

Optimized Video Image Security and Compression Using DCT and Depth Hexagon Based Search (DHEXBS) Algorithm

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Abstract

Cloud innovation has enabled its clients with surprising practicality as far as boundless stockpiling, openness, and accessibility of information. It has additionally added to the huge development of computerized information. To experience this frenziedly development, information deduplication has turned into a focal approach for Cloud Storage Providers (CSPs) since it enables them to expel the indistinguishable information from their stockpiles effectively. In this paper, a novel compression plot is suggested that accomplishes a protected deduplication of images in the cloud stockpiles. Its outline comprises of inserting a halfway encryption and a one of a kind picture hashing into the combination of DCT (Discrete Cosine Transform and Depth hexagon-based search (DHEXBS) for quick block coordinating based movement estimation is proposed. The fractional encryption plot is intended to guarantee the security of the proposed conspire against a semi legitimate CSP though the image hashing plan is implied for arranging the indistinguishable compacted and encoded pictures so deduplication can be performed on them, coming about to a safe deduplication methodology with no additional computational overhead brought about for picture encryption, hashing and deduplication. Trial results and security investigation are given to approve the expressed objectives

Keywords: Cloud storage provider Data security, DCT Cosine Transform algorithm Image hashing, video compression ratio.

INTRODUCTION

With the appearance of distributed computing and its advanced stockpiling administrations, the development of computerized content has turned out to be irrepensible at both the Endeavour and individual levels. As per the EMC Digital Universe Study, the worldwide information supply achieved 2.8 trillion GB in 2012, however only 0.5% of it was utilized for different sort of investigation purposes. A similar report has likewise uncovered that volumes of information are anticipated to reach around enormous GB for each individual by 2020. Because of this dangerous development of advanced information, there is an unmistakable request from CSPs for more financially savvy utilization of their stockpiling and system transmission capacity for information exchange. In the current years, information deduplication (Computer World, 2013a) has been supported as a promising and viable method to bank the advanced space by expelling the copied

information from the server farms or mists. Information deduplication can be performed at two levels: single client and cross-client levels. At the single client level, just the copy information spared by that particular client is deduplicated. Then again, at the cross client level, the information having a place with one client are coordinated with the information of every single other client keeping in mind the end goal to recognize any copies. Despite the fact that cross-client information deduplication frequently produces higher deduplication proportions contrasted with single client information deduplication, it has been accounted for to be more appealing to CSPs as far as capacity cost (Stanek et al., 2013). Then again, in the customer side deduplication choice, the comparative information is recognized at the customer side without sending it altogether to the cloud. The server side deduplication approach for the most part brings about less computational cost contrasted with the customer side deduplication alternative. In perspective of the above examined approaches for information deduplication and considering the points of interest offered by CSPs to corporate and private clients regarding outsourcing their information, the security of information has turned into an undeniably noticeable prerequisite from both the CSP and client viewpoints. The clients of the distributed storage benefits free (Ching-Yung et al., 2000) the control of their information once these are transferred in the cloud since they never again have a physical access to them. In this way, one of the primary security challenges is in what manner can these clients guarantee that their information are kept securely in the distributed storage without hardening, change or dangers from pernicious clients. This security concern is significantly more articulated (Feng P, Xiao et al., 2012)when cross client deduplication is considered since just a single one of a kind duplicate of the repetitive information will be permitted to be kept in the distributed storage and every one of its copies will be expelled. The following literature review give the depth details of our methodology

Anitha s, 2011 [1], proposed a image compression method in light of Discrete Cosine Transform (DCT). In this procedure isolating the picture into various recurrence parts this is called "Quantization" where the genuine compression process happens in this part. DCT using the Joint Photographic Experts Group (JPEG) for compacting consistent tone picture information with pixels.

Navjot Kaur,Usvir Kaur, 2013 [2], proposed a technique called a novel sound watermarking plan, In this achieve strategy

using an Arnold change with DCT-DWT. The Audio signals are changed over into equally isolated parts by doing Discrete Wavelet Transform (DWT) and Discrete Cosine Transform (DCT) process. The sound portions were chosen from partition parts, at that point apply to the low recurrence coefficients sound fragments which were chosen amid this procedure, the arbitrary private key is utilized for more secure watermarking inserted process.

Manik Groac, Amit Garg, 2012 [3], In this procedure proposed a wavelet based picture pressure calculation utilizing Set Partition in Hierarchical Tree (SPIHT) and DCSPHIT. A cross breed blend of Discrete Cosine Transform (DCT) and SPIHT is known as DCSPHIT. In this procedure got a proficient compression system implies it will utilize littlest mean-square blunder basis, and critical Wavelet coefficients are first encoded.

