

High PSNR Based Image Steganography

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Abstract:- In recent time, the Steganography technique is broadly used for the secret data communication. It's an art of hiding the secret data in another objects like videos, images, videos, graphics and documents to gain the stego or steganographic object so which it's not affected by the insertion. In this paper, we are introducing a new methodology in which security of stego-image increase by embedding even and odd part secret image into R, G, B plane of cover image using LSB and ISB technique. As we can see from the results session the value of PSNR, NCC are getting increase while the value of MSE is getting decrease.

Keyword :- *Steganography, Fusion process, DWT, IWT, Arnold Transform, Color space.*

I. INTRODUCTION

The steganography technique is a effective and fantastic method of data hiding data which has been utilized throughout the history. The networking and technological development have posed the serious threats to gain secured communication of data. The word 'steganography' is the result of Greek words "stegos" and "grafia". Where, "stegos" means "cover" and "grafia" means "writing". Combining them defines as the "covered writing". In the steganographic image the data information is hidden in to the cover images.

II. RELATED WORK

The related work has conducted on the DWT (Discrete Wavelet Transformation) that combined with an IWT (Integer Wavelet Transformation) for to hide secret image data in the digital images especially color images. The powerful DWT numerical analysis which is greatly applied to the application of digital image is introduced initially. At next the combination of IWT and DWT depended on steganography scheme described briefly.

The researcher NilanjanDey[1] has proposed the technique of steganography for hiding the multiple images in the color image depended on DCT and DWT. The technique provides the satisfactory value of PSNR in order to establish the work robustness. Only selected HF elements are changed for the hiding method, so there should be constraint on a secret size of image. The researcher K B Raja[2] suggested the technique of dual transform for robust steganography to establish secure and secret communication. Certain technique corresponded correction coding and error detection technique to enhance robustness that has efficient PSNR with the high security levels.

The researcher Gautom Sanyal et.al[3] suggested the novel approach to create the secure image depending on the steganography model by employing IWT. An experimental result of them illustrates an integrated way of combined IWT, the changed LSB and techniques of segmentation through the secure transfer. The researcher Sushil Kumar et.al[4] described the multilayered, robust, high capacity and secure image with the steganography algorithm. Particular algorithm gained three security layers, which is better in provisions of embedding capacity, robustness and

imperceptibility. The researcher JanKodovsky et.al[5] functioned out certain design principles as well as the steganographic components scheme for their security as well as the JPEG format.

Vijay Kumar [6] described the scheme, which combines DCT and DWT. Their result of experimentation enhances the steganography scheme performance in the terms of a PSNR value, a better performance with the better visual quality. The researcher K. B Raja [7] suggested WNLSB (Wavelet-based NON LSB) steganographic algorithm. The algorithm that suggested here is robust since a payload is encrypted with the transform cover image with better value of PSNR. The researcher Ali Al-Ataby suggested changed high-capacity technique of image steganography which depends on the WT (Wavelet Transform) with acceptable imperceptibility level and the cover image distortion with entire high-level security. Researcher Tanmay Bhattacharya [9] proposed a steganographic technique based on DWT. The technique gained the acceptable imperceptibility levels because of strong aspects of security. Researcher K. B. Shivakumar [10] suggested regarding the comparison of performance of multiple transformation depended robust steganographic techniques. Certain technique ensures maximum security than the individual techniques of transformation that has the great PSNR with the high-level security. Researcher Juned Ahmed Mazumder et al [11] suggested the Secured Color and High Capacity technique of Image Steganographic by using DWT (Discrete Wavelet Transformation). The Capacity and MSE are enhanced with the satisfactory PSNR value. Researcher NilanjanDey [12] proposed the "Novel Approach of Color Image Hiding by using DWT and R-G-B Color planes. The generated stego image is with acceptable imperceptibility level as well as the distortion contrasted with cover image and entire security is found to be high.

