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RESEARCH ARTICLE

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IMAGE COMPRESSION AND DATA HIDING ON SINGLE MODULE BASED ON SMVQ AND IMAGE IN-PAINTING

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ABSTRACT

The primary point of these tasks to decrease channel data transmission and expand security in correspondence frameworks. Information covering up in our proposition is connected to accomplish the objectives of concealing the mystery information into a Side-Match Vector Quantization (SMVQ) packed picture and lossless remaking of the first picture. The mystery information is covered up in packed codes of the spread picture amid the encoding procedure of SMVQ such that the interceptors will never catch the mystery data. Together the elements of information concealing and picture pressure can be coordinated together into one single module. Complex squares are utilized here to control the visual bending and mistake dispersion brought about by the dynamic pressure.. It gives higher concealing limit and keep up the extent of the encoded picture same as that of the first picture. We utilize the first picture caught on examination with the trusted picture in applying the blend of both the worldwide and nearby elements. In our exploratory results, the picture nature of shading host picture with the mystery information installed is better contrasted and different routines. This plan has a general attractive execution for concealing limit, pressure proportion and decompression quality.

Key words—Data hiding, image compression, image in painting, side match vector quantization.

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I. INTRODUCTION

These days, most computerized substance, particularly advanced pictures and recordings are changed over into the packed structures for transmission. Another vital issue in an open system environment is the means by which to transmit mystery or private information safely. With a specific end goal to ensure correspondence productivity and spare the system transfer speed, pressure strategy can be actualized on advanced substance to lessen excess, and the nature of the decompressed adaptations ought to additionally be preserved. Even however conventional cryptographic strategies can scramble the plaintext into the figure content [1-2], the futile irregular information of the figure content may likewise excite the suspicion from the assailant. To take care of this issue, data concealing strategies have been generally created in both the scholarly world and industry, which can implant mystery information into the spread information vaguely. Because of the commonness of advanced picture on the web, how to pack pictures and shroud the mystery information into the compacted pictures proficiently merits inside and out study. Recently, numerous information concealing plans for the packed codes have been accounted for, which can be connected to different pressure procedures of computerized pictures, for example, JPEG, JPEG2000, and vector quantization (VQ). As a standout amongst the most prevalent lossy information pressure calculations, VQ is broadly utilized for advanced picture pressure because of its straightforwardness and expense adequacy in execution. Amid the VQ pressure prepares, the Euclidean separation is used to assess the comparability between every picture square and the codeword's in the codebook. The list of the codeword with the littlest separation is recorded to speak to the square. In this way, a file table comprising of the file values for every one of the squares is produced as the VQ pressure codes. Rather than pixel values, just the record qualities are put away, in this manner, the pressure is accomplished viably. The VQ decompression procedure can be actualized effortlessly and proficiently in light of the fact that just a straightforward table lookup operation is required for each gotten list. In this work, we essentially concentrate on the information implanting in VQ-related picture packed codes. An versatile information concealing technique for VQ compacted pictures, which can change the installing procedure as indicated by the measure of shrouded information. In this strategy, the VQ codebook was divided into two or more sub codebooks, and the best match in one of the sub codebooks was found to shroud mystery information. With a specific end goal to build the implanting limit, a VQ-based information concealing plan by a codeword bunching method was proposed. The mystery information were inserted into the record table by codeword-request cycle change. By the cycle method, more potential outcomes and adaptability can be offered to enhance the execution of this plan. Balanced the pre-decided separation limit as per the required concealing limit and masterminded various comparative codeword's in one gathering to insert the mystery sub message. The pursuit request coding (SOC)[6] calculation was proposed which can be used to further pack the VQ record table and accomplish better execution of the bit rate through looking adjacent indistinguishable picture pieces taking after a winding way. Some steganographic plans were additionally proposed to insert mystery information into SOC compacted codes.Side match vector quantization was composed as an enhanced form of VQ, in which both the codebook and sub codebooks are utilized to create the record qualities, barring the squares in the furthest left section and the highest column. As of late numerous scientists have considered on installing mystery message by VQ. The weighted squared Euclidean separation (WSED) was used to build the likelihood of VQ for a high installing rate. In the accompanying, we will quickly present the SMVQ based coding framework.

