MEDICAL IMAGE COMPRESSION BASED ON ROI

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***Abstract*—Many of images contain some special regions which are more important than other part of the image .Everyday, a large number of medical images are produced by hospitals and medical center for research, surgical and disease diagnostics. So, as a result compression is necessary for storing, managing and transferring these data to make storage manageable. For some medical images or any images of other area, only a little portion of the image might be useful. Algorithms which deliver compression within the ROI, and compression separately elsewhere in the image, might be the key to providing efficient and accurate image coding to the medical community. We present JPEG algorithm for region-of-interest (ROI) compression. In this project, rst the medical image is segmented into two parts: ROI and NONROI regions. In the next step, JPEG compression algorithm is applied to the ROI areas, and is utilized for NONROI regions separately. In the end, the resulting reconstructed images are combined to create a complete compressed image. Key Words : Image compression, Region of interest, JPEG**

I. Introduction

Images can represent many things e.g. medical, military television, satellite or any other computer storage pictures. Medical imaging has gained immense importance in the last decades. It has a great impact on diagnosis of diseases and preparation to surgery. The storage and transmission is an important dilemma due to enormous size of medical images. The solution to this problem is to compress the image and make it more practical for storage and transmission. Several compression schemes have been proposed to compress digital images. However, compression of image may lead to loss of important information. The aim of this project is to propose an algorithm which compresses medical images based on region of interest. It requires some specific portion as region of interest called ROI in which we have to maintain the image quality and other than ROI portion is called Background. The medical images are used for diagnosis purpose so here good quality of ROI is required.

Two types of image compression techniques are available: 1) lossless compression 2) lossy compression. Lossy compression encoding methods use approximations for representing the content and produce high compression ratio. In lossless compression method, images are encoded in full quality and low compression ratio. Here, we are using JPEG compression algorithm which is a lossy compression to compress the image. The ROI is compressed to low compression ratio and NON-ROI is compressed to higher compression ratio. This would be helpful as it can preserve medical information of image along with compressing the image.

II. Literature Survey

A. Contextual encoding in uniform and adaptive mesh-based compression of MR images

R. Srikanth and A. G. Ramakrishnan has proposed a method for medical image compression using contextual encoding in uniform and adaptive mesh based lossless compression for medical images. In that project a Mesh based coding technique for 3-D brain Magnetic Resonance images was used which encouraged the declining of the irrelevant background that lead a way to meshing of the brain part of the image. The showed paper mainly focused on the lossless coding of the images, and after that compares the performance of both the uniform and adaptive mesh-based method.

B. Efficient FPGA implementation of DWT and modified SPIHT for lossless image compression

. Jyotheswar, Sudipta Mahapatra has published a paper on well organised FPGA implementation of Discrete Wavelet Transform (DWT) and modified Set Partitioning In Hierarchical Trees (SPIHT) for lossless image compression. Here the Discrete Wavelet Transform framework which is based on the lifting process.It was used to utilize the correlation in the middle of image pixels and also a modified Set Partitioning in Hierarchical Trees (SPITH) algorithm was used to encode the wavelet coefficients. As the final result showing that, the algorithm promotes better compression ratio and good PSNR (Peak Signal-to-Noise Ratio) with 3D medical images.

III. PROBLEM STATEMENT

Medical image Compression based on Region of Interest (ROI) in image compression by encoding ROI and background with low CR and high CR using JPEG algorithm.

A. OBJECTIVE

• To achieve a very low bit rate representation for a given data.
• To reduce storage space and transmission time and used bandwidth for voluminous medical images.
• To get a rapid browsing and retrieval of medical imagery from databases.
• To get good visual quality of the specific region (ROI) decrementing the size of the whole image.
• To reduce irrelevant and unnecessary data from the image.