Kai-Lung Hua et al., 2012 [4] a vast tree-organized word references of tilling for video compression is proposed. The principal commitment of this approach is taken a toll work utilizing rate-contortion cost work that applies an ideal working for movement video coder. It will be utilized for quick scan calculation for looking recordings. The second commitment of this procedure is encoded the specific tree structure working which makes utilization of effective math coding calculations.

V. Venubabu, M. V. Raghunadh, 2013 [5] the fundamental commitment of this examination issue is low transfer speed recordings and high bit rate determination picture or videos. This issue is correcting to utilizing the super resolution. Super resolution is only recreating a high determination picture or video using a few (low determination) low bit rate packed uproarious and obscured pictures. This procedure will be utilized for set of low determination images, De-obscuring and Spline interpolation.

M. Nagaraju Naik, P. Rajesh Kumar, 2012 [6] using the dynamic video coding issue. Settling this issue utilizing asset utilization and high information rate for quality arranged information benefit. In this procedure proposed a lower determination transmission and higher precision and a lower intricacy projection calculation is proposed. Projection calculations are a 3-D projection approach and the cubical spline projection for dyadic destruction.

N.Mages Meena, K.Thulasimani, 2012 [7] proposed a super-resolution approach using a spatiotemporal kernel regression technique in low resolution videos. The main objective of this approach is an image restoration, which is used to restore the degraded image visual information. It will be used in remote sensing, photographic deblurring, medical imaging, etc. Mohammed Mustafa Siddeq, 2012 [8] proposed an image compression technique based on the two level Discrete Wavelet Transform (DWT). DCT with the Minimize-Matrix-Size-Algorithm is used to minimize the low frequency sub-band which converts the AC-coefficient into array values. Eliminate Zeros and Store Data (EZSD) used to compress the high frequency sub-bands.

Frank Moosmann, Thierry Fraichard, 2010 [9] proposed a novel method that able to develop a dense motion based range

image. The segmentation process using segment-wise full six degree of freedom criteria. In Section 2, the proposed conspire is portrayed. In Section 3, some test comes about are given. In Section 4, we finish up our work. At last, Section 5 renders the conclusions

CONTRIBUTION OF WORK

The plan of the proposed approach for secure deduplication of pictures in the cloud includes depth segments, to be specific, image compression plot, halfway encryption conspire, and hashing plan as appeared. The delineates the stream of the information between the clients in the proposed deduplication display. Commonly, on the client's side, the client will process the image by applying compression pressure, incomplete encryption, and will ascertain the hash mark of the picture, all together. In the event that a match isn't discovered, the CSP will educate the client to transfer the picture. Something else, the CSP will refresh the picture metadata and afterward will deduplicate the picture by sparing just a solitary extraordinary duplicate. Image compression we propose to use image compression to accomplish picture deduplication. The explanation behind doing as such is that the pictures are packed in any case for productive capacity and transmission purposes. Actually, applying the compression first and scrambling the packed data next can help in sparing immense computational time and assets. As talked about over, the DCT is utilized for picture pressure since it can create an implanted piece stream from which as well as can be expected be remade expansion, it utilizes an installed coding technique which makes it a reasonable plan for dynamic ideal transmission that produces fine compression proportions. It additionally utilizes the huge data sets to decide the tree structures, and its execution depends upon the structure of the DCT calculation. The DCT calculation depends on the way that there is a relationship between's the coefficients that are in various levels of the chain of importance of the fundamental structure. It keeps up this data in the zero trees by gathering inconsequential coefficients together. Normally, every 4×4 square of coefficients in the root level of this tree structure relates to additionally trees of coefficients. Fundamentally, the DCT calculation can be broken into three stages, in particular, instatement, arranging stage, and refinement stages.

A. Discrete Cosine Transform

In Discrete Cosine Transform (DCT) based video compression, Motion Estimation (ME) utilizing a Block-Matching Algorithm (BMA) is generally utilized as a part of various movement repaid video coding approach, for example, those suggested by the H.264 and MPEG principles (Gustavo Sanchez et al., 2012) [11] to expel interframe and intraframe excess and in this way accomplish high video compression.

