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Block Construct BCH LZW Algorithm for Medical Image Compression

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***Abstract*-Paper presents image compression of medical images with LZW lossless-compressed. The image lossless compression reduces payload without data loss. This work is the grouping of definite ROI and image compression secret key. The presentation of the LZW compression and BCH method is associated with other conventional compression methods based on compression ratio. BCH is originating better and used for image lossless compression in medical images compression. A comparative view of time efficiency and the compression ratio is shown in both approaches.**

Keywords—BCH, LZW, time efficiency, compression ratio

I. INTRODUCTION

In the digitized world of today, the job play by computer and its applications are compulsory on each and every ground There are a lot of fields which has the broad range applications of the audio, image and digital video processing. with the aim of handle more number of data (images, videos) there is a requirement of a large amount of space and a huge bandwidth for the process of transmission summarized in [5]. The superior explanation for this difficulty is the compression of the images which diminish the unnecessary information and amplify the space.

In this paper, Lempel-Ziv-Welch(LZW) and Bose, Chaudhuri and Hocquenghem (BCH) algorithm are able of producing compressed images devoid of having an effect on the excellence of the image as described in [1]. This can be effectively brought about by reducing the total number of bits desirable to constitute each pixel of an image. Thus, in succession which minimizes the memory space required to store images and transmission can be done with the little amount of time.

There are two types of image compression. These are lossy and lossless image compression. Depending on the demand and degree of compression any type amid these two types can be selected.Lossless compression is used where the correct copy of the unique image is to be shaped. Lossy compression can be affected by the loss of data compared to the original data as explained in [2]. Fig. 1.1 explains the compression system of the image.

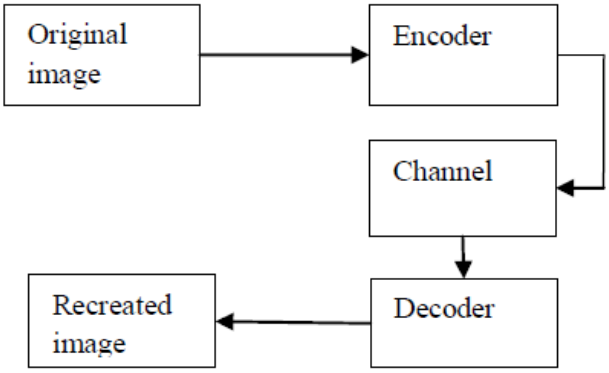

Fig1.1: Block diagram of image compression system

II. PROPOSED METHODOLOGY

The LZW compression works best for files containing lots of repetitive data. This is frequently the instance with monochrome images and text. The files which are compressed but do not need any recurring data can even develop bigger. Therefore; LZW compression cannot be used in variant color images or grayscale image or natural images that contain shadows or gradient as explained in [3] of The code table is initialized with all single character strings (256) and more invariant color images. LZW places. Improving LZW Image Compression longer and longer frequent entries into a dictionary, and then the code of the rope will be bigger than two bytes. So the compression ratio is near to zero.

Lempel-Ziv-Welch (LZW) is a worldwide lossless compression algorithm designed by Abraham Lempel, Jacob Zivand Terry Welch. This algorithm is simple to relate and acquire the potential for very high output in the hardware implementations. It was the algorithm of the broadly used UNIX file compression utility compress and is employed in the GIF image format described in [6].Fig. 1.2 is taken as the input image.

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Fig. 1.2 Input Image for Proposed Algorithm

The decoding algorithm works by understanding a value from the encoded input and outputting the corresponding string from the initialized dictionary. In order to reconstruct the dictionary in the similar method as it was built during encoding, it also obtains the subsequently value from the input and adds to the dictionary the concatenation of the existing string and the first character of the string obtained by decoding the subsequent input value, or the first character of the string if the next value can not be decoded. Then the decoder continues to the next value of the input (which was previously examined as the "next value" in the previous step) and repeats the procedure until there is no more input, where the value of the final input is decoded without any more additions to the dictionary.

The chief idea of this work is to split the input into diverse sized blocks, compress individually, and evaluate the results to decide the most favorable block size. The selection of ideal block size comprises trade-offs amid the processing time and compression ratio. The objective of the projected method in this research is to design an efficient and effective lossless image compression scheme. This section deals with the design of a lossless image compression method. The projected method is based on Block based LZW algorithm and the BCH algorithm an error correcting technique, in order to develop the compression ratio of the image comparing to other compression techniques.

