SECURE REVERSIBLE DATA HIDING IN A COLOR IMAGE USING SWT AND ENCRYPTION

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Abstract— Reversible Data Hiding (RDH) is a technique by which the host image is recovered after the embedded data is extracted. Reversible data hiding technique with encryption gives more security when secret data is transmitted. In this paper, we are using different data types such as text and image in color image by using reverse room before encryption approach and arithmetic coding by using reversible data hiding technique. Stationary wavelet transform (SWT) is applied to the host image for every color in the RGB.The proposed method provides more security and the data can be recovered without any error.

Keywords— *Reversible Data Hiding (RDH), Stationary wavelet transform (SWT), Arithmetic coding.*

I. INTRODUCTION

Now-a-days, we are having the advanced technologies so many of people use internet as the primary source to transfer the information. This transmission made easy, quick and accurate using the internet. While transferring the information the main Problem is the security threat i.e. confidential information may be hacked.so data security is one of the important process while transferring the information through the net. There are related techniques that are related to internet security such as cryptography, steganography and water marking.

Digital data hiding can hide sensitive information into multimedia for secret data communications. Data hiding techniques like steganography distort the cover media. Moreover, in the most instances, the effects on the cover media won't be reversible after extraction of the hidden data. Even though the distortion is often small and imperceptible to human visual systems, the irreversibility is unacceptable for certain sensitive applications like medical imagery, military imagery and law forensics. For those applications, reversible data hiding is required to extract the embedded data and to recover the original host media without any distortion. If we combined encryption with reversible data hiding, it will provide high security during data transmission.

RDH techniques in encrypted image can be generally classified into two frame works, Vacating Room after Encryption (VRAE) and Reverse Room Before Encryption (RRBE). VRAE method is difficult and sometimes insufficient.RDH using reverse room technique achieves reversibility of image and can hide a large amount of data [1].

In the proposed work, we focused on Enhancement of security for secret data communications through reversible data hiding in encrypted images. So we proposed a secured RDH technique by reverse room before encryption using stationary wavelet transform (SWT) in color images. Security can be achieved by encrypting the approximation coefficients of the covering image and then embedding the encrypted form of data in the detailed coefficients.

II. RELATED WORK

In previous years, researchers have developed RDH techniques and algorithms. RDH techniques are mainly classified into lossless compression [10], histogram shifting [6] and difference expansion based techniques [4]. Fredrich [10] uses the lossless compression and RDH technique. Compressible features of the host image are losslessly compressed and the data is embedded into the compressed region.Tain [10] introduced the DE based RDH technique. In this, difference of adjacent pair of pixels are expanded by multiplying by two and then least significant bit (LSB) of the difference can be used for secret data embedding.

Histogram modification based RDH technique, was introduced by the Ni et. AL[6], in which peak points and Zero points are used for embedding Data. By shifting the peak and the zero bin of a histogram of a image data embedded. To increase the performance [5], [7], we should combine both the DE and HS. Some [11],[12] of the authors proposed RDH technique in the frequency domain, in which Lifting Wavelet Transform is used for finding space for data embedding. Data can be embedded into the high frequency LWT coefficients.

There are some interesting work based on the combination of the encryption [8],[9],[3] and the RDH technique. Firstly the original image can be encrypted and embeds data into encrypted block by flipping three LSBs of half the pixels in each block. while extracting the data, it decrypts the marked image by flipping the LSB again. These all under come through the "vacating room after encryption approach".

There is also another approach called the "reverse room before encryption"[2]. In this, first empty the space in the original host image by embedding the LSBs of some pixels into other pixels within the method then encrypts the image. By

using this approach the embedding capacity and quality of the image increases.

III. PROPOSED WORK

The proposed RDH approach is based on the reverse coefficient before encryption. In this the color image is selected as the input host image then separated into R,G,B and stationary wavelet transform is used to get approximation. By using the RC4 encryption method, approximation part of each color image will be encrypted [13]. This image encryption enhances the security of the data transmission making not to be accessible by the any hacker. Before image encryption, the data hider will embedded the secret data in the detailed coefficient which are reversed before encryption.

Arithmetic coding [11] is used to hide the bits of secret data into detailed coefficients of host image. In the receiver side, host image can be recovered from the encrypted image by reversing the operation and the data will be retrieved without any loss.

The block diagram of the proposed algorithm is shown below.

