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A Survey on Image Compression by Different Techniques for color Images

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ABSTRACT

Image compression is a type of data compression applied to digital images, to reduce their cost for storage or transmission. Algorithms may take advantage of visual perception and the statistical properties of image data to provide superior results compared with generic compression methods .The Block Truncation Coding (BTC) is one of the lossy image compression algorithms. This paper presents Image compression technique that is employed to cut back the number of bits, scale back the cupboard space and transmission price. Completely different technique used for image compression like lossless and lossy compression (VQ) technique, there are a unit completely different technique Huffman encoding, vector division, Block Truncation Code ,run length cryptography etc. Every technique has some blessings and a few limitations. Here we have a tendency to area unit study on varied image compression techniques.

Keywords:-Data compression, VQ, Image Compression.

1. INTRODUCTION

Image process may be a terribly attention-grabbing and a hot space where day to day improvement is kind of unexplained and has become. Image processing is that the analysis, manipulation, storage, and display of graphical pictures. A picture is digitized to convert it to a kind which may be hold on in an exceedingly computer's memory or on some style of storage media like a hard disk. Image process may be a module that's primarily used to enhance the standard and look of black and white pictures. It additionally enhances the standard of the scanned or faxed document, by acting operations that remove imperfections. Image processing operations will be roughly divided into 3 major classes, Image Enhancement, Image Restoration and Image Compression. Compression is acquainted to most people. It involves reducing the number of memory needed to store a digital image. Digital compression may be a key technology within the field of communications and multimedia applications. An oversized range of techniques have been developed to make the storage and transmission of pictures economical. These ways will be lossy or lossless. II. IMAGECOMPRESSION Image compression is that the application of information compression on digital pictures. The target is to reduce redundancy of the image information so as to be in a position to store or transmit information (e- mail) in AN economical kind. There are 2 kinds of image compression: A LOSSY It is a information compression technique that discards (loses) Some of the information, with the result being a smaller file size. Common files varieties embody JPG and BMP. B. LOSSLESS It is a information compression technique that enables for a smaller file size, but also permitting the file to be decompressed back to its original quality and size. Common file varieties embody pettifogger, PSD, PNG, GIF, and RAW. Image compression addresses the matter of reducing the amount of information needed to represent a digital image. It is a process meant to yield a compact illustration of a picture, thereby reducing the image storage requirements. Compression is achieved by the removal of one or additional of th e 3 basic information redundancies, Coding redundancy is gift once less than optimum code words are used repose picture element redundancy results from correlations between the pixels of a picture. Sick person visual redundancy is as a result of information that is neglected by the human sensory system. Image compression techniques scale back the quantity of bits required to represent a picture

by taking advantage of these redundancies. AN inverse method referred to as decompression (decoding) is applied to the compressed data to urge reconstructed image [1]. The target of compression is to scale back the quantity of bits the maximum amount as possible, while keeping the resolution and also the visual quality of the reconstructed image as near the initial Image as attainable. Compression systems square measure composed of 2 distinct structural blocks: AN encoder and a decoder

1.1. Two ways of classifying compression techniques are mentioned here.

A. Lossless vs. Lossy compression

In lossless compression schemes, the reconstructed image, after compression, is numerically identical to the original image. However lossless compression can only achieve a modest amount of compression. An image reconstructed following lossy compression contains degradation relative to the original. Often this is because the compression scheme completely discards A. Lossless vs. Lossy compression In lossless compression schemes, the reconstructed image, after compression, is numerically identical to the original image. However lossless compression can only achieve a modest amount of compression. An image reconstructed following lossy compression contains degradation relative to the original. Often this is because the compression scheme completely discards redundant information. However, lossy schemes are capable of achieving much higher compression. Under normal viewing conditions, no visible loss is perceived (visually lossless).

