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# Remove Redundancy Technique of Lossless Image Compression

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**Abstract:** Image compression is method to get rid of the redundant info from the image in order that solely essential info may be keep to scale back the storage size, transmission information measure and coordinated universal time. The essential info is extracted by varied transforms techniques specified it may be reconstructed while not losing quality and data of the image. the aim of compression is that the original massive image with less bytes and transmission and needed with smart image recovery quality. The event of transmission and digital imaging has junction rectifier to high amount of knowledge needed to represent trendy mental imagery. this needs massive disc space for storage, and while for transmission over laptop networks, and these 2 are comparatively pricy. These factors prove the necessity for pictures compression. Compression addresses the matter of reducing the quantity of house needed to represent a digital image yielding a compact illustration of a picture, and thereby reducing the image storage, coordinated universal time needs. The key plan here is to get rid of redundancy {of data of knowledge of info} bestowed among a picture to scale back its size while not moving the essential information of it.

**Keywords:** Lossless Image Compression; Discrete Wavelet Transform (DWT), Discrete Cosine Transform (DCT), compression ratio (CR), peak signal to noise ratio (PSNR).

## I. INTRODUCTION

Image compression is the application of Data compression on digital images. The objective of image compression is to reduce redundancy of the image data in order to be able to store or transmit data in an efficient form. Image compression can be lossy or lossless. Lossless compression is sometimes preferred for artificial images such as technical drawings, icons or comics. This is because lossy compression methods, especially when used at low bit rates, introduce compression artifacts.
Lossless compression methods may also be preferred for high value content, such as medical imagery or image scans made for archival purposes. Lossy methods are especially suitable for natural images such as photos in applications where minor loss of fidelity is acceptable to achieve a substantial reduction in bit rate. The lossy compression that produces imperceptible differences can be called visually lossless. Run-length encoding and entropy encoding are the methods for lossless image compression

Advantages of Data Compression
i) It reduces the data storage requirements
ii) The audience can experience rich-quality signals for audio-visual data representation
iii) Data security can also be greatly enhanced by encrypting the decoding parameters and transmitting them separately from the compressed database files to restrict access of proprietary information
iv) The rate of input-output operations in a computing device can be greatly increased due to shorter representation of data
v) Data Compression obviously reduces the cost of backup and recovery of data in computer systems by storing the backup of large database files in compressed form.

Disadvantages of Data Compression
i) The extra overhead incurred by encoding and decoding process is one of the most serious drawbacks of data compression, which discourages its use in some areas.
ii) Data compression generally reduces the reliability of the records.
iii) Transmission of very sensitive compressed data through a noisy communication channel is risky because the burst errors introduced by the noisy channel can destroy the transmitted data.
iv) Disruption of data properties of a compressed data, will result in compressed data different from the original data.
v) In many hardware and systems implementations, the extra complexity added by data compression can increase the system's cost and reduce the system's efficiency, especially in the areas of applications that require very low-power VLSI implementation.

Redundancy
Redundancy different amount of data might be used. If the same information can be represented using different amounts of data, and the representations that require more data than actual information, is referred as data redundancy. In other words, Number of bits required to represent the information in an image can be minimized by removing the redundancy present in it. Data redundancy is of central issue in digital image compression. If n1 and n2

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denote the number of information carrying units in original and compressed image respectively, then the compression ratio CR can be defined as

$$CR=n1/n2;$$

Lossless compression
In lossless image compression algorithm, the original data can be recovered exactly from the compressed data. It is used generally for discrete data such as text, computer generated data, and certain kinds of image and video information. Lossless compression can achieve only a modest amount of compression of the data and hence it is not useful for sufficiently high compression ratios. GIF, Zip file format, and Tiff image format are popular examples of a lossless compression. Huffman Encoding and LZW are two examples of lossless compression algorithms. There are times when such methods of compression are unnecessarily exact.
In other words, 'Lossless' compression works by reducing the redundancy in the data. The decompressed data is an exact copy of the original, with no loss of data.

