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Application and Uses of Lossless Image Compression Techniques: A Review

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Abstract: Image processing modifies pictures to improve, extract information and change their structure (composition, image editing and image compression etc.). The image may be handled by optical, photographic, but image processing industries commonly using digital and efficient computers that fixed our required problem very easily & accurate. Image compression is such type of process by which as a researcher or industry people we can reduce the redundancy in given image. After Image compression when we transmit our data through any network that is very efficient in terms of data consumption. If we want to store in any drive that will give better result as storage requirement. Here we are trying to define and explore different types of image compression techniques. During analysis of different algorithms, we find that Differential Pulse Code Modulation (DPCM) may give better result.

1. Introduction

The objective of image compression is to reduce the redundancy of an image. Lossless compression is to reduce the redundancy of an image. Lossless compression method applies when data are critical and loss information is not acceptable. Medical image compressions are based on lossless compression method. Medical imaging is been used for diagnosis of diseases and surgical planning, and they need long-term storage for profiling patient's data as well as efficient transmission for long diagnosis [1]. It is essential to make the medical image compression lossless to avoid of critical medical information.

In the field of online diagnosis or real time applications such as telemedicine, demands for hardware to handle lossless compression that can accelerate the computation process. There have been many studies on medical lossless compression algorithm. DPCM has an advantage over other lossless compression schemes due to simple structure to implement [2].

2. Description of Problem identification in Existing Model in DPCM

Authors studied number of research paper and base paper and found that the methods apply to find out the pixel (predicted) value is complex. The Objective of this proposed work is to implement a robust technique that works to find the predicted pixels on the basis of Adder & subtractor for the images compression using Differential Pulse Code Modulation (DPCM) which can compress the data as much as possible. In this multimedia edge efficient compression is really a tuff work. The early research in image compression introduced many techniques such as JPEG, JPEG-2000, and JPEG-LS.

3. Image Processing Techniques

The analysis and manipulation of a digitized image, especially in order to improve its quality, storage & transmissions in networks or cloud. Our aim is how to improve compression techniques for implementing the above requirements.

Compression is important because it reflect to reduce requirement of costlier storage Devices and network devices. Bandwidth is also key features in this research. When we apply better compression then result of above two area storage and transmission will give better result [3].

Data compression is very important techniques that gives us many features like it reduces or saves storage space, when we transmit data it reduces bandwidth requirement during transmission time. We know that we have Compression techniques that is categorized as lossy and second one is loss-less. In loss-less compression and decompression the original Data or Image and decompressed Data files are very similar in terms of one by bits.

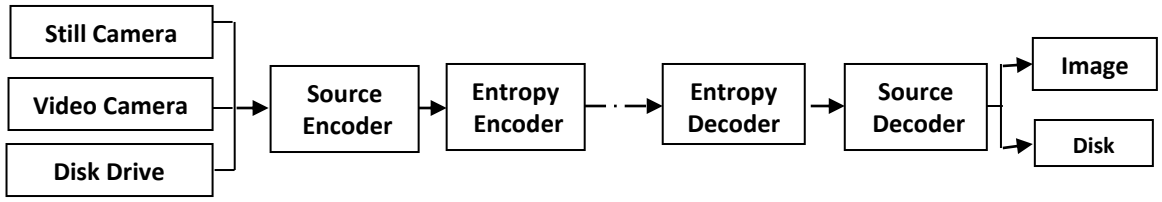

Figure1 Source Encoding and Decoding of image or video data for Storage or Transmission [5]

There are many loss-less compression techniques such as Arithmetic coding, Run Length Encoding, Huffman coding and some famous Dictionary based algorithm like Lempel-Ziv- Welch (LZW) coding, through Huffman coding forms the basis of many compression algorithms. JPEG, MPEG, which are lossy compression methods use Huffman coding. Even the new proposal algorithm like JPEG-2000 Burrows-Wheeler transformation (Bwt) and BTTC use Huffman coding in the final stage [4].

3.1 Types of Image Compression

There are 2 types of image compression: lossless compression (reversible) and lossy compression (irreversible). Run-length encoded (RLE) and the JPEG lossless compression algorithms are example of lossless compression. In lossy compression techniques, data can be discarded when compression will take place. And that loosed data cannot be recovered. Lossy compression mechanism will achieve greater compression than their opposite lossless techniques [5]. Wavelet and higher-level JPEG are examples of lossy compression. JPEG 2000 is a progressive lossless-to-lossy compression.

