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A General Survey on Lossy Compression Algorithms for Online Learning Images in Cloud Environments

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Abstract: *This paper presents the important inferences derived from the literature survey. A study of the literature available on the current problem reveals a large number of available techniques. Some of these techniques are mentioned. All these techniques suffer from various drawbacks like measuring image quality parameters and how much storage space occupy in the cloud environment. An extensive survey was made on the issues such as image compression and its features, image compression methods, existing compression algorithms, new proposed compression algorithm and their impact, the various levels of image compression in BTC were analyzed*

Keywords: BTC, AMBTC, Cloud, Compression and Clustering

I. INTRODUCTION

Image compression is a technique applied to a portrait report to decrease its length in bytes without degrading the image above a suitable threshold. More images can be saved in a given amount of disc or memory space by shortening the length. This paper highlights the various lossy image compression algorithms.

II. REVIEWS ON IMAGE COMPRESSION

Walter B. Richardson, refreshed the challenges looked as development progressed toward automated mammography, presented an in a general sense short framework of multi resolution examination, finally, gave current and future employments of wavelets to a couple of areas of mammography. Zesheng Yang et.al, expounded on the usage of Harr wavelets for lossy pressing factor of cutting edge mammograms. They attempted various things with a grouping of wavelet structures for a comparable explanation. They executed various types of cutting edge mammogram pressure using standard, misrepresented, and adaptable wavelet bases; and they investigated various roads in regards to various compel rates to see better the pressing factor ramifications for the nature and nature of the photos and such setbacks.

Armando Manduca, have made programming modules (both autonomous and in the biomedical picture examination and show group analyze) that could perform wavelet-set up pressure regarding both 2-D and 3-D faint scale pictures. He presented occurrences of such tension on an arrangement of clinical pictures, and assessments with JPEG and other pressing factor plans. He had in like manner shown occasions of the improvements procured by clear 3-D pressing factor of a 3-D picture (rather than 2-D pressing factor of each cut), and discussed issues, for instance, the treatment of edge effects and human visual structure response concerning a wavelet-based philosophy. Finally, he discussed extensions of that time current approaches to manage considerably more capable pressing factor plans.

Generally speaking, lossless pressure is executed using coding methodologies. Entropy coding encodes the given game plan of pictures with the base number of pieces expected to address them using the probability of the pictures. Pressing factor is refined by designating variable-size codes to pictures. More restricted code word is distributed to more probable pictures. Huffman coding (Huffman 1952) and Arithmetic coding (Rissanen 1976, Witten et al. 1987) are the most celebrated entropy coding procedures. Lossless picture pressure methods can be realized using Huffman coding and Number shuffling coding.

Lee et al. (1993), Goldberg (1994) and Perlmutter et al. (1997) called attention to that lossy pressure procedures could be applied for E-learning pictures without essentially influencing the substance of pictures. The decompression results show no huge contrast with the first for pressure proportions up to 10:1 if there should be an occurrence of study

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pictures in the work proposed by Ando et al. (1999). Examination considers (Slone et al. 2000, Skodras et al. 2001, Chen 2007 and Choong et al. 2007) showed that as computerized pictures possess huge measure, in any event 10:1 pressure proportion must be accomplished.

Adnan MohsinAbdulazeezBrifcani; JwanNajeeb Al-Bamerny (2010) A significant goal of electronic picture pressure is to decrease the piece rate for transmission or data storing while at the same time keeping a good dedication or picture quality. In this examination a proposed coding (pressure) contrive for faint scale picture by joining discrete wavelet change (DWT), multistage vector quantization (MSVQ) and Huffman coding is presented. After the presentation of DWT, wide assortments of wavelet-based pressure strategies have been accounted for. Among them, Embedded Zero Tree Wavelet (EZW) (Shapiro 1993) which uses parent-youngster dependancies between subband coefficients at a similar spatial area of wavelet deteriorated picture, Set Partitioning In Hierarchical Trees (SPIHT) (Said and Pearlman 1996) which utilizes the self-likeness between subbands of wavelet disintegrated picture and JPEG 2000 calculation (Taubman 2000, Boleik et al. 2000, Taubman and Marcellin 2002) which uses Embedded Block Coding with Optimized Truncation (EBCOT) are the most mainstream strategies.