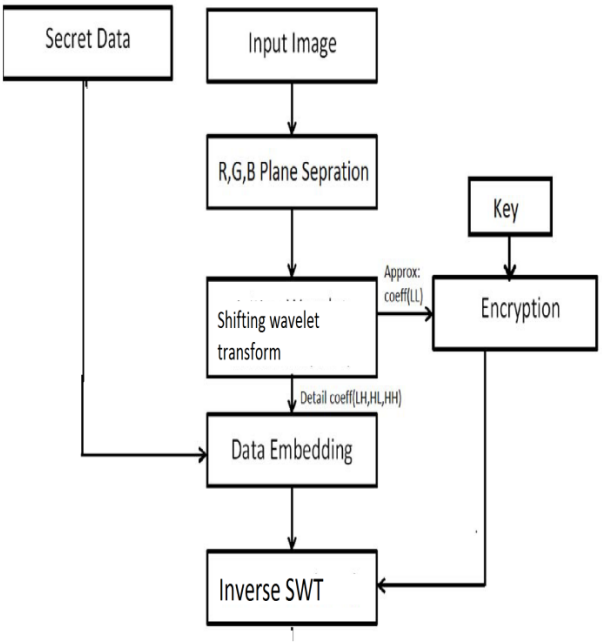


Fig: Block Diagram-Encryption and Data Hiding.

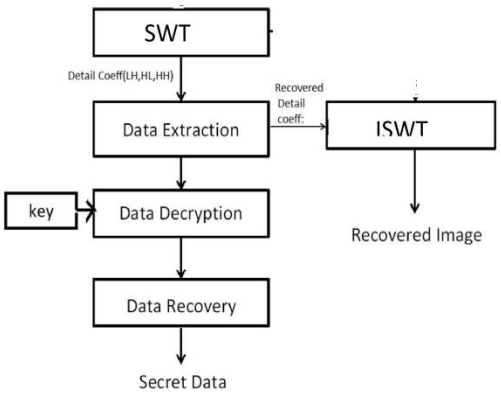


Fig: Block diagram -image recovery and data extraction.

A. Selection of input image and secret data.

A color image is selected as the host image where the secret data can be embedded. In the data hiding process the host image can be divided into the RED, GREEN and BLUE in order to increase embedding capacity. Any type of data can be used as the secret data such as text, audio and video. IN this proposed work we are using image as the secret data.

B. Stationary wavelet transform

The conventional wavelet transform is not good for data hiding as it is not completely reversible.in some cases we are going to lost the some of the information. By using the lifting wavelet transform the efficiency of image decreases while the transformations done through number of levels.

In the host image is subjected to stationary wavelet transform and space is reserved in detailed bands for data hiding. Decompose each color plane of original image into LL, LH, HL, and HH using the2-dimensional stationary wavelet transform. High frequency sub bands contain the edge information of the input image.

C. Data embedding

Main purpose of this is to hide secret data successfully and recover the original image and secret data losslessly. For embedding arithmetic coding is used.

d. Image Encryption

To enhance the security during secret data transmission, we encrypt the embedded data. This algorithm is based on the random permutation which is used for both encryption and decryption as the data stream is simply XOR ed with generated key sequence. This encryption can done by the bit XOR operations in which the hackers did not see the secret data.

Algorithm

Step1: Acquire the host image.

Step2: Acquire the secret image which we want to hide.

Step3: Now reshape and resize the secret image called the arnald image.

Step4: Then embedded the host image and the arnald image called as watermarked image.

Step5: Now encrypted the watermarked image.

Step6: Then decrypt the encrypted image.

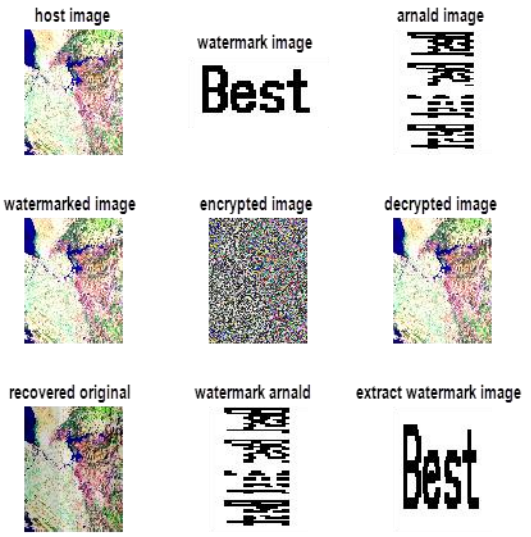
Step7: After decryption we get the recover original and watermark arnald.

Step8: Finally by reshaping the watermark arnald we get the original secret image.

An excellent style manual for science writers is [7].

IV. EXPERIMENTS AND RESULTS

To test efficiency and validity of the proposed method an color image will be taken and test the experiments. The below figure shows the result of the proposed work.



To get the performance of the reversible data hiding, we can see the visual quality of the recovered image.

V. CONCLUSION

This paper proposes a efficient and secure reversible data hiding using the reverse room before encryption by stationary wavelet transform. It provides a double security as the secret data is reshaping and then embedding.

The proposed work provides high embedding capacity and encryption without any loss while we are retiring the information. The efficiency does not change if when transformations done through number of levels also .Security in this proposed work is also more.

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