III. SIMULATION RESULTS

The results of MATLAB simulation are described further.

A. Median filtering

It follows the basic prescription. The median filter (filtered image in Fig.1.3) is usually utilized to decrease noise in a signal, to some extent similar to the mean filter. However, it frequently ensures an improved trade than the mean filter of preserving in the signal. This type of filter belongs to the edge preserving smoothing filters which act as non-linear filters.

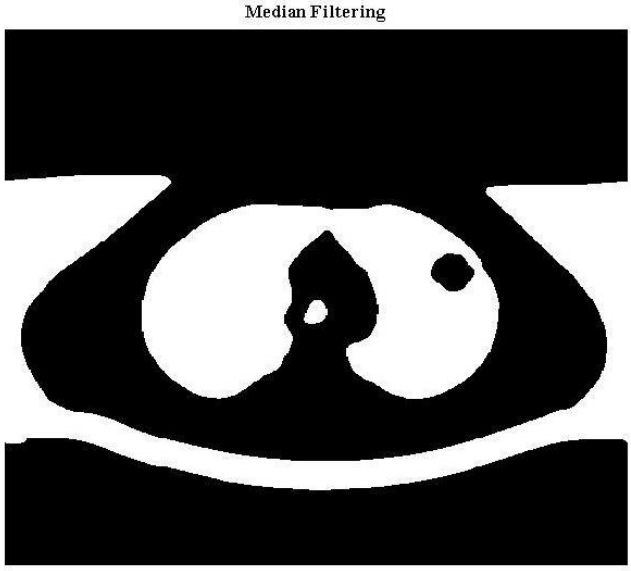

Fig.1.3 Median Filtering Image

B. Proposed BCH- LZWTechnique

The binary input image is distributed into blocks having size 7 bits each, 7 bits are used to represent each byte and the eighth bits represent the sign of the number (most significant bit). BCH checks each block if it is a valid code word and converts the valid code word to 4 bits. Fig. 1.4 is the segment of the processed input image.

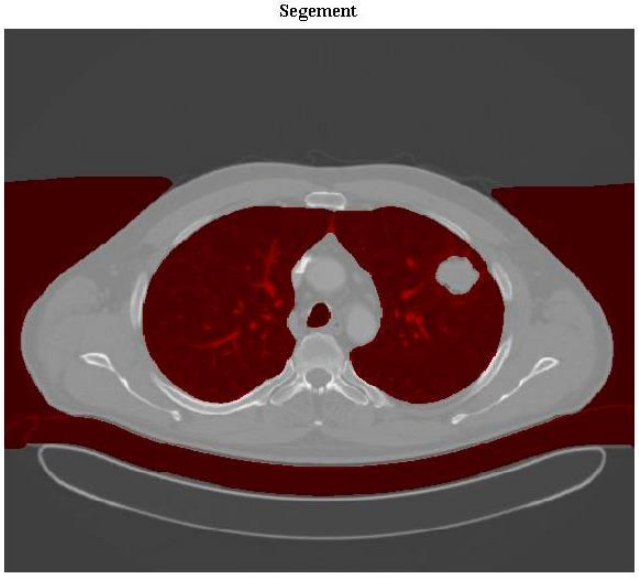

Fig. 1.4 Segment

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It adds 1 as an indicator for the valid code word to an extra file called map. If it is not a valid code word it remains 7 and adds 0 to the same file.

The map is a key for decompression to discriminate among the compressed blocks and non-compressed blocks. BCH is repeated for three times to get better the compression ratio elaborated in [7]. If repeated for more than three times then there will be the increase in time and it may affect other performance factors. therefore it is essential for this algorithm not to be repeated for more than three times. The first frame is decompressed using BCH followed by super-spatial structure prediction decoder. Fig. 1.5 is Region of Interest (ROI) of the input image. After the reproduction of the initial frame, the difference of the rest of the frames is decompressed. The initial frame becomes the reference frame for the next frame. After the reproduction of the second frame, it becomes the reference frame for the next frame and the procedure continues until all the frames are decompressed.