Kalyanpur et al. (2000) inspected the impact of JPEG and wavelet pressure calculations on clinical pictures and reasoned that there is no huge loss of analytic quality upto 10:1 pressure. People et al. (2000) talked about demonstrative exactness and revealed that recreated clinical pictures with a pressure proportion of 9:1 don't bring about visual corruption.

Saffor et al. (2001) looked at JPEG and wavelet and reasoned that the wavelet could accomplish higher pressure productivity than JPEG without trading off picture quality. Li et al. (2001) examined the impact of JPEG and wavelet pressure calculation on clinical pictures and reasoned that pressure proportion up to 10:1 is worthy. Hui and Besar (2002) considered the presentation of JPEG2000 on clinical pictures and showed that JPEG2000 is more satisfactory contrasted with JPEG as JPEG2000 pictures could hold more detail than a JPEG picture.

Kumar,S. also, Nancy have distributed an exploration article named "K-Mean Evaluation in Weka Tool and Modifying it utilizing Standard Score Method". In this paper, creator proposed the adjusted methodology of K-Means grouping and calculation has been planned. The whole information will be standardized utilizing standard score strategy which is additionally called z score and afterward bunch will be framed utilizing Euclidean distance. The quick grouping cycle will diminish the framework assets and gives the proficient procedure to create the bunches.

Jain,A. what's more, Chawla, S., have distributed an examination article named "E-learning in Cloud". In this paper, Cloud based e-learning will empower individuals to construct their learning around their particular necessities with the cloud permitting significant, custom-made substance to be made for the clients with no reliance on IT to refresh conveyance stages likewise.

Tambe, M., et.al., have distributed an examination article named "An E-learning System with Image Compression". In this paper, centered to give an e-learning stage, principally manages the arrangement of putting away the written by hand notes in digitized structure and furthermore putting away the pictures, Diagrams, Audio-video addresses and so on, on Cloud. The information will be put away by decreasing its size which would be gainful as it gets less space on cloud, consequently information control speed will be expanded. The paper is accomplished to utilize the different calculations like Thresholding, Grayscaling.

Robust image embedded watermarking using DCT and Listless SPIHT presented by DivyaJ.L et.al (2017). In this approach DCT based listless SPIHT was employed for digital watermarking technique. This method was more robust for some common attacks such as filtering, cropping, sharpening, inversion and compression. The method utilized Chinese remainder theorem (CRT) encryption technique and compared the performance with CRT-based DCT technique and DCT based inter block correlation technique. Shiliang et.al (2016) presented a method of image compression based on lifting wavelet transform and modified SPIHT algorithm. In this approach a method has been proposed to improve the efficiency of remote sensing image data storage and transmission. The lifting scheme and modified SPIHT algorithm is utilized for compression. The lifting DWT is employed for exploiting the correlation among the image pixels and 3/5 lifting DWT scheme is utilized for the purpose of storage elements of wavelet coefficients.

Robust Soft Decision Adaptive Interpolation (SAI) interpolation using weighted least square has presented by Kwok-Wai Hung et al (2011).SAI method provides powerful framework for image interpolation. In this approach, it addresses

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the mismatch problem of geometric duality during parameter estimation. In this method SAI could be improved further using weighted least square method instead of least square in both of the parameter estimation and data estimation. The experimental results of this method have0.25 dB increment in PSNR.

Tran Minh Quan et al (2016) have presented a fast DWT using hybrid parallelism on Graphics Processing Units (GPUs). In this approach, it provides state-of-the-art of GPU optimization strategies in DWT implementation. And also provide mixed band memory layout for Haarwavelet.

Somasundaram,K. and Rani,M.M.S., have published a research article entitled "*Novel K-Means Algorithm for Compressing Images*" . In this paper, the author proposed the possibility of application of statistical parameters for choosing the initial seeds for K-means algorithm. The selection of initial seeds depends on the statistical features of input data set. The novelty in their approach is the judicious selection of initial seeds based on variance, mean, median and mode parameters. Considering mode value of each dimension of the data adds uniqueness.

Malekar,N.C. and Sedamkar,R.R. have published a research article entitled "*Novel K-Means Clustering Approach for Compressing Hyperspectral Image*". In this paper, the author pointed out to compress the hyperspectral image by using k-means clustering. The compression ratio is improved by using k-means clustering approach by clustering pixels into classes based on pixel spectral similarity with other class members.