In Block-Matching Algorithm (BMA) current video succession outlines are partitioned into non covering square blocks. Square blocks are spoken to as pixels, say of size of the $N \times N$. BMA looks for the best-coordinated piece inside a pursuit window of size $(2W+N) \times (2W+N)$ in the past casing. Where w means most extreme permitted relocation. At that

point the similar position between the best coordinated square is spoken to as the movement vector of the looking piece. A coordinating blunder function $D_p(i, j)$ is very much characterized over every one of the positions to seek frames

$$D_p(i, j) = \sum_{x=0}^{N-1-N-1} \sum_{y=0}^{N-1-N-1} |f_t(l+x, k+y) - f_{t-1}(l+i+x, k+j+y)|^p \quad (1)$$

Where $p = 1$ or 2 and $-W \leq i, j \leq w$

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Where $f_t(l, k)$ the search block of its upper is left pixel at the arrange (l, k) in the present edge, and $f_{t-1}(l+i, k+j)$ is a next frame block of its upper left pixel at the organize $(l+i, k+j)$ in the past frame.

The DCT influenced the video to change on section and column independently (Xiaoyan Wang et al., 2014). Expect C and X means a image block and size of $N \times N$ grid speaks to the DCT framework $H = \{H[k, n]\}$

DCT is executing a math work on the first $N \times N$ matrix. It makes an interpretation of a flag into the recurrence space matrix. It connotes the segments as far as the entirety of the cosine work. A run of the typical $N \times N$ DCT matrix component can be described as appeared in Figure 1.

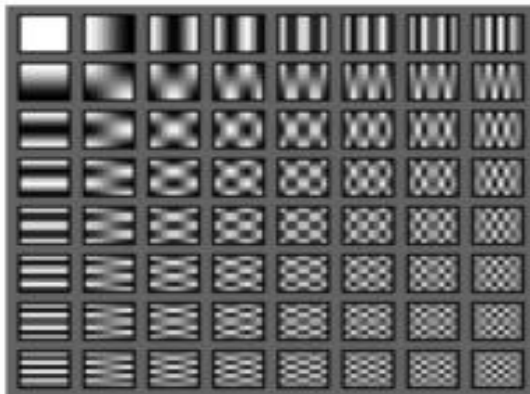


Figure 1. $N \times N$ DCT matrix in frequency domain

The following level compression of $N \times N$ DCT blocks is known as quantization. The limited arrangement of little esteems is utilizing the change procedure of ceaseless arrangement of qualities is known as quantization process. The real quantization condition as appeared as underneath

$$\text{Quantization value}(c, k) = \frac{\text{DCT}(c, k)}{\text{Quantum}(c, k)} \text{Rounded to the nearest integer} \quad (2)$$

From above equation 2, alludes that the base DCT coefficients of high-recurrence components isolated from the bigger quantum esteems settle most prominent frequencies result in the high-recurrence coefficients reality adjusted down to zero. The example grids and impacts of quantization on a DCT

matrix as appeared as Figure 1. DCT Matrix before Quantization as appeared as Figure 2(a) and DCT Matrix after Dequantization as appeared as Figure 2(b).

92	3	-9	-7	3	-1	0	2
-39	-58	12	17	-2	2	4	2
-84	62	1	-18	3	4	-5	5
-52	-36	-10	14	-10	4	-2	0
-86	-40	49	-7	17	-6	-2	5
-62	65	-12	-2	3	-8	-2	0
-17	14	-36	17	-11	3	3	-1
-54	32	-9	-9	22	0	1	3

Figure 2. Quantization Results (a) Before quantization

90	0	-7	0	0	0	0	0
-35	-56	9	11	0	0	0	0
-84	54	0	-13	0	0	0	0
-45	-33	0	0	0	0	0	0
-77	-39	45	0	0	0	0	0
-52	60	0	0	0	0	0	0
-15	0	-19	0	0	0	0	0
-51	19	0	0	0	0	0	0

Figure 3. Quantization Results (b) After Quantization

The high-recurrence districts of the matrix have the greater part of the pixel parts, have been diminished to zero, evacuating their impact on the decompressed picture. In this sense, insignificant information has been disposed of and the picture data has been compacted. After DCT based image compression, the quantization of DCT coefficients of picture shut is done. The new technique for entropy encoding is then utilized to the quantized DCT coefficients.

B. Depth Hexagon-Based Search (DHEXBS) Algorithm

DCT compression, would introduce very high computational complexity in searching process (R. Vani et al., 2014). It will be reduced by using Block-Matching Algorithm (BMA) but the time taken for this process is very high. Consider this problem, Hexagon-Based Diamond Search (HEXBDS) based inner search algorithm have been proposed to tackle this problem. Transient and spatial districts are known as spatial relationship which is very connected to its neighbouring pieces in movement vector. In HEXBDS movement vector forecast is finished by utilizing movement vector of Upper Block (UB) and Left Block (LB). It will influence utilization of expectation of Current block (CB), assembled hinder in the

past casing and zero movement vector of current frame based on the of the base Sum of Absolute Differences (SAD) esteem. For a N X N block, SAD is characterized as

Where d_i indicates remove from neighbors and x_i, y_i and x, y are the directions of neighbour I and inward point individually.

