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Research Article

Exploring the Multimedia Data Compression Attributes

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Abstract: Multimedia data such as image, data, video, &audio data need much transmission bandwidth & storage capacity. In spite of fast development in digital communication framework presentation, request for "data-transmission bandwidth &data storage capacity continues to outstrip the abilities of accessiblemethods. The latestdevelopment of "multimedia-based web applications" has not only essential for furtherproficientpaths to encode images &signals but have made compression of such signals central to communication &storagetechnology. The data compression (DC)objective is to signify any media as accurately as probable utilizing the least number of bits. This manuscript discovers attributes for image, audio, data, &video compression (VC).

Keywords: redundancy, traffic congestion, compression ratio, multiresolution, Irrelevancy, decompression.

1. Introduction

The compression is done to decrease the number of data and required to reproduce that data. And compression is done either or decreases bandwidth in case of audio, speech, and video or to decrease volume of information in case of fax, images, &text. The data compression might be observed as information theory reading in that significant objective for efficient coding & to diminish the transmission bandwidth speed. The significant reasons of this manuscript to representvariety of numerous multimedia compression methods and their comparative methods.

Compression is translation of information in such a layout that needs a small number of bits generally formed to store and send out the data without difficulty and resourcefully.

The digital video signifies visual images moving in form of digital data, while analog video signifies moving images in format of analog video. The VCwill be a method utilized transforming video signals with maintenance of original quality under numerouscircumstanceslike tile delay, storage, &power constraint. By exploiting data redundancy among computational resources &consecutive frames, the need of storage will be decreased. The current methods exploit the effective video compression methods fordecreasing size of file withleastinfluenceonvisual quality. The manifold video codec algorithms &standards have utilized for transmitting video in digital form.

Efficient data compression relieson data itself. Data is much usually utilized &most of compression method utilizes this feature to gain best compression. The encoder is gadget, which compresses data & decoder is gadget, which decompresses data.

Compression Terms

The procedure of decreasing the volume of data by applying a compression method is named compression. The subsequent data will be named as compressed data. The reverse procedure of reproducing the original data from compressed data will be named as decompression.The subsequent data will be named as decompressed data.There are 2 kinds of compression.

- Lossless Compression
- Lossy Compression

A. LosslessCompression

In lossless compression scheme, decompressed data will be similar as original data.

B. LossyCompression

The lossy compression compresses actual data from original data and substitutes them with an approximation.

Advantages Ofcompression

- The "storage space compressing data files" permits one to store more files in storage space, which will be accessible.

- Security also gives security level against illegitimatemonitoring.
- Permit real time transfer at provided datarate.
- Decrease file size and save diskspace.

1.1 Data Compression Features

The objective to improve novel "lossless data compressionmethods" will be to attain maximum attainable "data compression ratio" for numerous file kinds. The performance of data compression method [1.1] will be calculated in terms of encoding & decoding times, compression ratio, traffic congestion, accessible bandwidth, and serverload.

The data compression provides anexplanation for incrementing efficiencies and reducingprices of transferring & storing critical information of business. To incorporate compression method into business application needs 50% compression rate per file. The approach must be flexible to change your compression rate as per necessities. It must be work for whole data kinds and help all platforms.

By compressing data, "physical disk space" will be decreased; disk I/O and usage of memory have also decreased, thusenhancing performance. Nevertheless, there are few circumstances when DCwill be not suitable. The DCwill be much appropriated for data, which is upgraded rarely. Since much data in data warehouse will be deliberated read-only, DC is much similar with this kind of environment.

1.2 Audio/Video Compression Features

The "audio compression (AC)" might be calculated by degree of compression, speed of compression & decompression, product support, correctionof error &robustness. When we compress audio, decoded signal must be close as probable to original signal. It must have less executioncomplexity.

The ACmethod such as mp3 will be intended to decrease the number of data needed to signify audio recording. For audio, human ear will belastcritic of sound quality and it was executed as blindassessment.

In VC [1.2], it compresses video streams such as "successive discrete images". These images are highly interconnected. The VCapproach such as MPEG exploits this strong correlation to attain far enhanced compression rates than probable with isolatedimages.