IV. METHODOLOGY

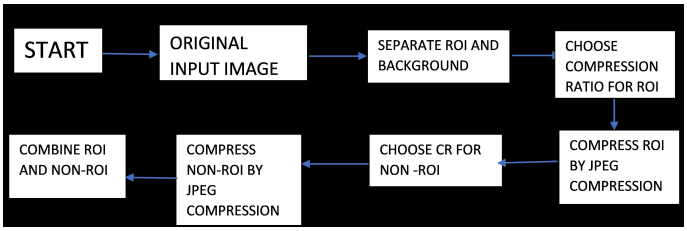

Fig. 1. Algorithm

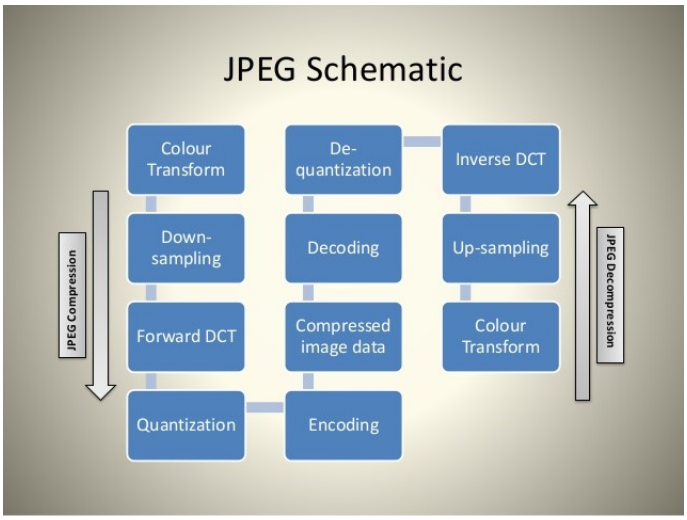

Fig. 2. JPEG Algorithm

A. Algorithm

- Initialization of parameters of an image and load the original image to be compressed.
- Select ROI and NONROI.
- Separate Background(NON ROI) in another image.
- Encoding of Region Of Interest is performed with JPEG algorithm.
- Encoding of NON-ROI region is performed with JPEG algorithm with higher compression ratio.
- Merge ROI and NON-ROI.
- Compare the results using parameter like MSE and PSNR.
- Make a table based on MSR-PSNR by taking different values of Compression Ratio

V. RESULTS AND ANALYSIS

- PSNR and MSE is calculated in this process for a medical brain MRI image.
- The results are mentioned in the table

In this project, initial image is compared with the final combined image.The ROI region is compressed with low compression ratio and background is compressed with high compression ratio.Then the roi and background is combined and compared with original image using mse and psnr.The value of mse varies from 10 to 20 for mri brain images and the psnr varies from 30-45 depending upon the compression ratio which is a good psnr value .

CR(ROI)	CR(Background)	MSE	PSNR
20	50	14.90	36.4324674
30	50	15.96	36.13
10	60	14.20	36.6417971
15	65	15.00	36.4032380
35	80	16.77	35.90