Jain,A. and Chawla, S., have published a research article entitled "*E-learning in Cloud"*. In this paper, Cloud based e-learning will enable people to build their learning around their specific needs with the cloud allowing relevant, tailored content to be created for the users without any dependence on IT to update delivery platforms accordingly.

Uthayakumar et al. proposed neighbourhood similarity sequence techniques for handling image compression problems. This work developed image correlation procedures for compression the data collected from visual sensors of Wireless Sensor Network (WSN). Recognizing the image patterns with more accuracy is depending on the rate of sensor image reconstruction procedures. In this scope, this existing work created image blocks in terms of binary bits and they were injected in to bit-level image reductions. This helped to compress the images of sensor visuals. This work contributed real time sensor based image compressions. In addition, this work gave both image pattern handlings and similarity sequence formation. However, this system used standard coding and compression techniques that affected accuracy of images.

Ramar et. Al. has proposed an extensive survey of various data aggregation techniques in WSN is performed by categorising the techniques as structured, structure-free, flat and hierarchical. These techniques are analysed in terms of energy conservation, network lifetime, packet delivery ratio, latency and various other parameters. It explains the significance of network data transfer. In 2011, Amin. An et al proposed a lossless spatial pressure procedure with improved pressure proportion utilizing Run Length Encoding (RLE). Bigger successions are broken into little groupings utilizing bit stuffing.

Mawane et al.and Yang et al. proposed e-learning based filtering systems and compression techniques for improving the quality of learning platforms. The first technique was using deep data analysis and unsupervised learning systems for recommending the optimal e-learning resources for the viewers. The later work concentrated on compression on time sensitive audio contents and loads in e-learning databases.

Chakrabortyet al.[2010] proposed image processing and image compression techniques applied on Internet of Things (IoT) environment. IoT contains both front end and E-Learning based back end databases. In this heterogeneous platform, various images are initiated. This work implemented ML techniques and their training phases on the basis of image pattern recognition strategies. This effort had been applied for finding the correlations and knowledge management activities on JPEG, JPEG 2000 and other image formats. This work stated that this effort produced good and accurate image compression outcomes.

Kavitha et. Al[2013]. used the Stationary Wavelet Transform (SWT) and Zernike Moments for finding and deleting shadows based on a threshold which can be finalized by wavelet coefficients. Multi-resolution property of the stationary wavelet transform helps to do the decomposition of the video frames into four different categories of bands without the loss of any spatial information. This wavelet concept can also be applied for Image compression techniques.

Liao et al [2013] the definition of the triplet loss function is based upon three images. These three images are anchor image, positive image, and negative image. The positive image and the anchor image are from the same person, whereas the negative image and the anchor image are from different people. Minimizing triplet loss is to make the

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distance between the anchor and the positive one closer, and make the distance between the anchor and the negative one further.

III. REVIEWS ON CLOUD COMPUTING

The data is processed in plaintext and is stored in the cloud. The provider is responsible for the security of the information when it is handled and stored said by Gehana Booth et al. (2009). Other concerns are the data location, data segregation how information it is stored. User encrypt their data and then send it as cipher text to a cloud. Data can be decrypted when required is said by Dimitrios Zissis et al. (2007). Shivalal Mewada et al. (2013) suggested that each CSP should support all the phases of the data lifecycle with appropriate security mechanisms. Some storage technologies are used to store data. Common to all these storage technologies is the fact that many customers share shared data storage. In this type of constellation, a secure separation of customer data is essential and should, therefore, be guaranteed. Rao and Selvamani (2015) proposed safety efforts for ensuring data. When numerous organizations share assets, there is a danger of information misuse. In this way, to evade chance, it is essential to secure data repositories and furthermore, the data that includes storage, transmit or process. Security of information is the most critical difficulties in cloud computing.