The SAD estimation of this position is used for sorting the block. Successfully using the HEXBDS inward inquiry design appeared in Figure 3. The overhead of the fast inner search is unimportant, where six increases are obliged calculations and six memory units are required to store the bends relating to the six endpoints of the hexagon. The hexagon is partitioned into six gatherings as displayed in Figure 3. In the event that one of group1, bunch 2, gathers 4 or gathering 5 has the second least SAD point, at that point just two internal directs close toward that gathering are sought. It is appeared in Figure 3 (a). On the off chance that gathering 3 or gathering 6 wins just a single point is looked as appeared in Figure 3 (b).

The searching strategy finding a fair beginning stage using the neighboring movement vectors can similarly be used in the upgraded HEXBS to diminish the amount of inquiry focuses in the coarse pursuit before the inner search. Thusly, the diminishing of the amount of look focuses for the enhanced HEXBDS calculation is required to be two perspectives.

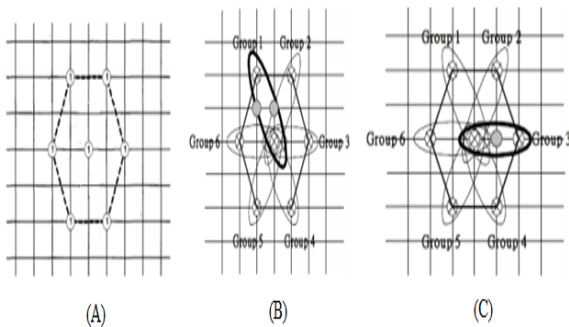


Figure 4. Hexagonal Pattern

C. Depth Hexagon-Based (DHEXBS) Algorithm

Method 1) Initial: check focuses is focused at (0,0) with extensive hexagon, the focal point of an already characterized look window in the movement vector field. In the event that the Minimum Block Distortion (MBD) point is observed to be at the focal point of the hexagon, keep on stepping iii) (Ending); generally, keep on stepping ii) (Final)

Method 2) Searching: With the MBD point in the past search venture as the middle, another extensive hexagon is framed. At that point new competitor focuses are designed, and the MBD point is again perceived. In the event that the MBD point is as yet the inside purpose of the hexagon look again framed hexagon shape, at that point go to Step iii) (Final); generally, rehash this progression consistently.

Method3) Final: Switch the search design from the huge size of hexagon to the little size of hexagon. Discover the base NGD, then he little hexagon are estimated to contrast and the

present MBD point. The novel MBD point is the last arrangement of movement vector.

EXPERIMENTAL RESULTS

A. Simulation Metrics

The proposed video compression reproductions are done on Windows stage with Intel I3-2310M at 2.10 GHz CPU and 4GB RAM. For Motion Estimation (ME) 15 Frames are utilized and the greatest piece measure is 8 X 8. In the movement estimation process, diminishing the video pressure time utilizing $\Delta PSNR$ and ΔME Time. To enhance the video encoded and decoded picture lucidity utilizing Peak Signal to Noise Ratio (PSNR). They are spoken to as in conditions (5)

$$\Delta PSNR = PSNR_{proposed} - PSNR_{original} \quad (3)$$

Where $f(M,N)$ Characterizes the present edge and $f'(M,N)$ is the reproduced outline with outline estimate as M X N. The compression proportion accomplished by lossless image compression in the proposed approach. Compression Ratio is as appeared as Figure 4. What's more, PNSR proportion is appeared as Figure 5.

B. Simulation Results

The simulation execution is utilized to three sorts of calculation which is proposed DCT utilizing Depth hexagon-based inquiry calculation in terms of image duplication and compression, Fast Step Search Motion Estimation (FSSME) and Diamond Search (DS) utilizing the accompanying test criteria: Average search point (ASP), the normal number of pursuit direct used toward discover the movement vector; and Average Mean Absolute Error (MAE) per pixel. Figures 4. The diagram demonstrates the video compression and duplication proportion is utilized for computing the pixel estimation of value factor as the proportion of N and the quantity of nonzero square DCT coefficients. The internal hunt focuses are checked, their relating bunch in comparing outlines it will be demonstrated the best outcomes utilizing Proposed DCT utilizing profundity hexagon-based inquiry calculation.

