Copyright Protection Technique in Images Based on DCT Compression and DWT

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Abstract- Info trade over web is expanding definitely step by step. All multimedia data is in computerized framework. To shield the multimedia system information from unlawful control and give authenticity, procedures for duplicate right protection and content authentication of digital media is required. Computerized watermarking is one of the techniques for protection and identification that covers up authentic watermarks in multimedia information for example, picture, audio and video. Keeping the above given importance of steganography, DCT and DWT based method is explained. Selection of Frequency domain method having various advantages like high robustness and security of the all others methods. Proposed method having high value of PSNR and low value of BER (Bit Error Rate).

Keywords- *Data hiding, Steganography, BER, DCT, DWT, PSNR.*

I. INTRODUCTION

Mechanized watermarking is one of the techniques for protection and identification that spreads up authentic watermarks in multimedia data for instance, picture, audio and video. This paper indicates watermarking of shading pictures in wavelet territory. Sending picture in a plain shape has a high danger for the data being helpless against take. Therefore, on account of diminishing the danger, data security systems should be realized. Data security techniques ought to be conceivable using Cryptography and Steganography. In light of the composition, the blend of cryptography and steganography can enhance happens. Cryptography as one of science in information security, which used as a piece of the technique of securing picture. Our exploratory results were assessed using Mean Square Error (MSE), Bit Error Rate (BER) and Peak Signal to Noise Ratio (PSNR).

II. RELATED WORKS

This kind of paper displays a fresh DWT contrast based stenographic strategy in change area. In this method first select the 8x8 DWT coefficients of the cover image. After taking discrete wavelet transform of the cover image selected 8x8 DWT coefficients had been divided in four seed coefficients and 3x3 neighborhood is chosen as the legitimate implanting region. For each seed prevent the DWT contrast between a couple of nearby pixel is figured. Number juggling activity is additionally connected to outline match of double bits relying upon the registered distinction. The proposed framework has been widely tried on an assortment of pictures with various surfaces. Evaluation happens show that the proposed framework effectively helps you to save the size of the pictures and remains undiscovered by the notable steganalysis techniques. Extraction process is impervious to pressure and various picture assaults and should be possible without the nearness of unique cover picture. [1]

Della Baby et al proposed noble method based on DWT using Haar window. In this method author decomposed secret image and cover image in three level using DWT. This work suggests a data securing approach that is employed for camouflaging multiple color images in to a single color image using discrete wavelet transform. The color image divided in three plane and key image embedded directly into RGB planes. Here, the stego image obtained has a less perceptible changes compared to the original image with high overall security. The result was compared using various parameters like PSNR and SSIM. The highest value of PSNR and SSIM was 56.39 and 0.8753 respectively. [2]

Another capable technique for non-dazzle picture watermarking is proposed in this paper. The exhorted procedure is performed by alteration on solitary esteem disintegration (SVD) of pictures in Complex Wavelet (CWT) space while CWT gives higher limit than the genuine wavelet Transform. Change of the right sub-groups causes a watermarking framework which positively safeguards the quality. The extra fortunate thing about the proposed method is its heartiness against the all of regular assaults. Assessment and exploratory outcomes indicate much enhanced execution of the proposed technique in correlation with the honest to goodness SVD-based and in addition mixture strategies (e. g. DWT-SVD as the current best SVD-based plan).

Double Tree-Complex Wavelet Transform (DT-CWT) has been acquainted as an intense approach with change invariant properties. This change gives fundamentally better directional selectivity when it utilizes the multi-dimensional flag separating. [3]

While recurrence based steganography has higher PSNR (top flag to commotion proportion) and is more ensured however it is more secure yet more mind boggling and requires more figurings. The LSB have value in the byte approximation of the image pixel. The LSB based image data hiding technique hides the secret information at all noteworthy bits of pixel approximation of the cover image (CVR). For above given technique of LSB based, the author computed the three measurements and got the important qualities like: BER=0.0625, PSNR=51.1dB. Not only for LSB but for other bit plane, the tree parameters were calculated. [5]

In this segment, we characterize the parameter of execution, portray the Least Significant Bit Algorithm, Discrete Cosine Transformation to acquire stego-picture, quantization, and runlength coding for pressure with illustrations. Here, the cover picture is a transporter of installed picture; concealed picture is a picture to be implanted in the cover picture and transported. LSB calculation is utilized to shroud a picture in a cover picture. Stego-picture is the mix of cover picture and shrouded picture. DCT is utilized to change over stego-question in spatial space into stego-picture in recurrence area. Quantization and runlength coding is connected for the pressure of stegoimage for improved security. The switch procedure is done at the recipient end, where the concealed picture is recovered from the encoded stego-picture utilizing the converse change methods like Decompression, encoding of runlength, dequantization and opposite DCT(IDCT). In this technique the BER is changing from 2.78 to 8.35 rate. [6]