In paper [13], Prabakaran G[et.al] present the DWT/IWT based Image Steganography. They provide the High PSNR for the DWT/IWT based Image Steganography. In paper [14], Md. Rashedul Islam[et.al] present the LSB based Image Steganography. For improve the performance of the Image Steganography, Status Bit along with AES Cryptography methodology is using. In paper [15], Praneeta

Dehare[et.al] present LSB Substitution method for Image Steganography by using Five Modulus Method (FMM).

III. PROPOSED METHODOLOGY

In order to raise the stego-image security by embedding the odd and even part of secret image into the R-G-B plane of a cover image by using ISB and LSB technique. The suggested algorithm may improve the stego-Image PSNR value. The suggested algorithm will improve available ISB and LSB method so which we are able to gain high security and high capacity of suggested system.

A. Embedding Process

Step 1: Take Secret image and Cover image from the standard database.

Step 2: The pixel shifting Matrix reordering functions on the secret image.

Step 3: Reordered the secret image that partitioned in odd and even part as well as the Cover image partitioned into the RGB plane.

Step 4: An even part that embedded into the G-plane by using the LSB technique and the odd part get embedded into the R-plane by using the ISB technique.

Step 5: Entire R-G-B plane concentrate and then get the stego- image.

Step 4: In this step apply LSB at the G part of Cover image as well as R part of Stego Image.

Step 5: Apply ISB at the G part of Stego Image as well as R part of Cover Image.

Step 6: Now, just take the Even LSB Part and Odd ISB part and add.

Step 7: Get an Extracted Secret Image.

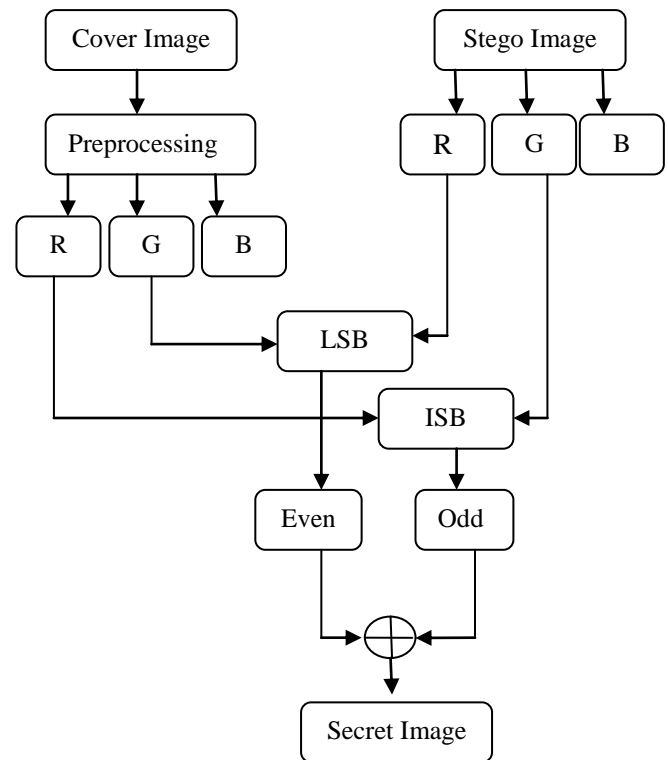


Fig 4 . Steganography Extraction Process

A. Preprocessing

The method of Pre-processing utilizes the small pixel at neighborhood in the input image to acquire a new value of brightness in image output. Entire image pixels in the spatial domain are usually multiplexed by encrypting the strength factors beta or alpha. The image preprocessing are usually deals when the fusion get functioned. The image get misaligned registration that used to set up the spatial correspondence in between all sensor images as well to determine the spatial transformation of geometric known as wrapping that aligns images.

B.ISB (Intermediate Significant Bit)

In this methodology, Cover Image and Secret Image (or Data) will be in Binary values. Binary Values of Secret Image Pixel will convert into unsigned integer Values. For Hide the Data into Cover image Logic Or Gate operation will perform in between bits of Cover Image and Secret Image.

