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TWO STEP TECHNIQUES FOR IMAGE COMPRESSION

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ABSTRACT

The image compression is the technique which is applied to reduce size of the original image. The image compression can be classified into lossy and loss-less type of compressions. The WDR is the lossy type of compression in which unwanted pixels will be removed from the image. In this work, improvement in the WDR algorithm is been proposed using the algorithm of decision tree. The decision tree is constructed of according to the similarity between the pixels. The pixels which have least similarity with the other pixels will be removed from the image. The simulation is been performed in MATLAB and it is been analyzed that PSNR, MSE and compression ratio parameters are improved with the proposed technique.

KEYWORDS: WDR, Decision Tree, Similarity, Compression.

INTRODUCTION

The objective of image compression is to reduce irrelevance and redundancy of the image data keeping in mind the end goal to have the capacity to store or transmit data in an efficient form. Image compression is minimizing the size in bytes of a graphics file without degrading the quality of the image to an unacceptable level [1]. The reduction in file size permits more images to be stored in a given amount of disk or memory space. It likewise reduces the time required for images to be sent over the Internet or downloaded from Web pages. There are a few different ways in which image files can be compressed. Different methods for image compression incorporate the utilization of fractals and wavelets. These methods have not gained widespread acceptance for use on the Internet as of this writing. Be that as it may, both methods offer promise because they offer higher compression ratios than the JPEG or GIF methods for a few sorts of images [2]. Another new method that may in time supplant the GIF format is the PNG format. A text file or program can be compressed without the introduction of errors, however just up to a specific extent. This is called lossless compression. Beyond this point, errors are introduced. In text and program files, it is crucial that compression be lossless because a single error can seriously damage the meaning of a text file, or cause a program not to run. In image compression, a small loss in quality is generally not noticeable [3]. The reason why an image can be compressed is that the correlation between one pixel and its neighbor pixels is high, or one can state that the values of one pixel and its adjacent pixels are fundamentally the same. Once the correlation between the pixels is reduced, one can exploit the statistical characteristics and the variable length coding theory to reduce the storage quantity [4]. This is the most essential part of the image compression calculation; there are a lot of relevant processing methods being proposed. The JPEG has been the most common image format on the web for a long time. It is capable of retaining high caliber with small file sizes. Its ability to pack so much visual information into a small file is to a great extent because of exploiting the capacities, or rather limitations, of the human eye [5]. The Discrete Cosine Transformation (from this point forward alluded to as DCT) resembles a discrete Fourier transform in that it turns the spatial domain of an image into its frequency domain. The objective of quantization is to reduce the precision and to accomplish higher compression ratio. After the quantization has been connected to the image, a symbol encoding system is connected to the image [6]. Entropy is the measure of information present in the data, and an entropy coder encodes the given set of symbols with the minimum number of bits required to represent them. Entropy coding techniques for the most part gives lossless compression.

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LITERATURE REVIEW

Mansour Nejati, et.al, (2016) proposed in this paper [7], boosted dictionary learning structure to develop an ensemble of complementary particular dictionaries for sparse image representation. These algorithms enhance the generalization properties of the trained dictionary contrasted with a few incoherent dictionary learning strategies. The calculation is assessed for compression of natural images. Experiments exhibit that the proposed calculation has better rate distortion execution as contrasted and a few contending compression strategies including explanatory and learned dictionary schemes.

Christian Rathgeb, et.al, (2016) proposed in this paper [8], an investigation on the influence of different cutting edge image compression principles on ear identification and ear recognition algorithms. Evaluations directed on an uncompressed ear database are considered regarding different stages in the handling chain of an ear recognition framework where compression might be connected, speaking to the most applicable forensic situations. Exploratory results are talked about in point of interest highlighting the potential and limitations of robotized ear recognition in nearness of image compression.

Azam Karami, et.al, (2016) exhibited in this paper [9], another lossy compression strategy for hyperspectral images that intends to optimally compress in both spatial and spectral domains and at the same time minimizes the impact of the compression on linear spectral unmatched execution. To accomplish this, a nonnegative Tucker decomposition is connected. This decomposition is a component of three measurement parameters. The proposed calculation achieves a superior execution (higher SNR variance and littler MSE) in comparison with two cutting edge compression algorithms, especially at high CRs.

