Quantization Encoding Algorithm Based Satellite Image Compression

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Abstract
In the field of digital data there is a demand in bandwidth for the transmission of the videos and images all over the worlds. So in order to reduce the storage space in the field of image applications there is need for the image compression process with lesser transmission bandwidth. So in this paper we are proposing a new image compression technique for the compression of the satellite images by using the Region of Interest (ROI) based on the lossy image technique called the Quantization encoding algorithm for the compression. The performance of our method can be evaluated and analyzing the PSNR values of the output images.

Keywords: Compression, Lossy, Quantization, ROI, and, PSNR

1. Introduction

Medical image compression based on hybrid DWT with Back Propagation Neural Network (BPNN) approach is described in [1]. Compressed image quality is improved by DWT technique and BP algorithm can be widely used as a learning algorithm. Region of interest coding techniques for medical image compression is described in [2]. ROI coding is to permit the use of arbitrarily and multiple shaped ROIs with random weights describing the degree of significance for every ROI images.

An adaptive sampling algorithm is used in [3], for evaluating the area difference between the predicted and the correct points to decide the significant coefficients. The paper discussed in [4] uses the hybrid algorithm for the image compression technique. The hybrid algorithm is DWT for achieving a higher compression ratio and the DCT with the Huffman algorithm is used to preserve the quality of the reconstructed image.

Region of interest (ROI) based on compression of image is discussed in [5] for classification applications. The method is a fusion of both lossy and lossless compression along with wavelets transforms like Embedded Zero-Tree Wavelet (EZW) is as derived techniques. A method to increase the compression ratio with less computational burden is discussed in [6]. In order to decomposition of a sub-block into equal sized bands, the DCT is used as a bandpass filter and a high similarity property is found among the bands.

An improved SPIRT algorithm in which most of the energy is intense in the low frequency sub-band after wavelet transform is discussed in [7]. An image compression method based on Integer Wavelet Transform (IWT) and SVD is discussed in [8]. A graph based quantization is used in the method but the adaptive Huffman coding is used for entropy encoding.

To compress the information that are sent form one place to another by means of the low frequency coefficients the LZW algorithm is used in [9]. This compression algorithm is done for the ROI based extracted image. The statistics analysis associated with difference image is discussed in [10]. The paper is based on the statistical analysis measure when compared with the compression of the lossless image.

2. Proposed System

Our proposed system is a method of lossy based image compression scheme based on the quantization encoding algorithm. In this method the compression is done by extracting the

ROI regions from the original satellite images. Then the compression algorithm of quantization encoding is applied and is compressed. The framework of the system is shown in Figure 1.

3. Extraction of ROI
The ROI extraction process is the first step in our proposed system. This ROI image is the images that are used for the compression process so as to increase our compression accuracy. The system is said to be as the lossy compression method. The reason for this is due to the usage of the ROI image for the compression process. From the ROI images the lossy compression is done by using the quantization encoding algorithm.
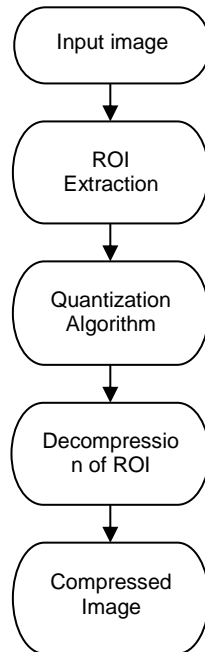
Input image

↓

ROI Extraction

↓

Quantization Algorithm

↓

Decompressio n of ROI

↓

Compressed Image

Figure 1. Framework of the proposed image compression system

4. Quantization Encoding Algorithm
The quantization algorithm is a type of the compression algorithm that is used for the compression process. Here the ROI images extracted from the original images are taken as the input for the quantization encoding is used for compression. That allows the probability density modeling functions by the prototype vectors. This usually works by obtaining the values by means of encoding multi-dimensional space vectors into a finite set of vector space values from a subspace. A lower vector space region needs a less storage space, so the data is compressed.

5. Results and Discussion
The image compression technique based on the ROI image based quantization encoding is said to be as the lossy compression technique in which the compression occurs with a dataloss in it during the encoding and decoding of the transmission process. The output result is as shown in Figure 2.
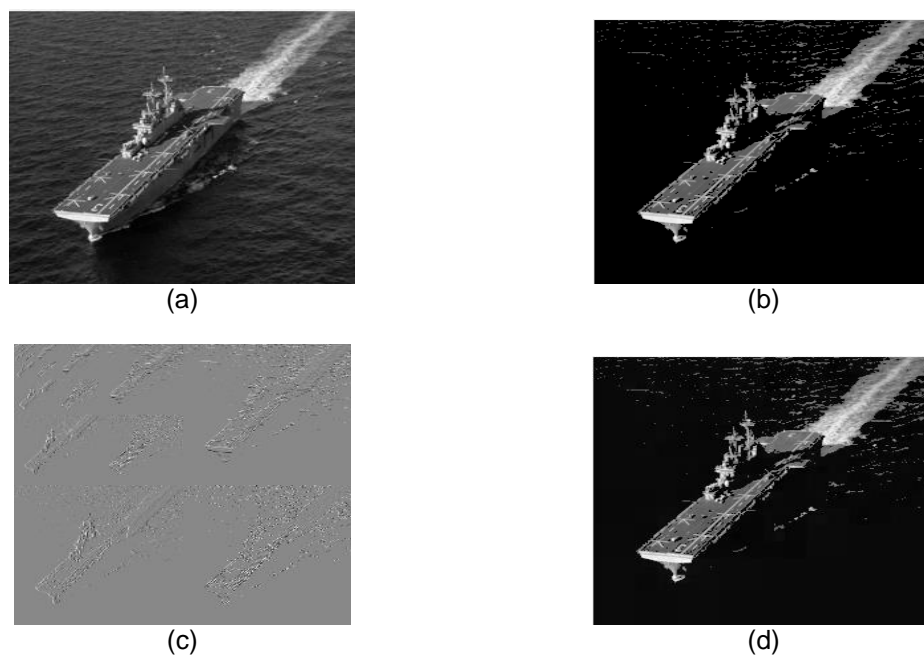
(a)   (b)

(c)   (d)

Figure 2(a). Original image (b) Extracted ROI (c) Quantization Output
(d) Compressed image

6. Conclusion

The proposed image compression method based on the ROI extracted based lossy compression method by using the quantization algorithm is discussed. The method is tested by the literally available satellite images. And the performance of the proposed system is analyzed by calculating the PSNR values of the compressed image. Our proposed system has obtained PSNR values of about 91.8% db.

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