A Review of Compression Techniques for Managing Multimedia data over Cloud Storage

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***Abstract* - Cloud Computing has become an important aspect in today's world as technology has grown past all the boundaries and there is a need to connect resources and users without having physical connection. The high demand for data processing and leads to high computational requirement which is usually not available at the user's end. This has encouraged several companies to provide services over the cloud in the form of service, storage, platform etc. But along with its advantages cloud computing has brought with it several challenges like security, storage, scheduling etc. Storage in Cloud computing forms a very important part as the need of virtual space to store our large data has grown over these years. But the speed of uploading and downloading limits the processing time and there is a need to solve this issue of large data handling. Compression techniques are much reliable method to reduce the space over cloud as high demands for digital data leads to inappropriate use of cloud storage .Compression techniques gives benefits to the companies when companies have to deal with large size data over cloud sever thus reducing cost .Here different compression techniques are discussed which are applied on digital data which is widely used over web. It is required to obtain lossless compression most of time because cloud storage deals with data used in real time applications, real time image processing.**

***Keywords*: Cloud Computing, Compression Techniques, Cloud Storage.**

I. INTRODUCTION

Cloud Computing

Cloud computing involves shared resources ,various services like software, platform ,infrastructure which is provided on demand over internet .It builds the virtual infrastructure for users with remote computing and provides with the facility of large storage capacity. Currently there are various cloud computing service provider such Amazon, Google, IBM etc and provide online access to various resources and also data storages for example Simple Storage Service (S3) built on Amazon EC2 and the Google drive etc.

Cloud Storage

It provides storage capacity to users for increasing data availability and processing of data over cloud inspite of buying and managing hardware companies rent virtual machines and storage space to store data ,organization data and application data and have to pay for the services used.

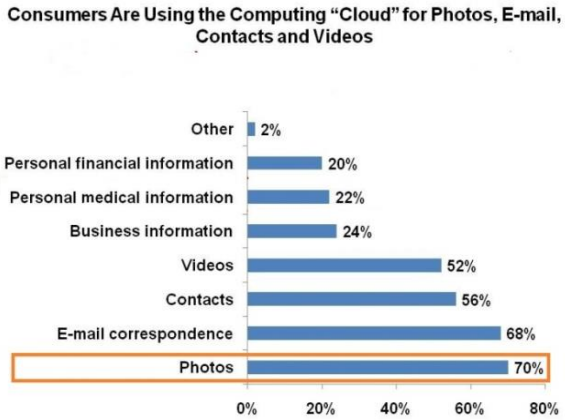

Figure 1: Consumption of images over cloud.

Multimedia Data

As adornments in storage space from magnetic tapes and disks, optical storage media, and flash memory to a network attached storage, and even storage virtualization approaches cannot compete with the radical growth of digital data to terabytes and

petabytes .Today digital images are spreading over the internet vastly and most effective way of representing information taking much of the storage over network.

Compression on cloud

Compressing large data leads to worthier utilization cloud storage as large sized data has grown over cloud storage. A number of compression techniques are available for compressing data .Compression techniques compress the data which is favorable for data storage and transmission applications thus reducing bandwidth , transmission time and leads efficient storage .From study of various papers , highly efficient and lossless technique for compression is required for managing cloud storage .There are two kinds of compression techniques lossy compression and lossless compression .In lossy compression some loss of information is acceptable such as in videoconferencing or in image where loss is unnoticeable to human eye. But for critical financial data lossless compression is essential in which data loss does not occur after compression. So lossless compression technique is sufficient methods over cloud storage because no loss is acceptable.

II. COMPRESSION TECHNIQUES

As cloud storage is increasing these days due to increasing of multimedia data over internet. A compression algorithm is prime approach for making improved cloud storage capacity .Basic compression techniques are available for multimedia data as image.

1. LZW(Lempel-Ziv-Welch) Compression :

This technique compress the content character by character replace the repeated occurrences of data with references to a dictionary that is pre-initialized with all possible symbols. In case of image data it checks the input pixels and runs the dictionary in order to find its correspondence.

2. Run Length Encoding :

In this method for compressing image data ,a sequences of repetitive pixels values are replaced by token whose one part includes the value of pixel and other include the number of repetitive values . For example 2223337777 can be replaced with (2,3)(3,3)(7,4) and results in lossless compression.

3. Huff mann Coding :

Huffman coding is lossless compression technique that is based on probability of occurrences of data symbols and builds the table according to probability of occurrences of data symbols and variable length bit code is assigned to each data symbol.

4. Lossless Compression based on Wavelet Transforms :

DCT is discrete cosine transform in which different data points are expressed in cosine functions that oscillates at different frequencies .It does not show much enhanced result in terms of execution time so solution is wavelet transforms that are applied to components of image and de-correlates the image into different size lines and producing sub bands , preserving much of its spatial correlation. Discrete wavelet transform converts the image into the high pass wavelet coefficients and low pass wavelet coefficient, thus results in enhanced execution time and compression ratio. Main drawback is that in case of DWT, wavelet coefficients are real numbers. Then efficient lossless coding is not possible by using linear transforms. For truly lossless result the wavelet coefficients are rounded off to nearest integers as they need less storage as compared with floating point operations results in Integer Wavelet Transform and Lifting Scheme can be used for reconstructing original data and for speeding up the mechanism of compression .Wavelet based compression methods produce the superior results.