1.3 Image Compressionf Eatures

The image compression (IC) decreases redundancy of image data. As pervisual perception of human, better calculation of original image might be reconstructed from image transmission with leastamount of examples. A valuable property of IC is that changing compression factorsas peressential file size. If you needbest quality and not satisfied with default compression setting, you might change default setting or adjust factorsas per your necessities.

If every pixel value signifies a distinctive and perceptually significant part of data, it would be problematic to compress an image. Providentially, data comprising a digital image is frequentlyirrelevant and/or redundant. A general feature of images [1.3] is neighboring pixels have correlated &thuscomprise redundant data. The significant missionwill be to discover less correlated depiction of image. Two main modules of compression are "redundancy &irrelevancy reduction". The "redundancy reduction" goals at eliminating duplication from signal source. The irrelevancy reduction neglects parts of signal that will not be observed by signal receiver, specifically "Human Visual System (HVS)".

With lossless compression, reproduction will be recognized to original, and therefore, quality will be not a problem. In case of lossy compression, but reproduction will be only approximation to original image. The quality measurement is central problem with lossy compression, &specifically in image & video compression. There are mainly2 methods to calculate the quality. The first one will be depending on human panels to compare reproductions with original. This will be a direct approach, however, subject to variety of problems. The human decision might be expressively affected by existence of framework introduced artifacts or errors. The judgments of human differ from 1 time to other time, & 1 person to another. The 2nd method will be to calculate numeric comparisons among original &reproduction and utilize this as objective measurement of quality.

2. Types Of Compression

Compression may be classified as symmetrical or asymmetrical. While symmetrical compression does not take time need to compress and to decompress are roughly the similar & asymmetrical needs to time taken for compression is frequently much longer than decompression. The compression is highly dependent on the type of media being used to compress the information.

2.1 Text Compression

Data compression is a valuable way for reduction channel bandwidth & storage space. There are 2significant kinds of compression lossy and lossless. Text compression compresses the data in the text files through various techniques [4].

2.1.1 Lossless Compression Techniques [5]

Huffman coding: This approach makes a prefix code for every node from alphabet by traversing tree from root to node. It creates 1 for right node &0 for left node.

Arithmetic coding: This approach of replacing every bit with codeword. Therefore, it substitutes aninput data string with single floating-point number as output.

Golomb coding: Golomb code provides an "optimal prefix code" whereas alphabets are geometrically distributed. This creates Golomb coding extremely appropriate for conditions in that incidence of minor values in input stream have much likely than largevalues.

LZ-78 Coding: LZ78 is relying on dictionary, which is created dynamically at runtime. The decoding & encoding procedure utilize the similar rules ensure that an identical dictionary will be accessible.

2.1.2 Lossy Compression Techniques [5]

Dropped Vowels: This method drops all vowels from text, it will disrupt whole text readability. Still, original text might be partially or fully recovered utilizing with spellchecker.

Letter Mapping Technique: This method is a macro character replacement in each word in whole text.This approach takes smallestoccurring characters and substitutes them with highly occurring characters.

Replace of Characters Technique: This method is to determine that characters to mix & that character to utilize to signify this mixturewill be quite flexible. This permits us to decrease numerous characters to be processed inadvance.

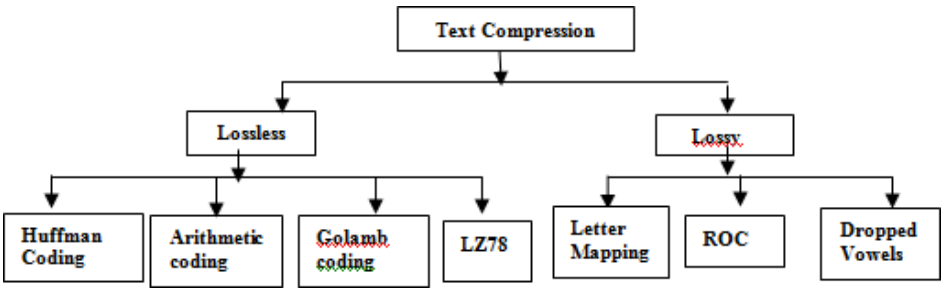


Figure 1: Flow diagram of text compression technique

2.2 ImageCompression

The ICwill be reducing size in graphics file without degrading image quality to unacceptable level. The size reduction of file permits many images to be stored in provided memory space or disk. It also decreases time needed for images to be sent over Internet [6].