Jianquan Yang, et.al, (2015) proposed in this paper [10], a hypothetical examination on the variety of local variance brought about by JPEG compression is introduced. To start with, the desire of intensity variance of 8×8 non-covering blocks in a JPEG image is inferred. Second, some fascinating properties that portray the conduct of the local variance under different degrees of JPEG compression are talked about. Last, both simulation and tests are performed to check our derivation and examination. The hypothetical examination exhibited in this paper gives some new bits of knowledge into the conduct of local variance under JPEG compression. Besides, it can possibly be utilized as a part of a few ranges of image handling and examination.

R.O. Preda et.al, (2015) proposed in this paper [11], a watermarking-based image verification plan in the discrete cosine change (DCT) domain close to JPEG compression. The twofold validation code is created from a pseudorandom grouping based on a mystery key and a block-dependent feature, securing the plan against cut-and-glue attacks. The watermark is embedded in low-recurrence DCT coefficients chose by the mystery key utilizing an adjusted quantization list modulation approach. The plan achieves high image quality of around 45 dB and low false positive and false negative identification rates contrasted and other existing image verification procedures.
Jianquan Yang, et.al, (2014) proposed in this paper [12], a compelling error-based measurable feature extraction plan is exhibited to take care of this issue. Initial, a given JPEG document is decompressed to shape a reconstructed image. Two classes of blocks in the error image, specifically, rounding error block and truncation error block, are investigated. At that point, an arrangement of features is proposed to describe the factual differences of the error blocks amongst single and double JPEG compressions. It is seen through the simulation results that the proposed strategy is better than the best in class technique on the UCID, NRCS and SYSU databases with different quality factors.

RESEARCH METHODOLOGY

The flowchart which is defined in figure 1 shows the procedure being followed in the proposed work. In the proposed flowchart, the vector quantization techniques have been applied with the DCT transformation. The vector quantization will extract the pixels of the input image whether it is in the gray scale form or in the RGB form. In the implementation of proposed algorithm, the gray scale pixels are divided and each pixel is analyzed individually. In the second phase of the vector quantization, the image is converted into RGB and each pixel is analyzed in terms of their RGB factors. The final step of vector quantization is to extract the pixel value of the pixels which are in the input image. In the given flowchart the steps of the method are explained.

1. Discrete Coefficient Transformation (DCT): The DCT technique is the coefficient based transformation in which the colored features of the input image are been analyzed and processed. In the proposed technique the image indexing is being done according to the pixel value of input image. To apply vector quantization the

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coefficients of the input image are calculated which the color intensity values are and in the last step the matrix of color intensity values is generated by taking mean of the pixels.

2. Vector Quantization: The vector quantization of the input value is generated from the mean matrix which is generated in the previous step. In the vector quantization, three steps are followed. In the first step, the gray scale pixels of the input image are divided to analyze individual gray scale pixels. In the second step, the RGB pixels are divided to analyze individual part of the pixel. In the last step, the DB values of the pixels are generated to generate final compressed image.

3. DCT and Image Masking: In the last step, the technique of DCT and image masking is being applied in which the pixels which have least importance are removed from the image. The importance of the pixels of the image is being analyzed through the DB values which are generated in the vector quantization. This leads to generation of the final compressed image which has less size than the input image.