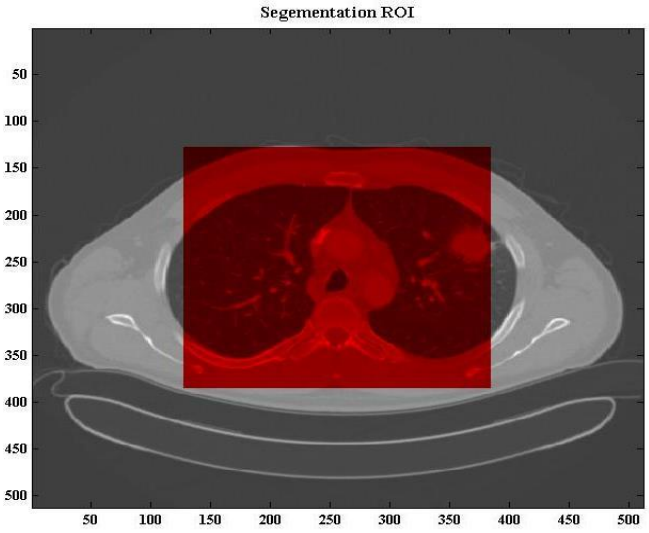

Fig. 1.5 Segmented Region of Interest of Input

After the image is compressed, the file (map) is compressed by RLE to decrease its size, and then it is attached to the header of the image. This step is iterated three times, the BCH decoding repeat three times to get better the compression ratio; we stopped repeating this algorithm at three times after done experiment; conclude that if we aim to decode more it will involve the other performance factor that leads to increasing time needed for compression, and the map file becomes big in every time we decode by BCH so it leads to the difficulty of enlarging the size of image, which opposes the objective of this paper to reduce the image size. Fig. 1.6 is encoded image and Fig. 1.7 is mask seeded region growing region of the image. Basically, MATLAB is cast-off as an experimental and simulation software for the design of system established up & for location up the data transmission among various nodes existing in the set-up. MATLAB is an essential software design & commands are used as a replication device.