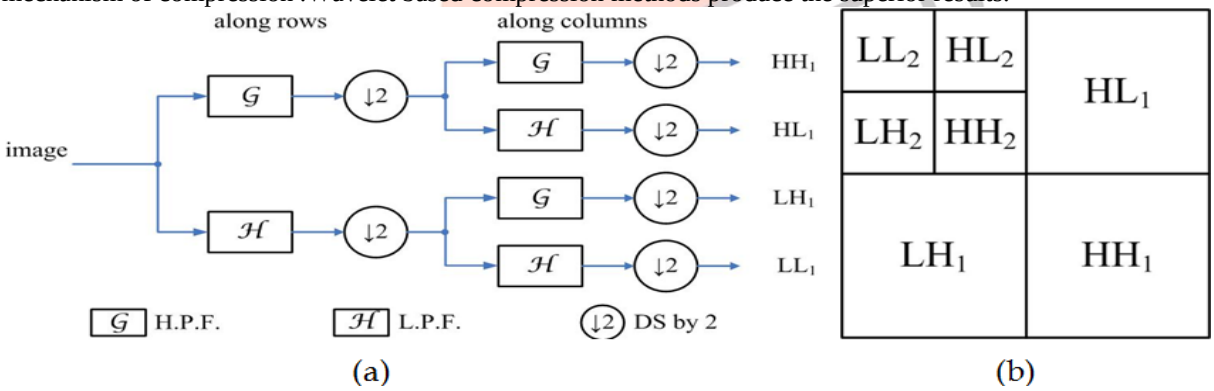

Figure 2: Wavelet decomposition of Image into sub bands

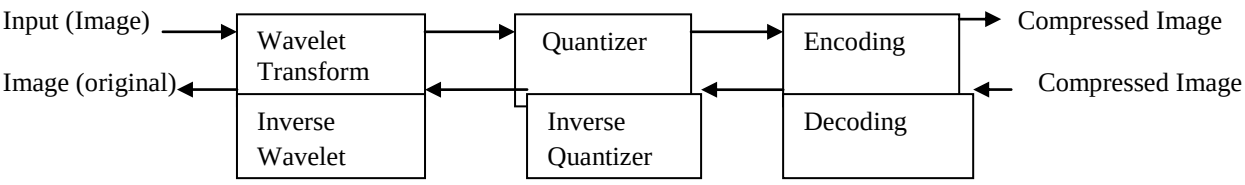

Figure 3: Basic steps of wavelet transform based compression

Genetic Algorithms

These are optimization techniques which reduce the execution time and retain quality of data as image. Without using exhaustive search mechanism ,the genetic algorithms will find optimal solutions to solve search problem using inheritance,

mutation, selection, and crossover . For obtaining better results genetic algorithms can be applied to compression techniques when regularities of the data to be compressed are less predictable.
Various other compression techniques are there as based on spatial and temporal redundancies, a Spatiotemporal Compression is conducted which results in better compression ratio and does not accept any data loss.

III. RELATED WORK

Chi Yang et al [2] discussed the problem of managing large size data on cloud such as big data , multimedia data etc. that raise hard challenges like memory bottlenecks and storage space . To overcome these issues large size data is being compressed by using spatiotemporal features on cloud and gives result in terms of data size and fidelity loss.
K. Govinda et al [3] discussed the problem with Simple storage service (S3) in july 2008 suffers from great loss because it is failed to route user's request to appropriate physical storage and proposed lossless LZW compression for optimizing the cloud storage that achieves 50 percent of compression.
Khobragade P. B. et al [4]made a survey on various compression techniques for compressing image such as lzw , run length encoding ,Huffman coding ,Transform coding as discrete cosine transform based compression ,discrete wavelet transform(DWT),integer wavelet transform(IWT) based compression and concluded that lossless wavelet transform based compression techniques gives better compression ratio and retains most of quality of data .
Mathur et al [5] proposed lossless Huffman compression method for image and it is type of statistical coding that attempts to reduce the amount of bits which are required to represent a string of symbols .It has given 65% compression for gray level images.
Mrs. Preet Kaur et al [6]made comparative analysis of DCT, DWT, LWT bases compression techniques. LWT is lifting wavelet transform that has given high execution speed and lossless results in terms of peak signal -to-noise ratio.
A.H.M. Jaffar Iqbal Barbhuiya et al [7] proposed discrete wavelet transforms for compression of color images and comparison with discrete cosine transform. The discrete wavelet compression gives the better results in terms of PSNR ,Compression ratio.
Muneshwara M.S. et al [8] discussed the efficient way of managing data over cloud and discussed the way of securing data .Hybrid compression by combining LZ77 and Huffman Coding is used which reduce the size of file upto 60-70%.
Mukherjee , Tilak et al [9] proposed better lossless compression approach using wavelets in which both approximation and detailed contents of the image are decomposed and yields better compression parameters. Using transform methods the wavelet coefficients are rounded off to integer values to finite precision and lifting scheme is used obtaining high PSNR and compression ratio [13]for real time image compression systems where speed is a deciding factor.
As digital data is spreading like a fire over the network that leads to inefficient storage for managing such data of petabytes.So various researchers have given various compression methods for efficient use of storage space.For cloud storage it is manedatory to manage data in storage space as to reduce cost for using storage provided by cloud providers.

IV. CONCLUSION

The various compression techniques have been studied so far. Although LZW lossless compression technique and other compression techniques gives the better compression ratio but further research was carried which emphasized on transform methods for compression of the color images as digital data has grown at high speed over internet. DCT based compression gives good compression but results in less execution time than DWT . In case of wavelet transforms based method also results in better compression and for purpose of obtaining lossless results wavelet coefficients are rounded off to nearest integer such transforms are known as Integer Wavelet Transforms .Lifting schemes can be used for real time compression system where speed up is major parameter. Genetic algorithms are used for optimization for retaining quality of data and reduce the execution time. So more improvement in compression techniques is required by modifying the compression algorithms with genetic algorithms to develop a intelligent compression system which will result in better compression ratio, high speed up and retains the quality of data .Thus the storage in cloud can efficiently be used by improving compression techniques.

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