Shaikh and sasikumar (2015), proposed a trust model, which measures the security quality and calculates the trust value. Trust esteem includes different parameters that are fundamental measurements along which security of cloud services can be measured. CSA (Cloud Service Alliance) benefit challenges are utilized to survey the wellbeing of an administration and legitimacy of the model. Swamy et al (2014), have proposed an efficient optimal robust video steganography technique using the Biorthogonal Wavelet Transform that has been incorporated with a hybrid model of the Artificial Bee Colony (ABC) with Genetic Algorithm (GA). The Biorthogonal Wavelet Transform is utilized to split the image into Low-Low (LL), Low-High (LH), High-Low (HL) and High-High (HH). The optimization technique ABC and GA are then utilized to attain best fitness values in the embedding and extraction processes.This subcategory focuses on the impact of cloud computing on educational institutes, especially those in the higher education sector. Operating and maintaining IT infrastructure has cost universities enormous amounts of money; hence, some argue that by adopting cloud-based solutions, such money could be saved and used in places more meaningful to the students and teachers [Ercan, 2010]. Articles in this category discuss how a variety of educational areas can benefit from cloud computing, such as those for elearning [Doelitzscher, Sulistio, Reich, Kuijs, and Wolf, 2011], online library resources [Jordan, 2011; Robert,2009], and online collaborative writing [Calvo, O'Rourke, Jones, Yacef, and Reimann, 2011]. Some articles analyse more generic issues such as the influence of cloud computing on the job roles of IT staff in higher education [Currie, 2008] and the inevitable adoption of cloud computing driven by NetGens 2.0 students whoare born digital natives and rely on cloud-based applications for their life and study [Brown, 2009].Shiliang et.al (2016) presented a method of image compression based on lifting wavelet transform and modified SPIHT algorithm. In this approach a method has been proposed to improve the efficiency of remote sensing image data storage and transmission.

Image Processing is of generally digital image processing but there are also analog and optical image processing possible. Image compression is an efficient technique to reduce the size of graphical file and also reduce the storage requirement area [Meenakshi ,V. K. Devi2011]

IV. REVIEWS ON BLOCK TRUNCATION CODING

Rani,M.M.S. and Chitra,P., have published a research article entitled "*Region of Interest Based Compression of Medical Images Using Vector Quantization*". In this paper, the author proposed method mainly focuses on compressing medical images with different codebook sizes for region of interest and non region of interest using vector quantization method. It achieves high compression ratio without compromising the quality of reconstructed ROI image

Mohammed, D. furthermore, Abou-Chadi, F., proposed a "Picture Compression utilizing Block Truncation Coding". In this paper, two calculations were chosen specifically, the first Block Truncation Coding (BTC) and Absolute Moment Block Truncation Coding (AMBTC) and a near report was performed. Both of two procedures depend on applying separated picture into non covering blocks. They vary in the method of choosing the quantization level to eliminate excess.

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Gupta,P., Bansal, V., and Purohit, G.N., have distributed an examination article named "Square Truncation Coding for Image Compression Technique". In this paper researched of dark scale pictures by utilizing Block Truncation Coding Technique. The method is to accomplished better quality picture generation. It is similar investigation of BTC strategy and proposed a technique that depends on Block Truncation calculation for picture pressure.

Vimala, S., Uma, P. furthermore, Abidha,B., have distributed an exploration article named "Improved Adaptive Block Truncation Coding for Image Compression". In this paper proposed a technique called the Improved Adaptive Block Truncation Coding dependent on Adaptive Block Truncation Coding. The element of between pixel repetition is abused to diminish the piece rate further by holding the nature of the recreated pictures.

Shashikumar, S., Parakale, A. furthermore, Mahavir, B.M., have distributed an examination article named "Picture Compression utilizing Absolute Moment Block Truncation Coding", In this paper, Absolute Block Truncation Coding procedure is utilized for picture pressure. AMBTC calculation is a lossy fixed length pressure technique that utilizes a Q level quantizer to quantize a given district of the picture. This procedure depends on applied partitioned picture into non covering blocks.

Mohammed, D. and Abou-Chadi, F., proposed a*"Image Compression using Block Truncation Coding"*. In this paper, two algorithms were selected namely, the original Block Truncation Coding (BTC) and Absolute Moment Block Truncation Coding (AMBTC) and a comparative study was performed. Both of two techniques rely on applying divided image into non overlapping blocks. They differ in the way of selecting the quantization level in order to remove redundancy.Gupta,P., Bansal, V., and Purohit, G.N., have published a research article entitled *"Block Truncation Coding for Image Compression Technique"*. In this paper investigated of gray-scale images by using Block Truncation Coding Technique. The technique is to achieved better quality image reproduction. It is comparative study of BTC technique and proposed a method that is based on Block Truncation algorithm for image compression.

Vimala, S., Uma, P. and Abidha,B., have published a research article entitled "*Improved Adaptive Block Truncation Coding for Image Compression"*. In this paper proposed a method called the Improved Adaptive Block Truncation Coding based on Adaptive Block Truncation Coding. The feature of inter-pixel redundancy is exploited to reduce the bit-rate further by retaining the quality of the reconstructed images.

