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A REVIEW OF VARIOUS IMAGE COMPRESSION TECHNIQUES IN RECENT YEARS

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***Abstract*:** Image compression is application of a data compression on digital image. The objective is to reduce the redundancy of the image data in order to be able to store or transmit data in an efficient form.This paper discuss the matter about various image compression methods & techniques .On this basis of analyzing the characteristics of various image compression techniques .This paper presents detailed survey of existing research papers. In this paper we analyze different types of existing methods oflossy image compression techniques. Compression of an image is significantly different than binary stored raw data. To solve these issues we use different types of techniques for image compression. for this purpose there are basically two types of methods are introduced namely lossless and lossy compression techniques. We in this paper have considered only lossy compression methods.

I.Introduction

Image compression is a type of an application for data/image compression in which the basic image gets encoded with the limited encoding bits. Thebasicobjectiveofthe image compression is to show an image in small quantity of bitsalsotheneededcontentofinformationisnotlostwithinthe actualimage.For the reproduction of the actual image. Some techniques are there which are used to perform this type of compression which are lossless and lossy.[3]

Why we need compression?

- To increase amount of image storage space
- Reduce the transmission time of an image on internet
- High resolution image conversions from satellite

II Compression Techniques

During the past two decades a range of compression methods have been developed to address the main challenges faced by the digital image. Compression methods can be classified as

1. Lossless compression method
2. Lossy compression methods

In this paper we are highlighting only lossy compression methods.Because in the lossy compression data will be lost but actual image can be recovered with certain threshold level.

A. Lossy Image Compression Techniques

- Transform coding
- Vector quantization
- Fractal compression

BLossy Compression Methods

All lossycompressors are three-step algorithms,eachofwhichisinaccordancewiththreetypesof redundancy as mentioned.Thefirstphaseisa transform to get rid of the inter-pixel redundancy to group information competently. Thenaquantizerisappliedtotakeoutpsycho-visual redundancytosymbolizethepackedinformationwith as fewbits as achievable. The quantized bits are then resourcefully encoded to get extra compression from the coding redundancy.

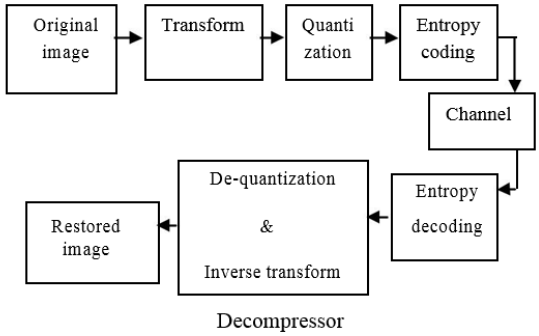

Fig 1: **Lossy image compression**

C. Quantization

Quantization is several to one mapping that replace a set of values with only one value. Scalar andvector quantization are two fundamental types of quantization.SQ (scalar quantization)performsvarioustoonemappingoneachvalue. VQ(vectorquantization)replaceeveryblockofinputpixels withtheindexofavectorinthecodebook,whichiscloseto the inputvectorbyusinga few closeness dimensions. The decoderonlyreceiveseachindexandlooksuptheequivalent vector inthe codebook.

Shannon first showedthatVQwouldoutcomeinalowerbit ratethanSQ. ButVQsuffersfromashortofgenerality, sincethecodebookoughttobetaughtonsomesetofinitial images. As aresult, the plan of the codebook will directly influence the bitrate anddistortion of the compression .

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a)Transform Coding

Transform coding is a common method for lossy image compression. Itemploys a fourier related transform such as discrete cosine is widely used . The most recently used was wavelet transform and followed by the quantization and coded successively in transform domain.[1]

b).VectorQuantization

Vector quantization (VQ) technique is the extension of Scalar quantization in multiple dimensions. This technique develops a dictionary of fixed-size vectors which are called codevectors.Agivenimageagainpartitionedintonon-overlappingblocks calledimagevectors. Then foreachimagevector, theclosest matchingvectorinthedictionaryis determinedandits indexin thedictionaryis usedas theencodingoftheoriginalimagevector.[2]

c).FractalCompression

Fractal image compression is recently used image compression method which exploits the similarities in various part of image. This technique works on the basis of observation that has fractals which can produce fairly realistic image.It must be possible to Fractal Coding decompose the image into segments by using standard image processing techniques such as edge detection, colorseparation, and spectrum and texture analysis. [1]

III Parameters For Measurement Of Image Compression

1.Image compression ratio: This is also known as image compression power defined as the ratio of uncompressed image size to the compressed image size.[4]

Compression ratio= uncompressed image size / compressed image size

Space saving is the difference form unity to the Image compression ratio given as .

Space saving= 1 – compression ratio

2.Peak to signal noise ratio: This term PSNR is a relative measurement term for the ratio between maximum achievable power of the image signal to the power of corrupting noise that affect fidelity of the reproduction of the image. Its a quality measuring parameter for reconstructed image.

$$MSE = \frac{1}{MN}\sum_{i=0}^{m-1}\sum_{j=0}^{n-1}\|I(i,j) - K(i,j)\|$$

The PSNR is defined as:

$$PSNR = 10\log_{10}\left(\frac{MAX^2}{MSE}\right) = 20\log_{10}\left(\frac{MAX}{\sqrt{MSE}}\right)$$

3.Signal to noise ratio: It's a term used to measure the loss occurred during transmission defined with respect to image as the ratio of signal power to noise power of the corrupted signal image.

$$SNR = \frac{P_{Signal}}{P_{Noise}} = \left(\frac{A_{Signal}}{A_{Sinal}}\right)^2$$

4.Mean square error: MSE is a estimator parameter or a loss function which identifies the amount of quantify by which an estimator differs a true value the quantifier being estimated.it measures a "average of square of errors". The error is the amount of difference.

$$MSE'(\theta') = \frac{1}{n}\sum_{j=1}^{n}(\theta_j - \theta)^2$$

with θ_j being realizations of the estimator of size n.

Benefits Of Image Compression

- Itsenhances the cost saving for transmissions
- Decreases the storage space and also the associated delay
- Decreaces the transmission error rate by adopting suitable algorithms
- Due to digital nature encryption are adoptable provides security for image transfer[3]

VI. Conclusion

This paper defines the image compression techniques, many researcher gave many techniques of image compression. In this paper, foremost lossy compression techniques and thequality estimation parameters are reviewed. And is concludedthatthree types of techniques can be used for compression. But in case of lossytechniques, compression ratio can be achieved more than lossless but at the cost of image quality.

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