II. PROPOSED SYSTEM

Data embedding process:

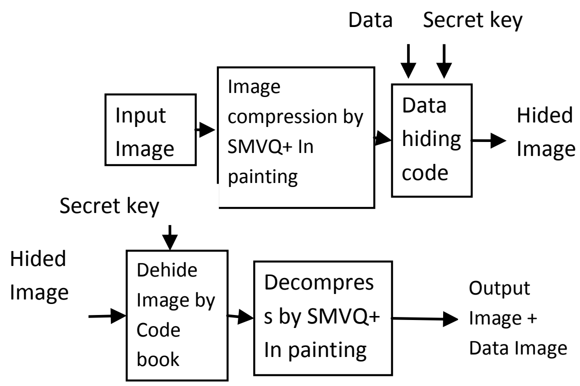

Figure 1: Block Diagram of proposed system

1. Description

Picture pressure and mystery information installing is performing in the encryption process. As an augmentation of VQ, SMVQ is create to reduce the square relic of the decompress picture and expands the pressure proportion, on the grounds that the connection of neighboring pieces is consider and files of the sub codebooks are put away. In this plan, the standard calculation of VQ is adjusted to further accomplish better decompression quality and to make it suitable for implanting mystery bits. The point by point methodology is portrayed as fallows. in this plan, the sender and the beneficiary both have the same codebook Ψ with W code words, and each codeword length is n2. SMVQ is used to direct pressure, which implies that the list esteem λ involving log2 R bits is utilized to speak to the square Bx,y in the compacted code. Since the codeword number R in sub code book Θx,y is not exactly the codeword number W of the first codebook Ψ, the length of the packed code for Bx,y utilizing SMVQ must be shorter than utilizing VQ. The utilized picture as a part of painting procedure is depicted in the following subsection nitty gritty. At that point, the compacted codes of all picture pieces are connected and transmitted to the beneficiary side.

Picture decompression and mystery information extraction is performing in the unscrambling procedure. Subsequent to getting the decompressed codes, the recipient leads the decompression procedure to get the translate picture that is outwardly like the first uncompressed picture, and the installed mystery bits can be removed either before or amid the decompression process. Since the (M +N − n)/n hinders in the furthest left and highest of the picture should be utilized as a part of the decompression for other leftover pieces, they ought to be initially decompressed by their SMVQ lists recovered from the picture compacted codes. Each SMVQ file of these pre-decompressed pieces involves log2 W bits. At that point, the k - (M + N − n)/n leftover squares are prepared piece by piece in raster-checking request and mystery bit extraction for every lingering square. To lead the decompression and mystery bit extraction of every leftover piece, the compacted codes are fragmented into a progression of areas adaptively as per the pointer bits. On the off chance that the present pointer bit is 1, this marker piece and the accompanying log2 (R + 1) bits are then fragmented as a segment, which implies this area relates to a SMVQ compacted square. In the wake of extricating a mystery information, picture edge based consonant in painting strategy is utilized for remaking lost or crumbled parts of the pictures Therefore, other than the picture pressure, the proposed plan can accomplish the capacity of information concealing that can be utilized for undercover correspondence of mystery information.

The sender can transmit the mystery information safely through the picture compacted codes, and the collector can separate the concealed mystery information successfully from the got packed codes to finish the procedure of incognito correspondence. Also, in light of the fact that the mystery information extraction in our plan can be led freely with the decompression handle, the beneficiary can get the mystery bits whenever on the off chance that he or she saves the packed codes. The proposed plan can likewise be utilized for the respectability verification of the pictures, in which the mystery bits for implanting can be viewed as the hash of the picture standard substance. The beneficiary can compute the hash of the standard substance for the decompressed picture, and after that contrast this ascertained hash and the removed mystey.

2. IMAGE COMPRESSION TECHNIQUE

Picture pressure is diminishing information required measure of memory. Picture pressure is diminish bit rate and it is two systems one is lossless picture pressure and on other on is lossy pressure procedures. Lossless picture pressure is uproot the measurable repetition and distinguish bits are decrease without loss of data. Lossy pressure method is decrease recognize superfluous data and misfortune some little measure of data

A lossy pressure strategy accomplished by compacting a scope of qualities to a solitary quantum esteem. At the point when the quantity of discrete images in a given stream is decreased, the stream turns out to be more compressible. For instance, decreasing the quantity of hues required to speak to an advanced picture makes it conceivable to lessen its record size. Particular applications incorporate DCT information quantization in JPEG and DWT information quantization in JPEG 2000.

