression-then-Encryption (CTE) paradigm meets the requirements in many secure transmission scenarios, the order of applying the compression and encryption needs to be reversed in some other situations. As the content owner, Alice is always interested in protecting the privacy of the image data through encryption. Nevertheless, Alice has no incentive to compress her data, and hence, will not use her limited computational resources to run a compression algorithm before encrypting the data. This is especially true when Alice uses a resource-deprived mobile device. To limit the effects of data loss that may occur on the communications channel, the wavelet transformed image data are partitioned into segments, each loosely corresponding to a different region of the image. Each segment is compressed independently, so that the effects of data loss or corruption are limited to the affected segment. (But note that segment boundaries are not sharply defined in the image domain) Partitioning the wavelet-transformed image data into segments also has the benefit of limiting the memory required for some implementations.

The task of partitioning a natural image into regions with homogeneous texture, commonly referred to as image segmentation, is widely accepted as a crucial function for high-level image understanding, significantly reducing the complexity of content analysis of images. Image segmentation and its higher-level applications are largely de-signed to emulate functionalities of human visual perception (e.g., in object recognition and scene understanding).

A compression method consists of definitions of two complex processes compression and decompression. Compression is a transformation of original data representation into different representation characterized by smaller number of bits. Opposite process reconstruction of the original data set is called decompression. There can be distinguished two types of compression: lossless and lossy [16]. In lossless compression methods, the data set reconstructed during decompression is identical as the original data set. In lossy methods, the compression is irreversible the reconstructed data set is only an approximation of the original image. At the cost of lower conformity between reconstructed and original data, better effectiveness of compression can be achieved. A lossy compression method is called "visually lossless" when the loss of information caused by compression-decompression is invisible for an observer (during presentation of image in normal conditions). However, the assessment, if a compression of an image is visually lossless, is highly subjective. Besides that, the visual difference between the original and decompressed images can become visible when observation circumstances change. In addition, the processing of the image, like image analysis, noise elimination, may reveal that the compression actually was not lossless.

The rest of this paper is organized as follows in the first section we describe an introduction of about the image compression and their techniques. In section II we discuss about the types of image compression methods, in section III we discuss about the related work. In section IV we present the problem statement after the rich literature review and finally in section V we conclude and discuss the future scope.

II DIGITAL IMAGE FORMATS

Digital image can be in many different formats. An image format defines a structure of a binary image. In every format, there will be several fields for storing metadata. These meta-data stores information related to the image such the width and the height of an image. Some formats may contain metadata that stores extra information which are not directly related to the image data such as the camera make and model, and comments.

- BMP

BMP, or popularly known as the Windows Bitmap File is a simple image file format which contains some basic information in its header followed by raw information on the brightness information of each channel (color). The brightness information for each channel is not compressed using any lossy or lossless compression algorithm resulting in large file size (compared to other common digital image formats). The advantage of this file format is that it retains the original brightness information as recorded by digital image capture device without any distortions (as opposed to JPEG). The simplicity of the format makes it easy to analyze and manipulate the raw data in the image.

➢ JPEG

Probably one of the most widely used format, JPEG which stands for Joint Photographic Expert Group, is a "lossy" image format. Lossy means that images stored in JPEG loses some of its details, due to the compression used in this format [13]. Because the file is compressed during storage, the size of the file is significantly smaller compared to Bitmap. The beauty of JPEG file is that we can control the quality of the stored image by manipulating the compression level. The higher the compression level used, the smaller the size of the file would be and the quality of the JPEG file would be low. Notice that the medium setting does not show significant artifacts (compared to the one using the lowest quality setting) and yet it is notably smaller than the one in full quality.

➢ GIF

Graphic Interchange Format or GIF, introduced by CompuServe in 1987, is another file format that uses compression [10]. However, unlike JPEG, the compression algorithm used in GIF is not lossy. GIF uses the LZW compression algorithm. GIF does not store brightness value as BMP and JPEG does. GIF uses a lookup table which can store up to 256 different colors. Every pixel value in a GIF is actually a pointer to this lookup table, which means that a GIF image can contains at most 256 colors.

III PROPOSED WORK

In this dissertation we proposed a new hybrid model for image compression techniques and compare their results with existing image compression techniques. The hybrid algorithm is a combination of integer wavelet transform function and particle swarm optimization. Integer wavelet transform function used 2D transform for the decomposition of image. The decomposed image process in terms of high frequency layer and low frequency layer, lower level also decomposed into terms of next level and finally form a packet. The wavelet packet process in two different modes one is redundant packet and another is non-redundant packet.

In this section describe the proposed algorithm in a hybrid model for image compression using transform techniques with neural network techniques, the neural network is used here the artificial neural network which works on the number of layers. All the results were simulated with the matlab software.