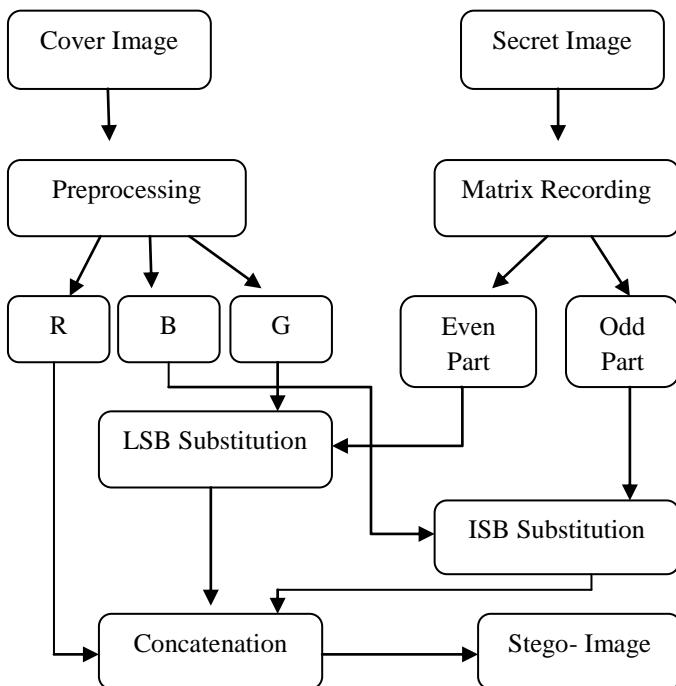


Fig 3. Steganography Embedding Process

B. Extraction Process

Step 1: Pre-process the Cover Image.

Step 2: Convert a pre-processing Cover Image into the R, G & B.

Step 3: Transform a Stego Image into R, G and B (three parts).

00011000	01010010	10101010
10101110	10010101	11010110
00110011	01010101	10010111

(Cover Image)

Logic OR Operation

11110000	01011111	11110010
01010110	10101001	01011010
00001100	01010110	01101010

(Secret Image or Data)

Fig 5. ISB (Intermediate Significant Bit) Process

Figure 5 is showing the Steganography process for the ISB (Intermediate Significant Bit) methodology. Cover image and Secret Image bits values perform Logic OR gate Operation among all the Bits of Cover Image and Secret Image.

C. LSB (Least Significant Bit)

In the First Process, Cover Image last bit will perform for a Masking. In the masking process, convert the "11111111" bits into Decimal. Now apply one bit shift into left side. Logic AND Gate operation will perform in the Original Bits and Shifted bits of masking.

Logic AND Gate operation will perform again in between Cover Image bits and Masking Bits. Mask Cover Image bits perform OR Logic Gate operation with Hidden Image.

IV. RESULTS

In the Result session, we will show the results of Image Steganography by DWT/IWT methodology and proposed methodology.



Fig 6. Original Cover Image

Figure 6 is showing the Original cover Image in which secret image will hide.



Fig 7. Secret Image

Figure 7 is showing the Secret Image which we have to hide in the Original Cover Image.



Fig 8. Proposed Stegno Image

Figure 8 is showing the Stegno Image in which secret image is hidden.



Fig 9. Retrieved Secret Image

Figure 9 is showing the Retrieve Image after complete the Steganography Process.

Table I . Comparison Table

	MSE	PSNR	NCC
DWT/IWT Methodology	0.02	32.93	0.75
Proposed Methodology	0.01	40.51	0.83

Table I is showing the comparison of MSE(Mean Square Error) , PSNR(Peak Signal To Noise Ratio) and NCC(Normalized Cross - Correlation) for the DWT/IWT Methodology and Proposed Methodology . As we can see that PSNR and NCC are increasing for the Proposed Methodology as compare to DWT/IWT Methodology .