This approach ends the internal pursuit if the present least contortion (point 0) is littler than limit esteem. The edge is set to keep the video picture quality unaltered, yet additionally lessens the base amount of internal checking focuses to zero. A discrete cosine change (DCT) communicates a limited arrangement of information focuses as far as a total of cosine capacities wavering at various frequencies. DCTs are imperative to various applications in science and designing, from lossy pressure of sound and pictures, to spectral techniques numerical arrangement of halfway differential condition of cosien as opposed to sine capacities is basic for pressure, since it turns out that less cosine capacities are expected to estimated a run of the mill flag, while for differential conditions the cosines express a specific decision of limit conditions.

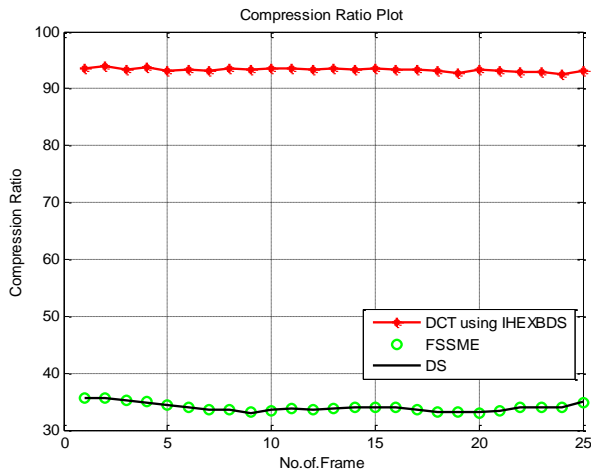


Figure 5. Performance in terms of image Duplication and Compression

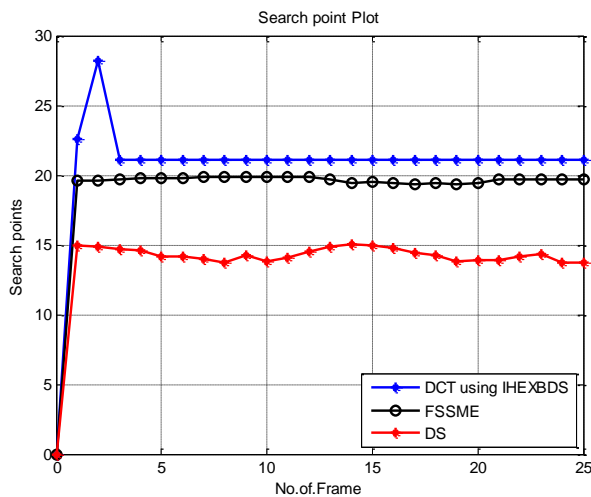


Figure 6. Performance in terms of Time

Figure 5 demonstrates the searching performance of different changed calculations, for example, proposed DCT utilizing profundity hexagon-based search calculation, Fast Step Search Motion Estimation (FSSME) and Diamond Search (DS). The quantity of inquiry focuses mirrors irrefutably the seeking pace of various calculations. The exploratory outcomes legitimize the possibility that the quick internal inquiry strategy is more proficient and appropriate for the hexagonal search design. The quick internal inquiry standards ought to be for the most part appropriate for different sorts of pursuit examples, for example, diamond shape. The better execution in both speed and precision is likewise exhibited for the new fast search algorithm.

CONCLUSION

We have introduced a novel secure picture deduplication plot through video image compression for distributed storage administrations reason. DCT based video compression utilizing Hexagonal search is proposed in this paper. It runs substantially quicker than the customary full-search method. This upgrade of searching speed depends on the quick Depth Hexagon-Based Search (DHEXBS) calculation. To maintain a strategic distance from the tedious calculations of video compression utilized a Motion Estimation (ME) utilizing a Block-Matching Algorithm (BMA). The proposed DHEXBS dependably has a quick search execution than customary. The proposed conspire is made out of two segments: DCT Compression halfway encryption. The picture hashing method permits a grouping of the indistinguishable packed and encoded pictures in light of their short marks, such that the picture deduplication step is completed efficiently. Later on, we intend to convey and test the proposed plot in a genuine distributed storage administrations setting. What's more, to additionally fortify the security of the proposed conspire; we plan to coordinate in it a proof of recovery and evidence of proprietorship conventions. The test comes about have confirmed that the above articulation, comes about demonstrates the prevalence of the DHEXBS over the other fast motion search method as far as using the minimum number of search focuses with gathering increment in distortion.

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