2.2.1 Lossless Compression Techniques:

***Huffman Coding*:** a method for lossless compression of files based on occurrence frequency of symbol in file, which is being compressed. The "Huffman algorithm" will be rely on statistical coding that means possibility of symbol has a direct bearing on length of its representation [7].

Run length Coding: This coding executes lossless data compression & much appropriated to "palette-based iconic images". It does not work best at all on "continuous-tone images" like photographs, though JPEG utilizes it quite efficiently on coefficients [7].

Dictionary Coding: It encodes symbols into bit strings that utilize fewer bits. The dictionary-based methods encode "variable-length strings" of symbols as singletokens; do not encode single symbols as "variable-length bit strings".

Bit plane Coding: The mean squared error among decoded &original image at any progression level is recognized prior to encoding/decoding [7].

***SCZ Coding*:** SCZ will be an easy set of compression routines for decompressing &compressing arbitrary data. The primary set of routines implement novel loss-less compression methods with perfect decompression [7].

2.2.2 Lossy Compression Techniques:

Color space: Decreasing color space to very general colors in image. The choosencolors have identified in color palette in compressed image header [8].

Chroma Subsampling: This takes benefit of human eye observes spatial variations of brightness very sharply than color, by dropping few chrominance data in image.

Transform Coding: This is very generally utilized method. In specific, Fourier-related transform like "Discrete Cosine Transform (DCT)" is broadly utilized. The very latelyestablished wavelet transform will be also utilized broadly, followed by entropycoding &quantization [8].

Fractal Compression: This method classifies possible self-similarity within image & utilized to diminish number of data needed to reproduce an image[8].

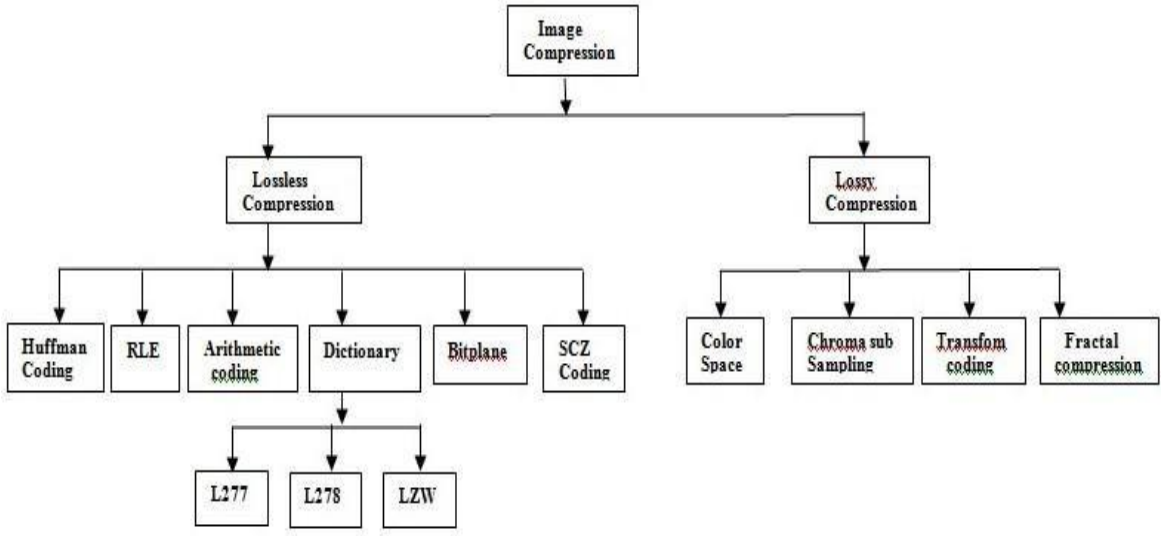


Fig 2: Classification of IC technique[9]

2.3 AudioCompression:

***Coding Redundancy*:** It optimizes coding of symbols and quantize in lossy coding. It can be classified three techniques [10]. They are

1. PCM
2. U-law
3. A-law

Inter Sample Redundancy: It signify runs of pixels, frequency domain representations, silence in audio, and object descriptions. It can be categorized are asfollows:

4. DPCM
5. ADPCM

Psycho-Perceptual Redundancy: It represents as a masking effects and noise and distortion thresholds.