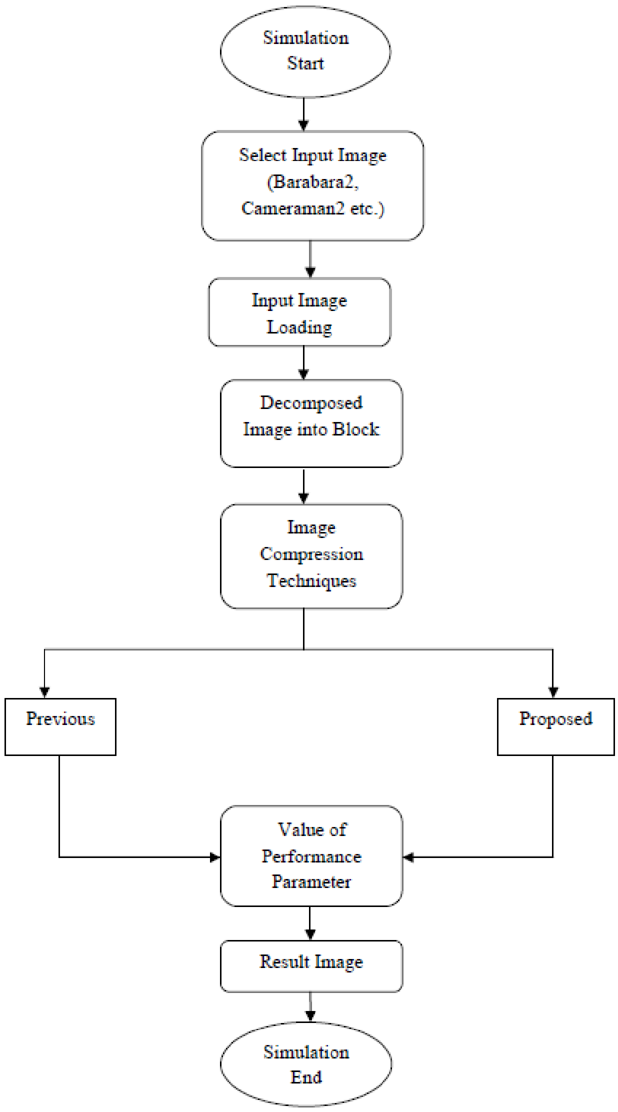

Fig 1: Proposed method block diagram.

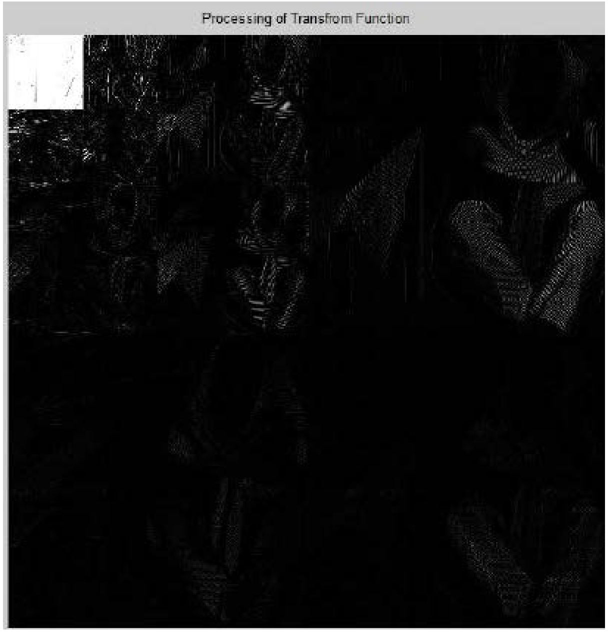

Fig 2: Transformation function of the Barbara2 image.

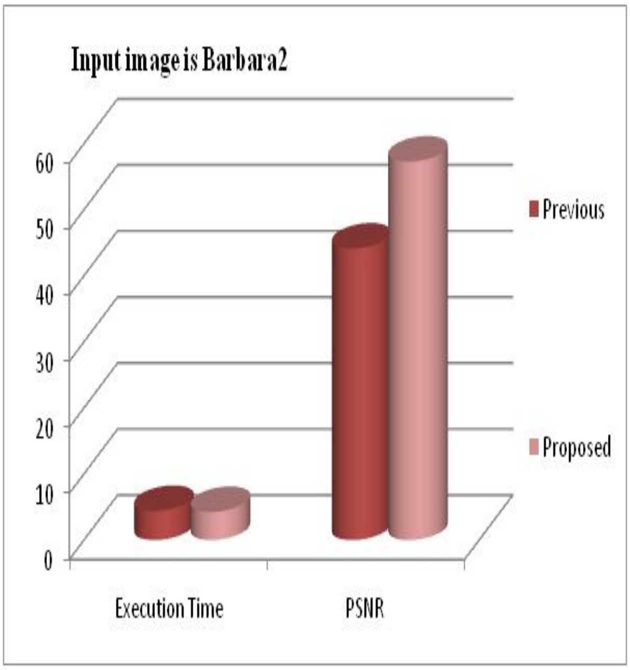

Fig 3: Comparative result graph for the Barbara2 image.