Fig. 3. MSE-PSNR TABLE

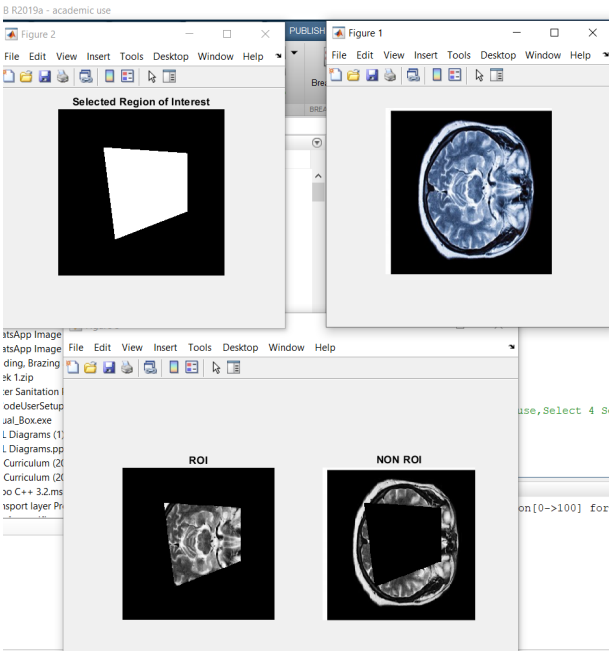

Fig. 4. Region of interest Selection

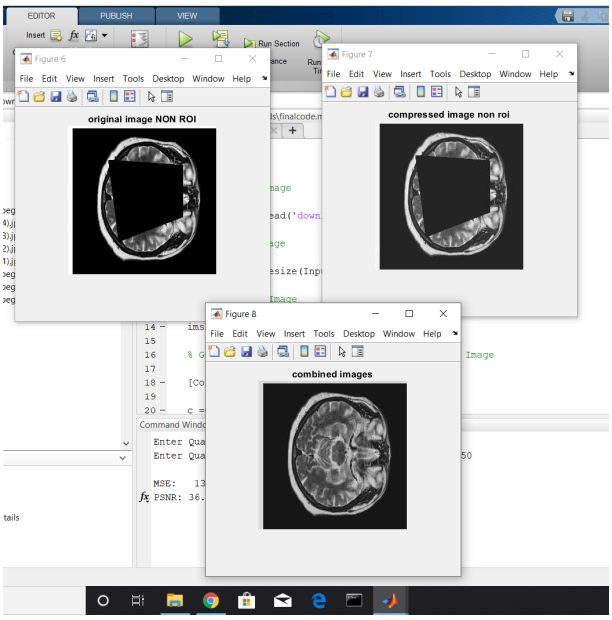

Fig. 5. Combined image

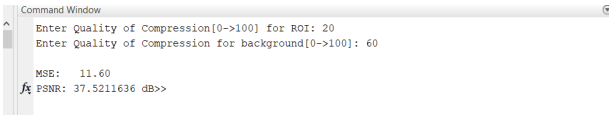

Fig. 6. MSR-PSNR RESULT

VI. CONCLUSION

In case of the images of medical department the ROI should not loss more data after compression. In case of general compression schemes the same loss of information will occur for whole image, as they are compressed with equal Compression Ratio. In Region Of Interest based compression the visual quality of important area will be quite better due to less data loss of ROI as compared to background.

VII. ACKNOWLEDGEMENT

We would like to thank our professors in our department ,particularly Prof G. Rammohan Reddy and Manoranjitham R for helping us shape the idea of our project.

VIII. INDIVIDUAL CONTRIBUTION

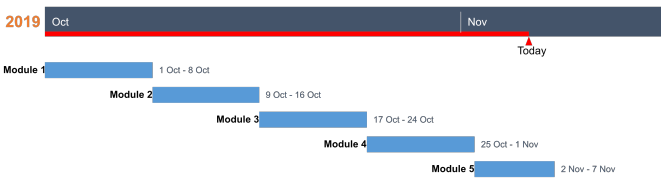

Fig. 7. Gantt Chart

Module 1:Select ROI and NON ROI
Module 2:Separate Background
Module 3:Encoding of background and ROI
Module 4:Merge ROI and background
Module 5:MSE and PSNR Calculation

- 181IT108: Selection of ROI , Selection of Background, Comparison of images(MSE PSNR calculation)
- 181IT154: JPEG Encoding (Quality Matrix, DCT IDCT, Quantization of DCT coefficient)
- 18IT220: JPEG Decoding (Dequantization ,IDCT ,Combining ROI NONROI.)

IX. BASE PAPER

An Overview of Image Compression Approaches

In this base paper,under the speculation of knowledge compression main subjects of compression (proportion of compression, repetitions caused by coding, fidelity criteria) parts of compression systems are analyzed. thenceforth lossy and lossless image compressions are analyzed.

X. REFERENCES

1. Zuo, Zhiyong, et al. ”An improved medical image compression technique with lossless region of interest.” Optik-International Journal for Light and Electron Optics 126.21 (2015): 2825-2831.
2. L. Crocker, ”PNG: The Portable Network Graphic Format”,Dr. Dobb’s Journal, July 1995.pp.36-44. [3] G.K. Wallace, The JPEG still picture compression standard, CACM 34 (1991) 3044.