In our plan, the sender and the beneficiary both have the same codebook _ with W code words, and each codeword length is n2. Mean the first uncompressed picture measured M × N as I, and it is partitioned into the non-covering n × n pieces. For effortlessness, we accept that M and N can be isolated by n with no leftover portion. Indicate all k partitioned obstructs in raster examining request as Bi, j, where k = M × N/n2, i = 1,2, . , M/n and j = 1,2, .N/n. Before being installed, the mystery bits are mixed by a mystery key to guarantee security. The squares in the furthest left and highest of the picture I, i.e.,Bi,1(i = 1, 2, . . . , M/n) and B1, j (j = 2, 3, . . . , N/n), are encoded by VQ specifically and are not used to implant mystery bits. The leftover pieces are encoded dynamically in raster filtering request, and their encoded strategies are identified with the mystery bits for inserting and the connection between's their neighboring squares. The square graph of the handling for every remaining pixels.

3. SIDE MATCH VECTOR QUANTIZATION

Since side match vector quantization (SMVQ) gives better picture nature of recreated picture and pressure bit rate than vector quantization (VQ) does, it gets to be another decision to pack the transmitting pictures when the transfer speed is restricted. To extend the spread media for transmitting classified data, we propose a novel information concealing plan which implants mystery information into the SMVQ-packed picture. As far as the payload limit, the visual quality, and the pressure rate, exploratory results affirm that the exhibitions of our plan are superior to anything that of other data concealing plans for VQ-based and SMVQ-based packed pictures. Also, the installed mystery information can be removed from the stego-picture without referencing the first cover picture.

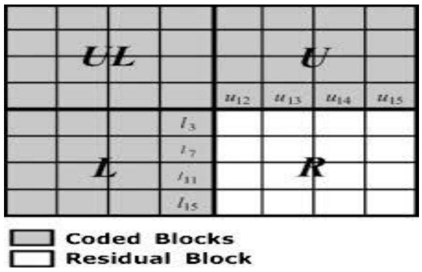

Figure 2: Code block and residual block

Side match vector quantization provide

Change original seed blocks. More seed blocks or "cross" blocks. Then residual blocks can be recovered by comparing with sides of its upper, right, down, and left blocks.

1. We recover every residual blocks in advance. Compare with corresponding blocks in original image. When its distortion is over predetermined threshold, then encode the block in usual way.
2. The SMVQ algorithm tries to make the gray level transition across the boundaries of the vectors as soon as possible

4.SMVQ FOR IMAGE CODING

4.1 Encoding process

As mentioned in previous section, SNVQ takes advantage of both the redundancy within a block and strong correlation between the neighboring blocks for high quality image coding at low bitrates. The original SMVQ encodes each image block by a small-sized state codebook generated from a master codebook using a side match selection function as shown in figure 1. Assume that the master codebook has N code words with each code word as $m \times n$ vector denoting by Ci. i=1, 2,….,N. Also assume that the image to be encoded is partitioned into blocks of size m × n. SMVQ encodes the image blocks in an order from left to right and top to bottom. For each block being encoded , SMVQ uses the side information of its upper and left neighboring blocks to produce the state codebook. The block is encoded as the index of the code word in the state code book which is the best match to the block.

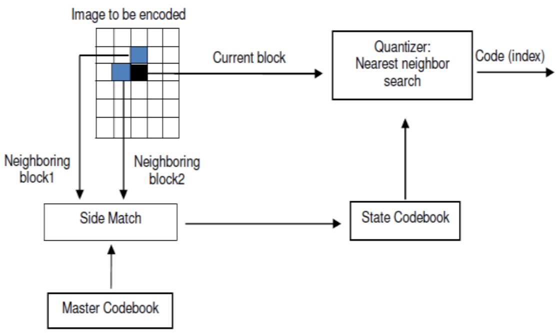

Figure 3: Block diagram of SMVQ encoder

4.2 Decoding process

For the decoding of each image block, SMVQ first generates the state codebook which was used to encode it according to step (1) and (2) in the encoding process.

Once the state codebook is generated, the reconstructed block is obtained by simply selecting the corresponding codeword in the state codebook using the index which is the code of the block generated in the encoding process. The block diagram of SMVQ decoder is shown in Figure.

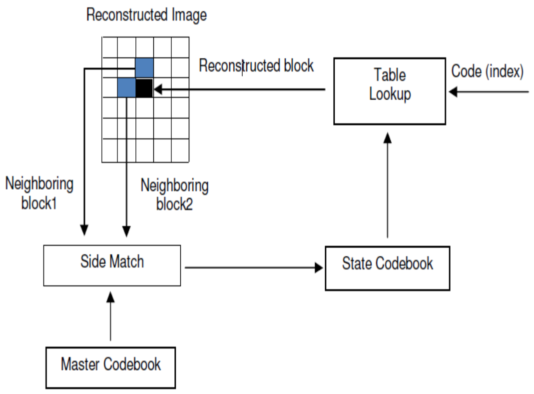

Figure 4 : Block diagram of SMVQ decoder

5. DATA HIDING

Data hiding, a form of steganography, embeds data into digital media for the purpose of identification, annotation, and copyright. Several constraints affect this process: the quantity of data to be hidden, the need for invariance of these data under conditions where a "host" signal is subject to distortions, e.g., lossy compression, and the degree to which the data must be immune to interception, modification, or removal by a third party. In explore both traditional and novel techniques for addressing the data-hiding process and evaluate these techniques in light of three applications: copyright protection, tamper-proofing, and augmentation data embedding.