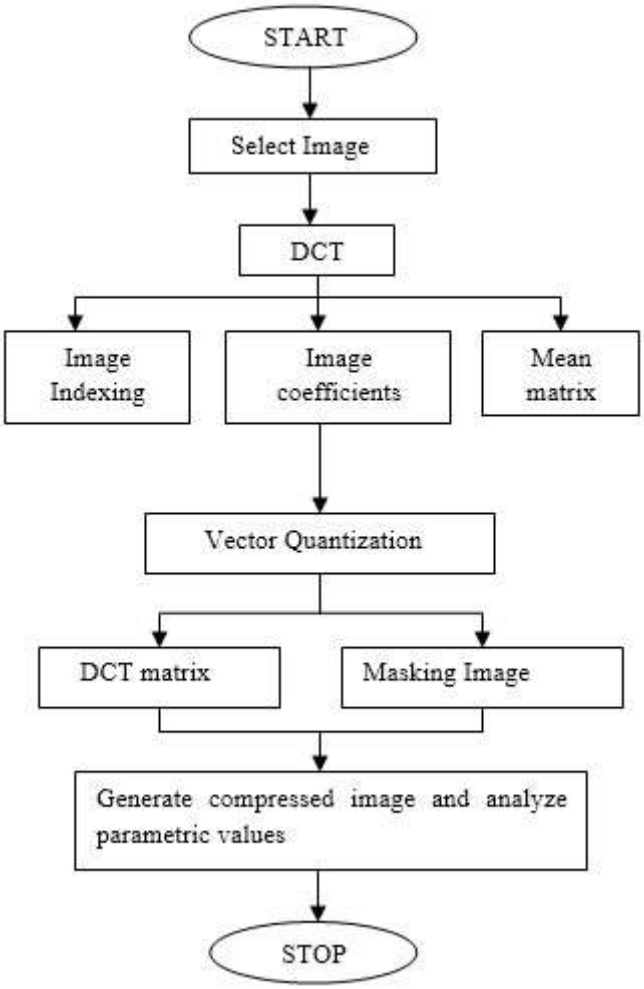

Fig: 1 Proposed Flowchart

EXPERIMENTAL RESULTS

The proposed algorithm has been implemented in Matlab and the results are analyzed in terms of PSNR and CR.

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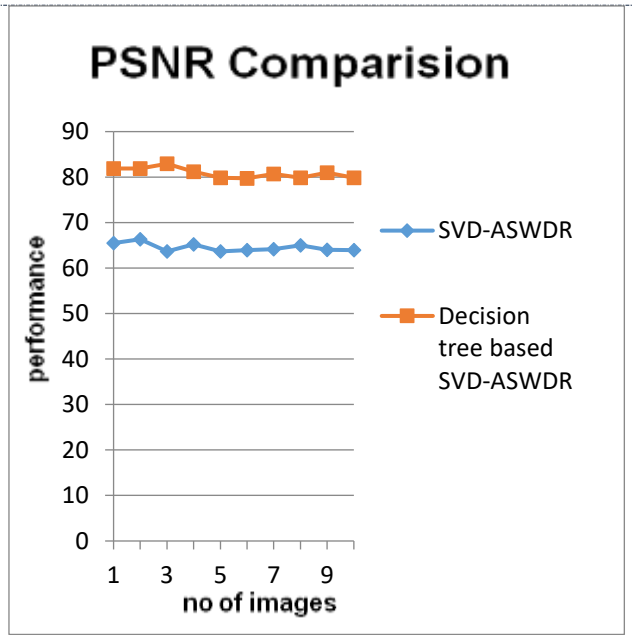

Fig. 2 PSNR comparison

As shown in figure 2, the performance of Decision tree-based SVD-ASWDR is better in comparison to the SVD-ASWDR technique alone in terms of the PSNR ratio values.

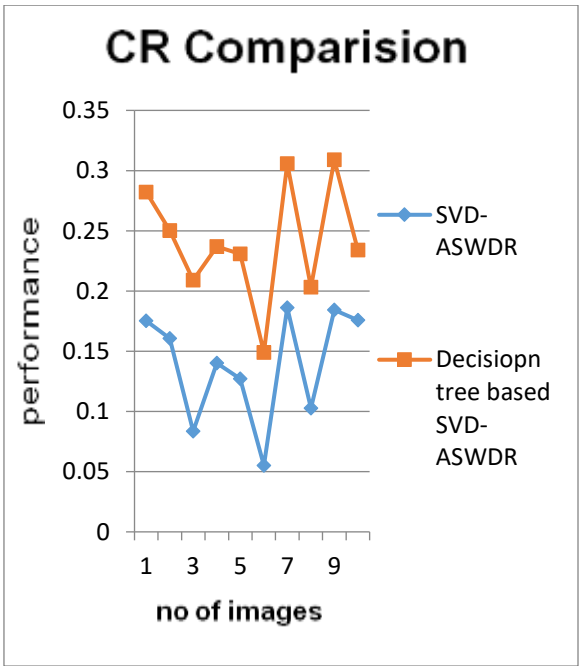

Fig.3 CR Comparison

As shown in figure 3, the performance of Decision tree-based SVD-ASWDR is better in comparison to the SVD-ASWDR technique alone in terms of the CR comparison values achieved.

CONCLUSION

In this work, it is been concluded that image compression is the technique which reduce size of the input image. The image compression is of two types which are lossy and loss-less type of compression. The decision tree based technique is been applied which will increase the compression ratio of the WDR algorithm. In future, improvement in the WDR will be proposed using the SVM classifier for image compression.

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