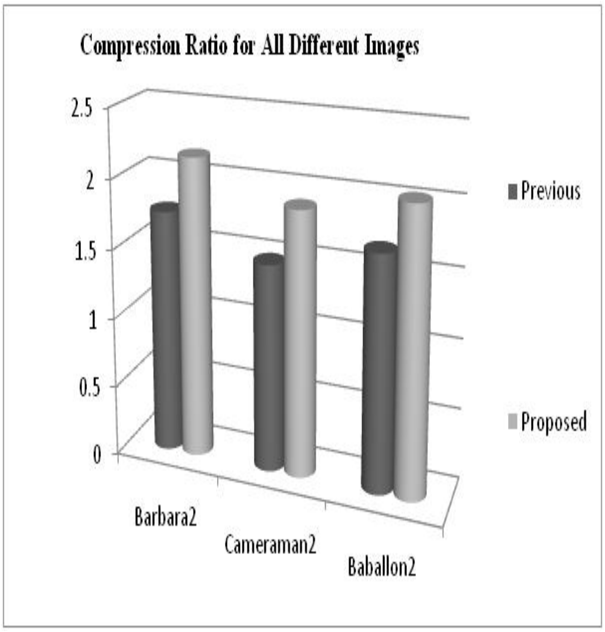

Fig 4: Compression ratio for different images.

IV CONCLUSION AND FUTURE SCOPE

Image compression is the application of data compression on digital images. In effect, the objective is to reduce redundancy of the image data in order to be able to store or transmit data in an efficient form. Image compression can be lossy or lossless. The types of image involve some standard images, digital images, bio-medical images etc. for the image format .png, .jpeg, .bmp, etc. during the literature survey we found the some issues and challenges with image compression techniques such as PSNR value of image, Compression rate, Compression ratio, Computed time etc., Our simulated result shows good results than the previous approach.

REFERENCES:-

[1] Xinfeng Zhang , Weisi Lin , Shiqi Wang, “Fine-Grained Quality Assessment for Compressed Images”, IEEE TRANSACTIONS ON IMAGE PROCESSING, VOL. 28, NO. 3, MARCH 2019, pp 1163-1175.

[2] Oren Rippel, Lubomir Bourdev, "Real-Time Adaptive Image Compression", International Conference on Machine Learning, 2017, pp 1-9.

[3] Johannes Ball, Valero Laparra, Eero P. Simoncelli, "END-TO-END OPTIMIZED IMAGE COMPRESSION", ICLR 2017, pp 1-27.

[4] Lucas Theis, Wenzhe Shi, Andrew Cunningham& Ferenc Husz´ar, " LOSSY IMAGE COMPRESSION WITH COMPRESSIVE AUTOENCODERS", ICLR 2017, pp 1-19.

[5] Hyomin Choi and Ivan V. Baji, "HIGH EFFICIENCY COMPRESSION FOR OBJECT DETECTION", IEEE 2018, pp 1792-1796.

[6] Lihua Gong, Kaide Qiu, Chengzhi Deng, Nanrun Zhou, "An image compression and encryption algorithm based on chaotic system and compressive sensing", Elsevier 2019, pp 257-267.

[7] Mazen Abuzaher, Jamil Al-Azzeh, "JPEG Based Compression Algorithm", International Journal of Engineering and Applied Sciences 2017, pp 94-97.

[8] Aljaz Jeromel, Borut Zalik, "An efficient lossy cartoon image compression method", Springer 2019, pp 1-19.

[9] Gianluigi Ciocca, Silvia Corchs, Francesca Gasparini, Carlo Batini, and Raimondo Schettini,"Quality of Images", Springer 2016, pp 113-135.

[10] Haojie Liu, Tong Chen, Qiu Shen, Tao Yue, and Zhan Ma, "Deep Image Compression via End-to-End Learning", CVF 2017, pp 1-4.

[11] Cristian Perra "LOSSLESS PLENOPTIC IMAGE COMPRESSION USING ADAPTIVE BLOCK DIFFERENTIAL PREDICTION", IEEE 2015, pp 1231-1234.

[12] Bogdan Rusyn , Oleksiy Lutsyk , Yuriy Lysak , Adolf Lukenyuk , Lubomyk Pohreliuk, "Lossless Image Compression in the Remote Sensing Applications", IEEE First International Conference on Data Stream Mining & Processing 2016, pp 195-198.

[13] Stuti Asthana, Dinesh Goyal, Amitkant Pandit and Rakesh Bhujade, "An Extensive Survey on Compression Algorithm for Effective Image Compression", ICIoTCT 2018, pp 876-881.

[14] George Toderici, Damien Vincent, Nick Johnston, "Full Resolution Image Compression with Recurrent Neural Networks", CVF 2017, pp 5306-5314.

[15] Ye Zhang, Biao Xu, Nanrun Zhou, "A novel image compression–encryption hybrid algorithm based on the analysis sparse representation", Elsevier 2016, pp 223-233.

[16] Achinta Roy, Dr. Lakshmi Prasad Saikia, "A COMPARATIVE STUDY ON LOSSY IMAGE COMPRESSION TECHNIQUES", IJCTER 2016, pp 16-25.

[17] Alina Trifan, Ant´onio J. R. Neves, "A Survey on Lossless Compression of Bayer Color Filter Array Images", International Journal of Computer, Electrical, Automation, Control and Information Engineering 2016, pp 1-7.

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