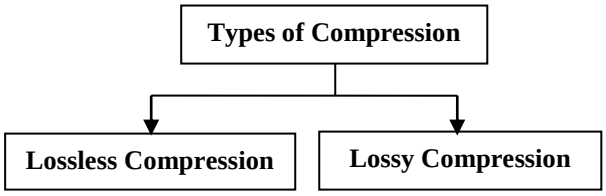

Figure2 Types of Image Compression

3.1.1 Lossless Image Compression

When we came to know that any data file are reduced, It means that when we do our work as a result we will get a resultant image that have less quality in terms of many features like aspect ratio, compression ratio, brightness and many others. If we apply loss less techniques then information of our data will totally be avoided [6].

3.1.2 Lossy Image Compression

As we know that in medical field Lossy data compression is not acceptable because medical image is very crucial in many terms a small change may reflect huge problem in terms of health. We know that during transformation of an image encoding is very necessary.

4. Proposed Methodology

The proposed technique uses Differential Pulse Code Modulation (DPCM) for image compression in efficient manner. In this method we have two system, Compression system and Decompression system. Since we know that we have many techniques to implement transformation. Here we will use Differential Pulse Code Modulation.

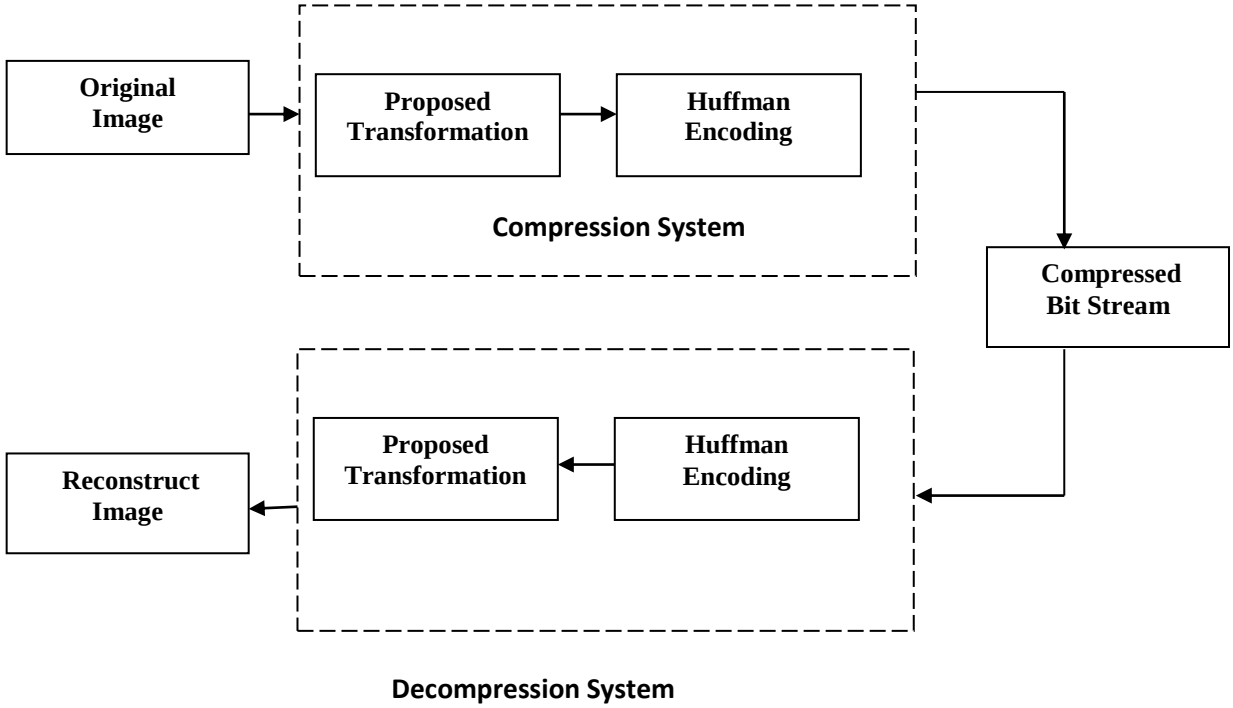

Figure3 Propose Method Block Diagram

5. Conclusion

In this paper, we analyse the previous work done in the image compression using various Transformation and encoding techniques and we find that Differential Pulse Code Modulation (DPCM) and Huffman encoding has better performance and easily to implement.

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