Shashikumar, S., Parakale, A. and Mahavir, B.M., have published a research article entitled *"Image Compression using Absolute Moment Block Truncation Coding"*, In this paper, Absolute Block Truncation Coding technique is used for image compression. AMBTC algorithm is a lossy fixed length compression method that uses a Q level quantizer to quantize a given region of the image. This technique rely on applied divided image into non overlapping blocks.

Almrabet, M.M., Zerek, A.R., Chaoui,A. and Akash, A.A., have published a research article entitled *"Image Compression using Block Truncation Coding"*. In this paper, the Block Truncation Coding algorithm uses a two-levels (one bit) nonparametric quantizes that adapts to local properties of the image. The quantize that shows great promise is one which preserves the local sample moments. The quantize is compared with standard (minimum mean-square error and mean absolute error) one bit quantizes. The efficient management of the database in e-learning resource environment is always a challenging task for any database administrator. E-learning databases are containing text files, image files and other multimedia files in distributed manner. These files are usually created at different platforms and delivered to various nodes. In this regard, they are completely heterogeneous in nature. Comparing to other e-learning resources, image databases are more vulnerable and dependent on the node based applications. Thus the image compression and reconstruction procedures are need to be taken significantly to maintain the image quality in both ends. Image compression techniques and decompression techniques are widely depending on the phases of image coding principles. The effective coding and decoding makes the image with less errors in pixel values. In this situation, many image compression techniques were proposed and implemented to keep the image quality at the reconstruction end.

In 2011, Yang, Y et al introduced a quick BTC strategy dependent on a shortened K-implies calculation. This uses the picture between block relationship and the union property of the k – implies bunching calculation. This calculation produces an ideal arrangement with great handling speed.In the year 2011, Liu Y.F, Guo, J.M and Lee, J.D introduced a halftone picture order utilizing Least Mean Square calculation and innocent Bayes classifier. The creators have built up a most un-mean-square channel for improving the strength of the separated highlights, and utilized the credulous Bayes classifier to check every one of the removed highlights for grouping.

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In 2013 Kekre, H.B et al proposed a picture pressure strategy utilizing Multilevel Block Truncation Coding for picture order. Highlight vectors are separated with four degrees of Block Truncation Coding to order the few classes of pictures for execution correlation in six dChen et al. proposed Ant Colony Optimization (ACO) techniques for retrieving the image block contents. In this approach, BTC was used to convert and manipulate the image blocks in terms of binary representations. These binary values were given to ACO procedures for enriching the quality of retrieved image values. This work provided optimized image retrieval observations. At the same situation, the technique was not enough to deal with more types of images.

Yung-Yao et al. applied AMBTC technique for securing data values. This system proposed AMBTC procedures for handling high resolution images and large sized data in huge databases. This algorithm was implemented to provide simple coding and decoding principles that are mainly dealt with high quality data only. This technique was not meeting the requirements of minimal quality datasets.

Kavitha et. Al. applied the Stationary presents a Stationary Wavelet Transform (SWT) and Zernike Moments for identifying and removing moving shadows based on a threshold determined by wavelet coefficients. The multi-resolution property of the stationary wavelet transform leads to the decomposition of the frames into four different bands without the loss of spatial information. The wavelet concept may also be used for Image compression.

V. REVIEWS ON CLUSTERING

A divisive clustering starts with one cluster of all data points and recursively splits the most appropriate cluster. Start at the top with all patterns in one cluster. The cluster is split using a flat clustering algorithm. This procedure is applied recursively until each pattern is in its own singleton cluster. Chipman et al[2010], proposed the hybrid hierarchical clustering approach for analyzing microarray data. A work by AzharRanf et.al [2011] had proposed a method known as K-means clustering, it calculated initial centroids instead of random selection, due to which the number of iterations is reduced and elapsed time is improved.

Aggarwal et al.[2011] proposed an algorithm called CluStream that uses a k-means approach for clustering evolving data streams. In CluStream the online–offline framework for clustering data stream is used; this has been adopted for most of the data stream clustering algorithms.