Data hiding is a software development technique specifically used in Object oriented Programming (OOP) to hide internal object details. Data hiding is reducing system complexity and the robustness by limiting interdependencies between software components is increased data hiding is also encapsulation or information hiding.

***5.1 Data hiding in still images*:**

Data hiding in still images presents a variety of challenges that arise due to the way the human visual system (HVS) works and the typical modifications that images undergo. Additionally, still images provide a relatively small host signal in which to hide data. A fairly typical 8-bit picture of 200 × 200 pixels provides approximately 40 kilobytes (kB) of data space in which to work. This is equivalent to only around 5 seconds of telephone-quality audio or less than a single frame of NTSC television. Also, it is reasonable to expect that still images will be subject to operations ranging from simple affine transforms to nonlinear transforms such as cropping, blurring, filtering, and lossy compression. Practical data-hiding techniques need to be resistant to as many of these transformations as possible.

Figure 5 : Example of Data hiding in still images

6. IMAGE IN PAINTING

In-painting is used to reconstruct the lost and remove small regions or small defects and also define image in-painting as image and video or audio interpolation. In basic image in-painting is referring to the sophisticated algorithm.

In our scheme image in painting is ancient technique and it is repair valuable art work an un detectable manner. Digital use in painting repairing damaged part of photography or films and removing chosen areas and wiping of visible watermarks.

Applications of image in-painting cinema and photography is used for film reconstruction for reveres distortion e.g. cracks in photographs or dust spots in film and scratched.

The image in-painting is very ancient technique; it is manually repairing valuable artwork in an undetectable manner. Image in painting is used to repairing the damaged photographs and digital images. The image in-painting method is usually depends upon the partial differential equation (PDE) method. Partial differential equation based methods interpolation based methods and patch based method. In this several mathematical physics models that can be used for PDE based method. The field of isophote is defined as:

$$\nabla^{\perp} B_x(\xi,\eta) = \left(-\frac{\partial}{\partial \xi} i + \frac{\partial}{\partial \xi} j\right) B_x(\xi,\eta),$$

Having finished the in painting process, $\nabla^{\perp} B_x(\xi,\eta)$should be normal to the gradient of the smoothness $B_x(\xi,\eta)$.

III. EXPERIMENTAL RESULTS

In the experiment, the sizes of the divided non-overlapping image blocks were 4x4, i.e., n=4. Accordingly, the length of each codeword in the used SMVQ codebook was 16. The parameter R was set to 15. Six standard, 512 x 512 test images, i.e., Lena, Peppers, Lake, Airplane, Sailboat, Tiffany are shown in fig2. Besides these six standard images, the uncompressed color image database that contains 1338 various color images with sizes of 512 x 384 was also adopted. The performances of the compression ratio, compression quality, and hiding capacity for the proposed scheme were evaluated. Because the threshold T used in the procedure of the image compression and secret data embedding is closely related to the compression method for each residual block and also influences on the performance of the proposed scheme, testing for different values of T was conducted in the compression and secret embedding procedure. The Results are shown in below figure.