Here a method utilizing DWT with Coding is executed. DWT changes over picture into recurrence space which builds heartiness and Predictive Coding chooses legitimate area to high watermark which expands indistinctness without debasing picture quality. At last, Arnold Transform (AT) is utilized to scramble watermark which additionally upgrades security of watermark and in addition watermarking plan. Trial comes about show much preferred outcomes over past plans in the two cases without Arnold and with Arnold. The author got different result with AT PSNR is 76.75dB and Normalized Correlation is 0.80 and without AT gives peak signal to noise ratio 76.70dB and Normalized Correlation 0.96. [7]

III. THE PROPOSED METHOD

Data Hiding Algorithm
1. Take Secret Image as Data(Fig-1)
2. Compress above Data using DCT transform (up to 52dB) (Fig-1)
3. Take mean of DCT coefficients of step 2
4. Select cover image (Fig-2)
5. Calculate 2-level DWT of cover Image and select Vertical Detail matrix for data hiding
6. Take mean of Vertical Detail matrix in above step and Decompose Coefficients in 8×8 Matrix
7. Take mean of above 8×8 matrix of confidents
8. Take ratio of quantities in step 7 and step 3(Scaling Factor)
9. Take DCT coefficient matrix in step 2 and divide this matrix with the ratio calculated in above step
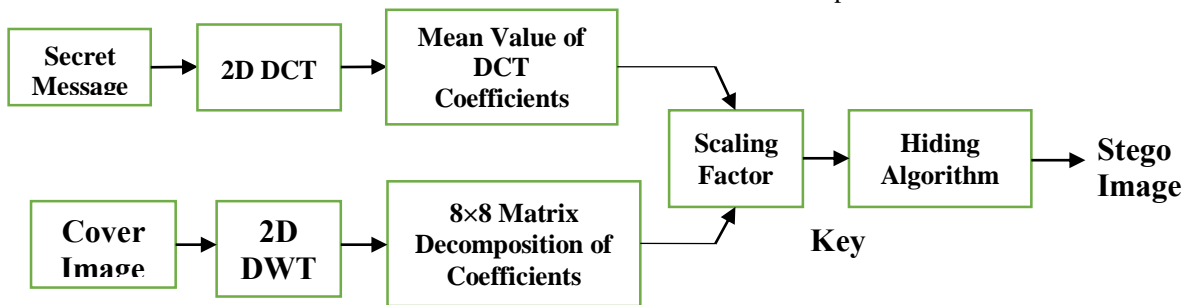10. Hide above found matrix directly in Vertical Detail matrix of step 5