6. Masking
7. Perceptualcoding

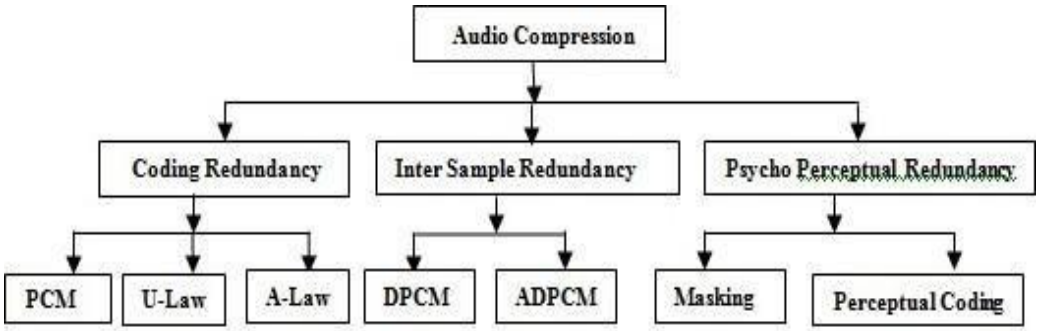


Fig 3: Classification of AC techniques

2.4 Video Compression:

The video compression will be the procedure of decreasing the number of pixels in every frame by preventing redundant data [11].

2.4.1 Lossless Compression:

DCT: The DCT transforms input data into a format to decrease "interpixel redundancies" in input image. The transform coding methods utilize "linear mathematical transform" to map pixel values onto a group of coefficients that have encoded &quantized [12].

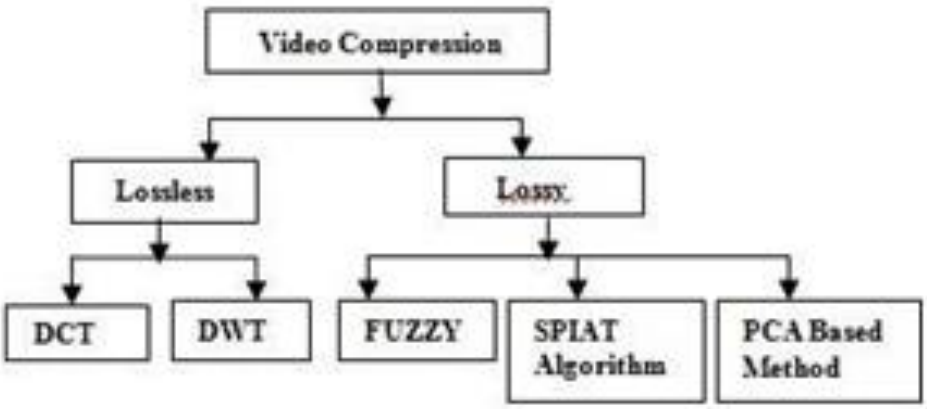
DWT: "Discrete Wavelet Transform (DWT)" signifies an image as sum of wavelet functions, recognized as wavelets, with dissimilarscale &location. DWT signifiesimage data into group of low pass (approximate) &high pass (detail) coefficients. The image is first separated into blocks of 32×32[13].

2.4.2 Lossy Compression:

Fuzzy Concepts: Fuzzy based soft hybrid JPEG method gives higher compression ratio, improvedquality of image [14].

SPIHT Algorithm: The benefits of SPIHT method are easy, quick, & effective results. The presentation of different wavelets is compared utilizing SPIHT method in prior toapplication of wavelet transform, RGB component of images are converted into YCbCr[14].

PCA Based Method: By executing visual change assessment, video segmentation, and object tracking, operations of PCA based video representation method is allowed[15].



3. Conclusion

This manuscript, discovered the simple compression methods and conclude all multimedia compression methods are beneficial in their related regions and each day novel compression method is improving that provides best compression ratio. This manuscript provides perfect idea about main compression methods & its kinds. Relied on survey of diverse kinds of multimedia data & its compression methods, we conclude that compression technique relied on 3 attributes: number of compressions, image quality and compression speed

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