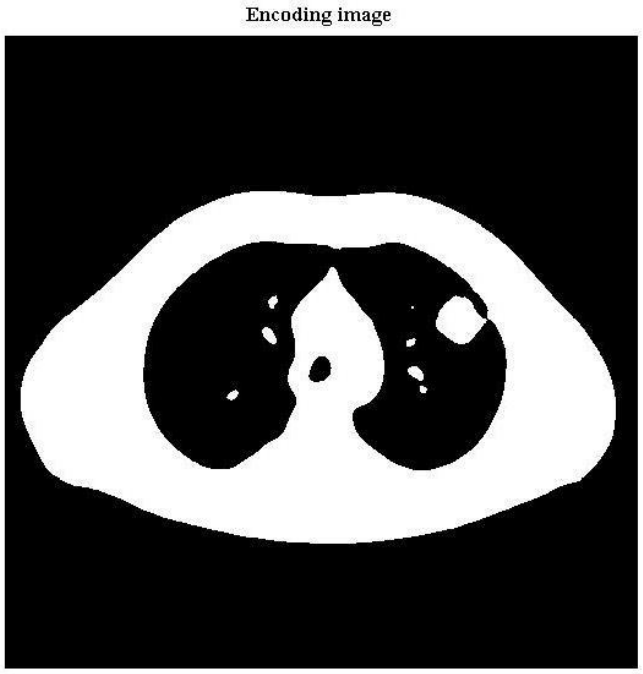

Fig. 1.6 Encoding Image

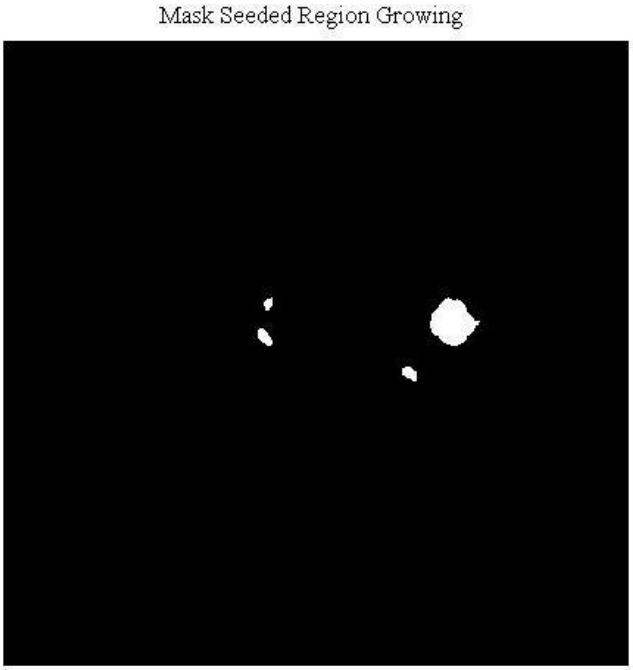

Fig. 1.7 Mask Seeded Region Growing Image

These images are very vital and hence LZW-BCH compression Technique is necessary to decrease the number of bits topile up these image sequences and take less time to transmit over the system. The proposed compression method combines area of curiosity with median filtering coding that includes Compensation to achieve higher compression ratio. Fig. 1.8 and 1.9 show the compression ratio and time efficiency respectively between two approaches.

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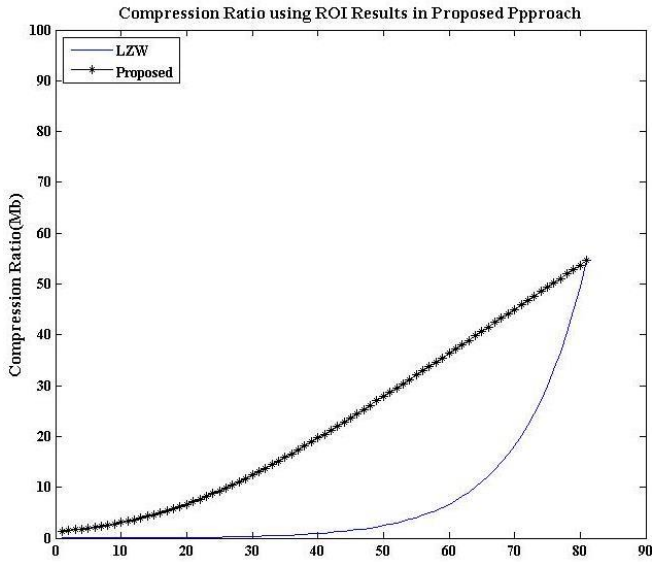

Fig. 1.8 Compression Ratio Comparison

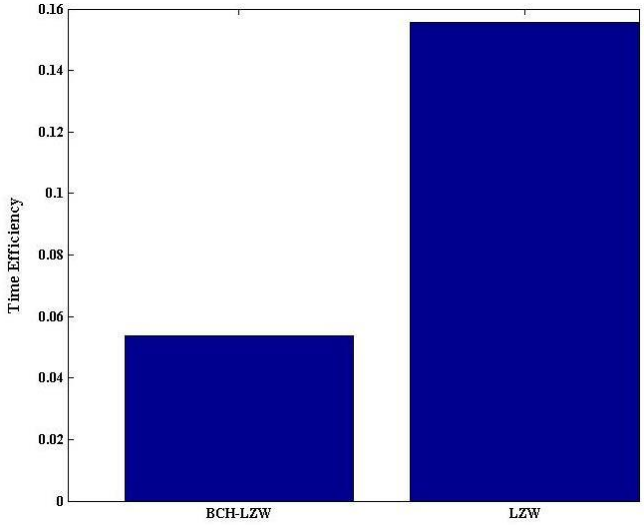

Fig. 1.9 Time Efficiency

IV. CONCLUSION

Image Compression is useful technique through which we can diminish the storage space of images which will supportive to amplify storage and communication process with saving the channel bandwidth. There is numeral of algorithms available for lossy and lossless image compression. As the lossy technique is not reversible so it is beneficial to use a lossless technique to recover the original image. In this research work, diverse types of offered method of lossless image compression are analyzed. The methods which are discussed BCH and LZW method with its performance.The better compression that is achieved by a coding technique the harder it becomes to extract each percent of additional compression. It has not been easy to find easily implementable methods for improving the performance of BCH, especially when we impose an additional constraint that the execution time requirements should not be severely affected.Comparative analysis is provided for the discussed techniques based on the compression ratio achieved by each technique

Future work includes certain improvements in both techniques and the assessment of the results over a range of multi-view image sets and encoder architectures using wavelet transforms.

There is need to provide the security at the time of sending the report from one place to another. The existing method of for the lossless compression technique has been proposed according to the literature review, which was earlier used. These methods are capable of compressing the simple images like .jpeg, .bmp images etc. But these methods are not providing the compression on .dcm format images easily. LZW compression technique we also use to compress the other types of images like satellite imaging.

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