## II. LITERATURE REVIEW

[1] Rahul Jain, "Efficient data hiding scheme using lossless data compression and image steganography", International Journal of Engineering Science and Technology (IJEST)
Steganography is an art of hidden communication in which secret message is embedded into a cover image. It has many applications like Online transactions, military communication etc. In this paper, we have proposed a data hiding scheme using image steganography and compression. This scheme can be applied to gray scale as well as color images. This scheme improves the data hiding capacity of the image as compared to other existing image steganography methods while retaining the quality of the image after embedding the secret message into it. The improved embedding capacity of the image is possible due to preprocessing the secret message in which a lossless data compression technique is applied.
steganography technique. In image steganography, image is used as a carrier for transmission of the secret information or data. The image used can be either gray scale or color image. In this technique data is firstly pre-process. This preprocessing reduces the size of the data by a significantly great amount. This pre-processed data is then embedded into the LSBs of the pixels of the image depending upon the intensity of the pixel values. Our proposed algorithm is targeted to achieve very high image embedding capacity into the cover image and more security of the secret data. The proposed technique performs better than MKA. It has high PSNR value and low MSE value as compared to MKA. This preprocessing reduces the size of the secret data by a significant amount and thus permits more data into the same image. The embedding capacity of the proposed technique is very high as compared to MKA. This method has good imperceptibility, sufficient payload and has high security. Data security and high embedding capacity is there due to the pre-processing of the data before embedding into the cover image. This method does not require the original image while extracting the secret data from stego image. The work can be extended to provide an alternative strategy for data compression which can further reduce the size of the data. Efficient cryptographic techniques can also be used along with the steganographic techniques to provide more security to the data.

[2] ARUN KUMAR, "Implementation of Image Compression Algorithm using Verilog with Area, Power and Timing Constraints"
An image compression algorithm was simulated using Matlab to comprehend the process of image compression. Modifications on the padding style showed reduction in the error, because it offers a better reproduction of image at its edges. It also supports faithful reproduction of the image, keeping the size of the transform coefficient matrix equal to the image size. For the VLSI implementation of an image compression encoder, Verilog HDL was chosen. Understanding the importance of the multiplier in implementing a Discrete Wavelet Transform(DWT), fixed-point 16-bit signed Booth Multipliers were implemented in Verilog HDL for different architectures and a thorough analysis in terms of timing, power and area were carried out. Finally the Booth Multiplier architecture using 17-bit Carry Save Adder for adding partial products and a 31-bit Ripple Carry Adder for adding pseudo sum and carry vector was selected to perform the multiplication operation in DWT. Selection of this architecture was based on the least area and its better performance in timing and power analysis. The discrete wavelet transform was computed using a customised code to reduce the redundancy and to avoid the needless computation. The transform coefficients obtained after DWT is encoded by exploiting the presence of zero trees to obtain the compressed form of the image. The compressed image was stored using two bit streams namely, flag register and data register which complements each other to represent the image in a compressed form.

[3] Hengfu YANG, "A High-Capacity Image Data Hiding Scheme Using Adaptive LSB Substitution", 2009
Many existing steganographic methods hide more secret data into edged areas than smooth areas in the host image, which does not differentiate textures from edges and causes serious degradation in actual edge areas. To avoid abrupt changes in image edge areas, as well as to achieve better quality of the stego-image, a novel image data hiding technique by adaptive Least Significant Bits (LSBs) substitution is proposed in this paper. The scheme exploits the brightness, edges, and texture masking of the host image to estimate the number k of LSBs for data hiding. Pixels in the noise non-sensitive regions are embedded by a k-bit LSB substitution with a lager value of k than that of the pixels in noise sensitive regions. Moreover, an optimal pixel adjustment process is used to enhance stego-image

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visual quality obtained by simple LSB substitution method. To ensure that the adaptive number k of LSBs remains unchanged after pixel modification, the LSBs number is computed by the high-order bits rather than all the bits of the image pixel value. The theoretical analyses and experiment results show that the proposed method achieves higher embedding capacity and better stego image quality compared with some existing LSB methods.

## III. OBJECTIVES

Our objective is to design an efficient and effective progressive lossless image compression scheme.

- Study of existing image compression techniques.
- Understand and design efficient "Remove the Redundant Data" Technique.
- Implement the proposed algorithm in MATLAB Tool for Redundant data removal and image compression.
- Achieve a higher PSNR value and compression ratio.
- Evaluate results.

## IV. RESEARCH METHODOLOGY

The general approach to data compression is the representation of the source in digital form with as few bits as possible. Source can be data, still images, speech, audio, video or whatever signal needs to be stored and transmitted. In general, data compression model can be divided in three phases: removal or reduction in data redundancy, reduction in entropy and entropy coding.

## V. RESULTS

**Experiment**

**Size:** 7.30 KB

**Dimensions:** 80x80 Pixel

Figure 6: Input Image 1

**Output file of Experiment 1:** Output.Hdwt

Size: 3.08Kb

**Decompress:** Output.Hdwt

Figure 7: Output Image after Decompress

**PSNR = 42.6194**

## VI. CONCLUSION AND FUTURE WORK

Currently, our method uses an Modified Redundant data removal technique to decrease file Size. Our main objective is to achieve a higher PSNR and compression ratio. In the future work, our techniques can be applied on other algorithms to decrease execution time.

An image compression algorithm was simulated using Matlab to comprehend the process of image compression. Modifications on the padding style showed reduction in the error, because it offers a better reproduction of image at its edges. It also supports faithful reproduction of the image, keeping the size of the transform coefficient matrix equal to the image size.

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