K. A. Abdul Nazeer et al. proposes k-implies calculation, for various arrangements of estimations of beginning centroids, produces various bunches. Last bunch quality in calculation relies upon the determination of beginning centroids. Two stages remember for unique k methods calculation: first for deciding introductory centroids and second for allocating information focuses to the closest bunches and afterward recalculating the bunching mean. Soumi Ghosh et al. present a near conversation of two bunching calculations in particular centroid based K-Means and delegate object based FCM(Fluffy C-Means) bunching calculations. This conversation is based on execution assessment of the effectiveness of grouping yield by applying these calculations. Shafeeq et al. present an altered K-implies calculation to improve the group quality and to fix the ideal number of group. As information number of bunches (K) given to the K-implies calculation by the client. However, in the reasonable situation, it is hard to fix the number of bunches ahead of time. The strategy proposed in this paper works for both the cases for example for known number of bunches ahead of time just as obscure number of bunches. The client has the adaptability either tofix the quantity of bunches or information the base number of bunches required. The new group focuses are processed by the calculation by increasing the bunch counter by one in every cycle until it fulfils the legitimacy of bunch quality. This calculation will survive this issue by tracking down the ideal number of bunches on the run. Junatao Wang et al.propose an improved k-means calculation utilizing commotion information channel in this paper. The inadequacies of the customary k-implies bunching calculation are overwhelmed by this proposed calculation. The calculation creates thickness based location techniques in light of qualities of clamor information where the revelation and preparing steps of the commotion information are added to the first calculation. By pre-handling the information to bar these clamor information prior to bunching information sets the bunch union of the grouping results is improved fundamentally and the effect of commotion information on kmeans calculation is diminished viably and the grouping results are more exact. Shi Na et al. present the examination of inadequacies of the standard k-implies calculation. As k-means calculation needs to figure the distance between very information article and all bunch places in every cycle. This tedious cycle impacts the effectiveness of bunching calculation. An improved k-implies calculation is proposed in this paper. A straightforward

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information structure is needed to store some data in each emphasis which is to be utilized in the following cycle. Calculation of distance in each cycle is dodged by the proposed technique and recoveries the running time. Spectral Clustering, proposed by Donath and Hoffman, is an emerging technique under graph clustering which consists of algorithms cluster points using eigenvectors of matrices derived from the data. In the machine learning community, spectral clustering has been made popular by the works of Shi and Malik. A useful tutorial is available on spectral clustering by Luxburg. The success of spectral clustering is mainly based on the fact that it does not make strong assumptions on the form of the clusters. As opposed to k-means, where the resulting clusters form convex sets (or, to be precise, lie in disjoint convex sets of the underlying space), spectral clustering can solve very general problems like intertwined spirals. Moreover, spectral clustering can be implemented efficiently even for large data sets, as long as to make sure that the similarity graph is sparse. Once the similarity graph is chosen, it just have to solve a linear problem, and there are no issues of getting stuck in local minima or restarting the algorithm for several times with different initializations. However, it have already mentioned that choosing a good similarity graph is not trivial, and spectral clustering can be quite unstable under different choices of the parameters for the neighborhood graphs. So spectral clustering cannot serve as a "black box algorithm" which automatically detects the correct clusters in any given data set. But it can be considered as a powerful tool which can produce good results if applied with care More literature (partially) on graph and spectral clustering can be seen in.

Fraley et al [2018] presents a comprehensive discussion on how to decide a clustering method and described a clustering methodology based on multivariate normal mixture models and shown that it can give much better performance than existing methods. This approach has some limitations, however. The first limitation is that computational methods for hierarchical clustering have storage and time requirements that grow at a faster than linear rate relative to the size of the initial partition, so that they cannot be directly applied to large data sets.

VI. REVIEWS ON CNN

Reddick et al[2010]. developed a pixel based two-stage approach where a SOM is trained to segment multispectral MR images. The segments are subsequently classified into white matter, grey matter, etc., by a feed-forward ANN. Nonhierarchical, modular approaches have also been developed. Fukumi et al. developed a hierarchical approach for rotation-invariant object recognition. This approach, like its predecessor, maps the image to a polar space in which rotation-invariant recognition takes place.

Mentzer et al. proposed highly effective image compression techniques and DL based image compression techniques in Internet of Things (IoT) platform. In both the cases, DNN units were used for compressing the images in different ways. The first work was implemented for high reliability compression procedures whereas the second system was implemented for handling the underwater images of IoT scenario. Both the works had been developed for training the compression models to produce reliable results. In contrast, they were lacking in error control qualities.