B. Predictive vs. Transform coding

In predictive coding, information already sent or available is used to predict future values, and the difference is coded. Since this is done in the image or spatial domain, it is relatively simple to implement and is readily adapted to local image characteristics. Differential Pulse Code Modulation (DPCM) is one particular example of predictive coding. Transform coding, on the other hand, first transforms the image from its spatial domain representation to a different type of representation using some well-known transform and then codes the transformed values (coefficients). This method provides greater data compression compared to predictive methods, although at the expense of greater computation.However, lossy schemes are capable of achieving much higher compression. Under normal viewing conditions, no visible loss is perceived (visually lossless). B. Predictive vs. Transform coding In predictive coding, information already sent or available is used to predict future values, and the difference is coded. Since this is done in the image or spatial domain, it is relatively simple to implement and is readily adapted to local image characteristics. Differential Pulse Code Modulation (DPCM) is one particular example of predictive coding. Transform coding, on the other hand, first transforms the image from its spatial domain representation to a different type of representation using some well-known transform and then codes the transformed values (coefficients). This method provides greater data compression compared to predictive methods, although at the expense of greater computation.

1.2. Block Truncation Coding: Lossy Compression Approach

Encoding Steps

- Each image is divided into a set of non-overlapping blocks of n×n pixels.
- Pixel values of each block are used to calculate a bit plane B and two quantization levels l and h.
- The triple (l, h, B) is used to represent the encoded block for storage or transmission.

Decoding Steps

- The received bit planes and quantization levels are used to reconstruct the image.

2. RELATED WORK

Jing-Ming Guoproposed an improved BTC, namely dot-diffused BTC (DDBTC) to overcome inherent artifacts, blocking effect and false contour, caused by low bit rate configuration in BTC algorithm approach.

This method can provide excellent processing efficiency by exploiting the nature parallelism advantage of the dot diffusion, and excellent image

quality can also be offered through co-optimizing the class matrix and diffused matrix of the dot diffusion. According to the experimental results, the proposed DDBTC is superior to the former error-diffused BTC in terms of various objective image quality assessment methods as well as processing efficiency. In addition, the DDBTC also shows a significant image quality improvement comparing with that of the former ordered-dither BTC.

Seddeq E. Ghrare presents a proposed method for the compression of digital images using hybrid compression method based on Block Truncation Coding (BTC) and Walsh Hadamard Transform (WHT). The objective of this hybrid approach is to achieve higher compression ratio by applying BTC and WHT. Several gray scale test images are used to evaluate the coding efficiency and performance of the hybrid method and compared with the BTC and WHT respectively. In this paper three compression methods have been applied which are BTC, WHT and a hybrid method in which both techniques are used together.

The evaluation of performance using objective criteria including MSE and PSNR show that the proposed method achieves a good compression ratio while keeping a good quality of the reconstructed images. A comparative investigation between the proposed hybrid method and the BTC and WHT proves that the proposed method performs better than the BTC and WHT.

3. PROPOSED CONCEPTS

- The encoding method of VQ is time consuming, whereas its decoding method uses table look-up method and is very fast. This method results in higher compression ratio, though quality of the reconstructed image is usually not as good as BTC.

- BTC is a simple and fast method, which enables high quality reconstruction but bit-rate is also high. Comparatively, the encoder of BTC is faster than that of VQ, while its decoder is little slower.

- A compromise between these two methods gives a fast decoder, maintains good quality for reconstructed image with moderate bit-rate.

- In the proposed BTC-PF method, for each image block of size n×n, the pattern P is selected from a set of, say, M predefined patterns called pattern book. Each pattern represents Q intensity levels of the block and size is same as that of the block (i.e., n × n). For an image block B, the best fit pattern P is found from the pattern book.

Then Q quantization levels are determined from the B using the intensity pattern defined by the selected pattern.

4. CONCLUSION

In this thesis a spatial domain technique for image data compression, namely, the block truncation coding (BTC) has been considered. This technique is based on dividing the image into (4×4) non overlapping blocks and uses a two-level quantize. An advance form of BTC Algorithm has been proposed, termed as BTC pattern fitting algorithm. The BTC-PF algorithm has been applied to gray scale Image as well as colour image (Reference Image as well as Real Image) each contains 256×256 pixels. BTC-PF include Block Truncation coding and vector quantization method for pattern fitting.

The reconstructed images obtained from applying this technique have excellent performance. For a block size of 4*4, MSE for real image is least and the PSNR value is highest. The same scenario is with an image of block size 8*8 & 16*16 respectively. But as we increase the block size performance of the algorithm degraded, i.e. we get blurred image. But memory space need to store the image is very less. So if user can compromise with the quality 16 *16 block size takes least memory

space. But if balance between the memory size and image quality is needed block size of 4*4 is the best option.

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