V. CONCLUSION

In this paper , we are improving the performance of the Image Steganography . For improve the performance, we show three parameters PSNR , MSE and NCC . PSNR ,NCC is getting increase and MSE is getting decrease for the Proposed Methodology as compare to DWT/IWT Methodology .

REFERENCES

- [1] Tanmay Battacharya, NilanjanDey and Bhadra Chauduri S.R., "A Session Based Multiple Image Hiding Technique using DWT and DCT", InternatlOnal Journal of Computer Applications, vol 38(5), pp. 18-21 , 2012.
- [2] Bhattacharyya S , Kshitij A P and Sanyal G, "A Novel Approach to Develop a Secure Image based Steganographic Model using Integer Wavelet Transform", International Conference on Recent Trends in Information, Telecommunication and Computing, pp. 173-178, 2010.
- [3] K B Shiva Kumar and Khasim T, K B Raja, "Dual Transform Technique for Robust steganography", International conference on Computational Intelligence and Communication Systems, pp. 173-178, 20 II.
- [4] Mutoo S.K. and SushilKumar , "A Multilayered Secure, Robust and High Capacity Image Steganographic Algorithm", World of Computer Science and Information Technology Journal , vol 6 , pp . 239-246 , 2011 .
- [5] Jan Kodovsky, Jessica Fridrich "Influence of Embedding Strategies on Security of Steganographic Methods in the JPEG Domain" Proceedings of SPIE, the international Society for Optical Engineering, vo1.6819, 00.681902.1-681902.13,2009.
- [6] V.V. Das, R. Vijaykumar and Dinesh Kumar, "Digital Image Steganography Based on Combination of DCT and DWT", ICT,CCIS 101, 00.596-601,2010.
- [7] Sabyasachi Pattnaik, R K Chhotaray, K B Raja and K B Shiva Kumar, "Performance Comparison of Robust Steganography Based on Multiple Transformation Techniques", International Journal on Computer Technology Applications , vol 2(4) , pp . 1035 - 1047 , 2011.
- [8] Ali Al-Ataby and Fawzi Al-Naima, "A Modified High Capacity Image Steganography Technique Based on Wavelet Transform", International Arab Journal of Information Technology , vol 7 (4), pp . 1-7 , 2010 .
- [9] K B Raja and H S Manjunatha Reddy, "Wavelet Based Non LSB Steganography", International Journal of Advanced Networking and Applications, vol 03(3) , pp . 1203-1209 ,2011.
- [10] S R Bhadra Chaudhuri , Nilanjan Dey and Tanmay Bhattacharya, "A Novel Session Based Dual Image Encoding and Hiding Technique Using DWT and Spread Spectrum", International Journal on Computer Science and Engineering , vol 03(11), pp. 3510-3517 , 2011.
- [11] Juned Ahmed Mazumder and Kattamanchi Hemachandran, "A High Capacity and Secured Color Image Steganographic Technique Using Discrete Wavelet Transformation", International Journal of Computer Science and Information Technologies, Vol. 4 (4), pp. 583 - 589, 2013.
- [12] Nilanjan Dey, Anamitra Bardhan Roy, and SayantanDey, "A Novel Approach of Color Image Hiding using RGB Color planes and DWT", International Journal of Computer Applications, vol1.36, ,2011.
- [13] Prabakaran G, Dr. Bhavani R and Sankaran S," Dual Wavelet Transform in Color Image Steganography Method ", International Conference on Electronics and Communication System,2014.
- [14] Md. Rashedul Islam, Ayasha Siddiqua, Md. Palash Uddin, Ashis Kumar Mandal and Md. Delowar Hossain," An Efficient Filtering Based Approach Improving LSB Image Steganography using Status Bit along with AES Cryptography ", International Conference On Informatics, Electronics & Vision, 2014.
- [15] Praneeta Dehare, Padma Bonde, "Implementation of Image Steganography in Image by using FMM nested with LSB Substitution ", International Journal on Recent and Innovation Trends in Computing and Communication, Volume: 2 Issue: 11, November 2014.