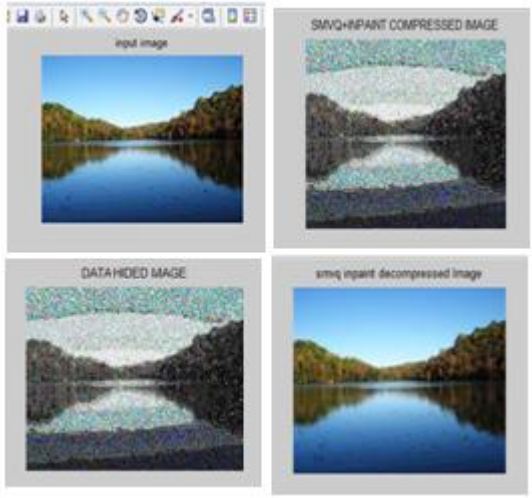

Figure 6: Lake experimental results

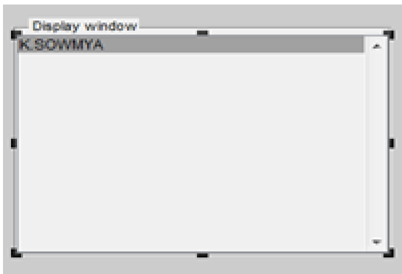

Figure 7: Text display window

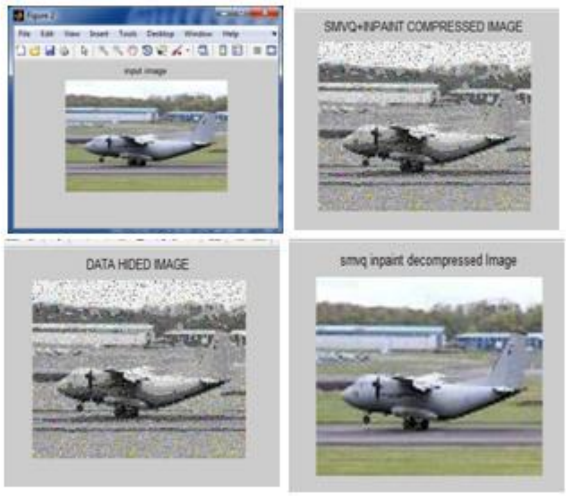

Figure 8: Airplane experimental results

IV. PERFORMANCE EVALUATIONS OF PROPOSED SYSTEM

TABLLE 1 : Performance evaluation of Lake image with different sizes

	W=256		W=512		W=1024	
	PSNR	CR	PSNR	CR	PSNR	CR
VQ	30.40	16.0	31.13	14.1	31.67	12.80

		0		2		
SMVQ	40.77	24	40.72	30	40.73	48

TABLLE 2 : Performance evaluation of Airplane image with different sizes

	W=256		W=512		W=1024	
	PSNR	CR	PSNR	CR	PSNR	CR
VQ	29.81	16.00	30.62	14.12	31.14	12.80
SMVQ	43.28	19.92	43.95	25.69	43.95	56.23

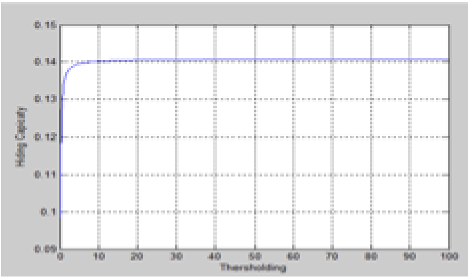

Figure 9: Average performances of Hiding Capacity and Thresholding

IV .CONCLUSION

In this propose a novel approach for efficient implementation of data-hiding and compression scheme by using Side match Vector quantization and image edge based harmonic in-painting. The blocks of the image that is leftmost and top most excluded and residual block can also embedded, and the adopted compression method SMVQ according to the embedding bits. In the segmented section receives embedded bits and compressed codes into a series of sections by the indicator bits, the embedded secret bits can be easily extracted according to the index value and the decompression for all blocks can be achieved successfully by SMVQ and image in-painting. The experimental results show that our scheme has the satisfactory performances for Communication systems.

VI.REFERENCES:

[1]. National Institute of Standards & Technology, —Announcing the Advanced Encryption Standard (AES), Federal Information Processing Standards Publication, vol. 197, no. l, 2001.

[2]. R. L. Rivest, A. Shamir and L. Adleman, —A Method for Obtaining Digital Signatures and Public-Key Cryptosystems, Communications of the ACM, vol. 21, no. 2, pp. 120-126, 1978.

[3]. P. C. Su and C. C. Kuo, —Steganography in JPEG2000 Compressed Images, IEEE Transactions on Consumer Electronics, vol. 49, no. 4, pp. 824-832, 2003.

[4]. H. W. Tseng and C. C. Chang, —High Capacity Data Hiding in JPEG- Compressed Images, Informatics, vol. 15, no. 1, pp. 127-142,2004.

[5]. Y. C. Hu, —High-Capacity Image Hiding Scheme Based on Vector Quantization, Pattern Recognition, vol. 39, no. 9, pp. 1715-1724, 2006

[6]. C. C. Lee, W. H. Ku and S. Y. Huang, —A New Steganographic Scheme Based on Vector Quantization and Search- Order Coding, IET Image Processing, vol. 3, no. 4, pp. 243-248, 2009.

[7]. C. C. Chen and C. C. Chang, —High Capacity SMVQ Based Hiding Scheme Using Adaptive Index, Signal Processing,

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