Wolterink et al. discussed about GAN principles and working functionalities. These literatures gave overview of GAN architectures and noise reduction mechanisms in computer tomography images respectively. These works illustrated various applications of GAN mechanisms. In the same manner, Jia et al. proposed GAN based minimal cost image compression techniques. In this image compression technique, light-field image pixels were extracted and compressed using GAN techniques. This approach helped to improve image reconstruction quality. However, these techniques were limited to certain types of images not for e-learning based heterogeneous images.

The literatures discussed in this section delivered various image compression techniques and coding techniques. Among these various techniques, BTC and GAN structures were mostly concentrated for improving image compression qualities. In contrast, these existing techniques were not extended to meet more complex image reconstruction techniques. instinctive shading spaces.

Li et al.[2009] and Yang et al. provided the details on DL based image compression techniques that were used develop deep coding and decoding models. These models were implemented to extract the image contents using deep analysis and deep training procedures. These DL based techniques used CNN and Masked CNN on image compression logics. These techniques delivered optimal results with less computation efficiency and significant error rate. These works were named as Mask Layered CNN (MLCNN) and Deep Focused CNN (DFCNN) respectively.

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As an extended contribution, Sivakumar, R.D.et al.[2011] proposed GAN based image compression models and reconstruction techniques with the help of BTC variants. In this work, GAN adapted BTC (GA-BTC) was developed to discriminate the image pixel intensities for independent blocks. This work delivered more optimal results in terms of MSE, compression accuracy rate and Signal to Noise Ratio (SNR) etc. However, this contribution can be improved using more multi-level classifiers and DLCNN approaches as illustrated in section 3. These related research contributions helped to clarify the practical possibilities of various image compression techniques depends on the domain they belong with either ML or DL strategies. In common, most of the research works were implemented on generic image databases rather than complex E-Learning databases. In this regard, this proposed work is developed to attain maximum quality and optimal image compression rates in multi-level image properties. Thus the proposed DLDCT techniques are implemented for the benefit of deep and accurate image compression environments.

Peddinti, et al [2014] providing a time delay deep neural network in the framing of the long temporal contexts utilizing the i-vector based network adaption. The time delay neural networks developed are viewed as the forerunner of the CNN ensuring a long term temporal dependencies from the short term features extracted from the image, allowing a lower layer of the network to get updated with the gradient that are accumulated over every time step of the input temporal context during the back-propagation and a speedy training by the effective selection of the sub-sampling indices. Zhang et al [2014], the convolutional neural network, which is the most common type of deep neural network employed in broader range of applications, are more efficient as they provide with the enhanced way of designing the spectral correlations in the acoustic features for an automated image recognition and the diminishing of the spectral variations, for having an computationally effective end to endimage recognition the CNN are integrated with the connection temporal classification for sequence labeling. Jaitly et al [2012], Palaz, et al [2011], the deep belief network for the pre-trained ANN/HMM for a continuous image recognition in the large vocabulary is proposed in the paper and shows much improvement in the image recognition than the GMM/HMM Manohar, et al [2017] overlapping image recognition with the acoustic Modelling utilizing the data augmentation approaches integrated with the DNN architectures, front –end image echoing, beam forming and robust i-vector extraction enables to have a considerable improvement in the image recognition than the traditional method with an diminished error rate.

The first large CNN model proposed to classify color images with a size of 227 × 227 × 3 was AlexNet (Krizhevsky, A., 2012). It has five convolutional layers, some followed by pooling layers and three fully connected layers in a total of 60 M weights, 1000× more than LeNet. The activation function adopted by AlexNet was ReLU that permitted the improvement of the convergence rate of learning and the problem of the vanishing gradient.

Howard et al [2012] the framework partitions a graph representation of the network and generates distinct bitstreams for each part of the graph to dynamically configure the FPGA. This way, it can map the network according to the area constraints of the FPGA. The on-chip memory of the FPGA is used to store intermediates results between different sub-graphs and also to cache data when running a sub-graph to avoid external memory accesses. The architecture explores inter-output and kernel parallelism. Given the area constraints associated with the design, fpgaConvNet shares MAC units to reduce required resources, which creates a trade-off between area and performance.

VII. CONCLUSION

In this paper summarizes the review of literature in the image compression techniques, with respect to the image storage in the cloud environment discussed the advantages and disadvantages in Cloud storage concept in the image compression. Indeed, CNN methods do not permit full compensation of image compression during storage and how the changes in image resize to store in the CNN in an efficient manner especially in E-learning cloud environment.

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