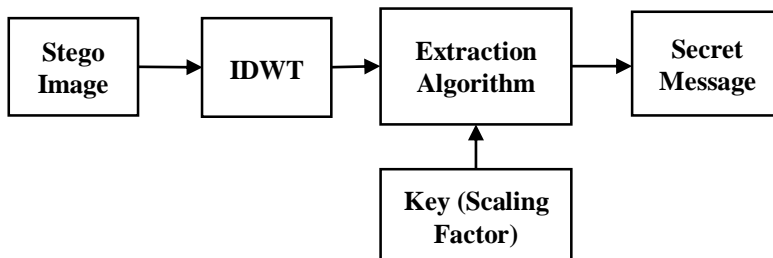**Fig1:** Algorithm for Data Hiding

Fig. 2. Algorithm for Data Extraction

Data Extraction Steps
1. Take stego Image
2. Calculate 2-level DWT of the stego image
3. Extract DCT coefficient from Vertical Detail Matrix
4. Multiply above found coefficient with the ratio found in Data Hiding steps 8 (Scaling Factor)
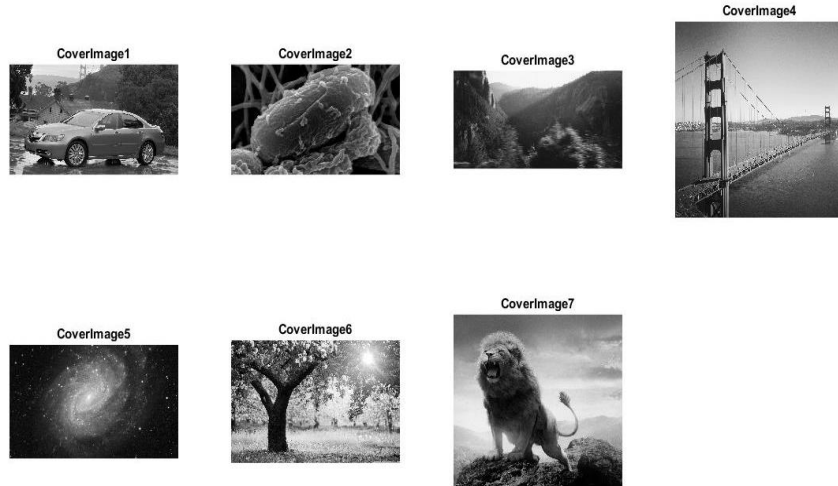5. Take IDCT of above extracted image

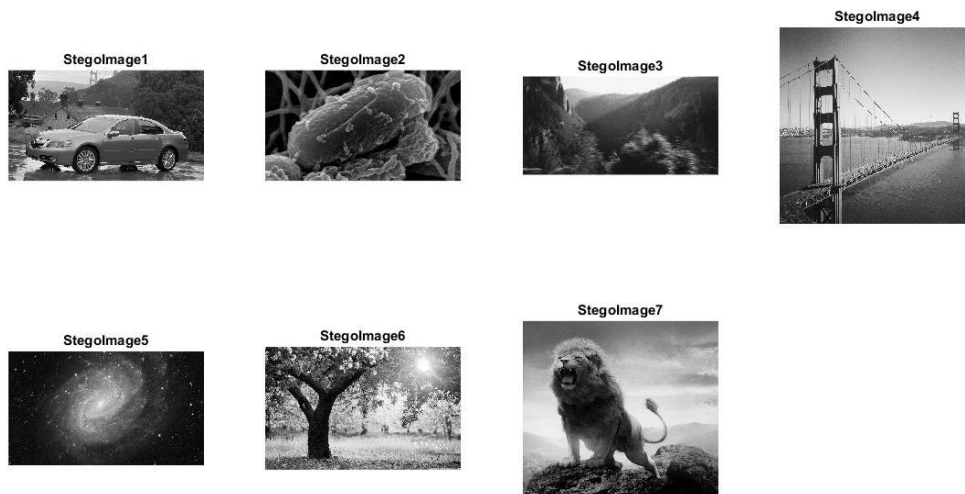Fig3: Original Cover Image Taken for Data Hiding

Fig4: Stego Image after Data Hiding

IV. NOISE ANALYSIS AND EXPERIMENTAL RESULT

Mean Square Error (MSE) and Peak Signal to Noise Ratio are two parameters for quality measure and their corresponding equations are also given below. [9] Consider two images, x (a, b) and y (a, b) of M×N dimensions. The formula for mean square error is [2]

$$MSE = \frac{1}{MN}\sum_a\sum_b[x(a,b) - y(a,b)]^2$$

$$PSNR = 10\log(\frac{255}{\sqrt{MSE}})$$

There are seven images image selected for this paper and result in given table shown below
                 Bit Error Rate (BER)-

S. No.	Cover Image	PSNR(dB) of Cover Image	BER of Cover Image
1	CoverImage1	103.8771	0.0821
2	CoverImage2	122.1358	0.0737
3	CoverImage3	158.0479	0.0726
4	CoverImage4	104.0809	0.0743
5	CoverImage5	142.1394	0.0830
6	CoverImage6	115.8155	0.0834
7	CoverImage7	122.8279	0.0736

Table 1. Experimental Result of Various Cover Images

S. No.	Secret Image	Cover Image	PSNR(dB) of Secret Image	BER of the Secret Image
1		CoverImage1	573.3698	0.1422
2		CoverImage2	624.8272	0.1169
3		CoverImage3	624.1941	0.1174
4	SecretImage	CoverImage4	645.4819	0.1090
5		CoverImage5	657.1742	0.1042
6		CoverImage6	606.0510	0.1294
7		CoverImage7	603.3759	0.1248

Table 2. Experimental Result of Secret Images after Data Extraction

V.   CONCLUSIONS

The PSNR and BER calculated in all cases for the comparison. The experimental result showing very good result. For any method to be good based on various parameters the PSNR should be high and BER should be minimum.

VI.   REFERENCES

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