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Reserving Space approach for Reversible Data Hiding in Images

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***Abstract* :- Due to rapid improvement in digital world, lot of images get exchanged in daily routine. So security of that images is main constrained in tadays life. For that security and confidentiality lot of methods are exist. But most effective method is data hiding which kept privacy without loss of any smallest information. So it is most secure method in tadays application.**

I.INTRODUCTION

In general, security denotes the quality or state of being secure to be free from danger. Security is classified into different layers depending on the type of content intended to be secured:

Network security: The network security is responsible for safe guarding the information regarding the networking components, connections and contents.

Information security: Information security is the protection of information and the systems and hardware that use, store, and transmit that information. Information security can be defined as measures adopted to prevent the unauthorized use or modification of use of data or capabilities.

The main objective of the project is to propose the method and critically discuss the properties which help to transmit the data or information over a network without any modifications. The critical characteristics of information are:

- Availability
- Accuracy
- Authenticity
- Confidentiality
- Integrity

II.LITERATURE SURVEY

As certain operations are always takes place on images when they are travelling. So efficient system should be present to avoid loss of information or interaction with noise. RDH technique guarantees these kind of transmission. This work was started by Kalkar and Williams who established rate distortion theory which provide rate distortion bounds of RDH for memoryless cover. Then afterwards Zhang improve the recursive code construction for binary images.

Then Fridrich constructed general framework which is used for reversible data hiding. In which firstly from original cover , compressible features are extracted and then compressing them. That sparse space is used for data embedding. Popular method is DE (Differential expansion). In this method difference between pixels is expanded and LSB's can be used for data embedding.

Another method is HS (Histogram Shift) bins of histogram of gray values are shifted. Then that space is used for data embedding. Next is VRAE(Vacating Room After Encryption). In this method, first image is encrypted, then space is created to embed the data, then data is embedded. But some feature of images may lost during space creation. So RRBE is prefered. In this first space is created without loss of feature then image encryption takes place.

III.SYSTEM ARCHITECTURE

In the existing system reversible data hiding technique the image is compressed [3] and encrypted by using the encryption key and the data to hide is embedded in to the image by using the data hiding key. At the receiver side he first need to extract the image using the encryption key in order to extract the data and after that he'll use data hiding key to extract the embedded data. It is a serial process and is not a separable Process. However this system is unable to perform the privacy requirement and its principal content of the image are revealed before data extraction.If someone has the data hiding key but not the encryption key he cannot extract any information from the encrypted image containing additional data.

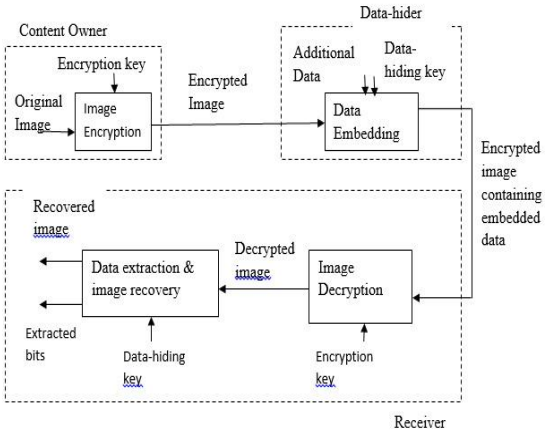


Fig. State of art

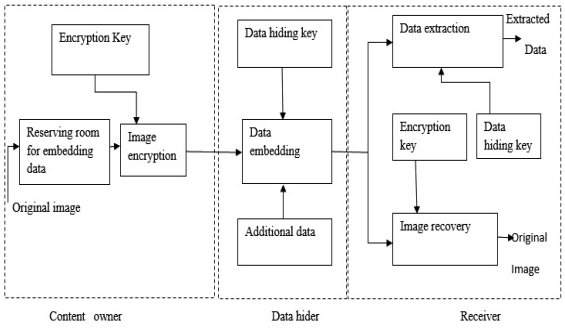


Fig. proposed System

The RDH algorithm has following steps.

A] GENERATION OF ENCRYPTED IMAGE

This step is performed at content owner side having different three steps. First image is divided into two parts like A and B. Then pixels of A are merge into pixels of B using first order function. Then RDH algorithm is used to encrypt image.

i] Image partition

As image is divided into two parts A and B. Aim of this step is to make smoother area B for efficient working of RDH algorithm. For that, first order function is used to calculate smoothness f as,

$$f = \sum_{u=2}^{m}\sum_{v=2}^{N-1}\left|C_{u,v} - \frac{C_{u-1,v} + C_{u+1,v} + C_{u,v-1} + C_{u,v+1}}{4}\right|$$

By using this function, we are calculating complex texture of every pixel of A and B. Then fewer texture of B i.e pixel with lowest value of f are replace by the higher texture of A i.e highest value of f. So ultimately image is compressed and space is created before encryption.

ii] Self-Reversible Embedding

In this step, actual embedding operation takes place which involves the replacement of LSB planes A into B. Remaining pixels of B are divided into alternate white and black pixels. Then consider white pixel $B_{i,j}$ first, it is surrounded by four black pixels, So calculate interpolation value for each white pixel using formula,

$$B'_{i,j} = w_1 B_{i-1,j} + w_2 B_{i+1,j} + w_3 B_{i,j-1} + w_3 B_{i,j+1}$$

Then estimating error between actual value and calculated value is found. Using that error , some data con be embed using histogram shift. Same procedure can be repeated for black pixels and some data can be embed in them also.

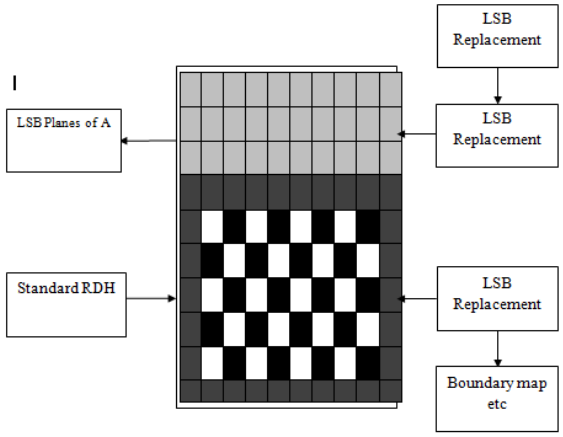


Fig. Illustration of image partition and embedding process

iii] Image encryption

After rearranged self-embedded image, denoted by X, is generated, we can encrypts X to construct the encrypted image, denoted by E. We are using stream cipher algorithm in encryption.

$$E_{i,j}(k) = X_{i,j}(k) \oplus r_{i,j}(k)$$

Here $r(k)$ is generated using encryption key.

At the end of encryption, we have embed 10 bit information for knowing which rows and column we have to use for data hiding in LSBs of image.

B] DATA HIDING IN ENCRYPTED IMAGE

As image is encrypted, at data hider side first we are extracting that 10 bit information to find which rows and column can be embed. Then after knowing that 10 bit we can embed data using data hiding key.

Finally end of process is shown by label.

C] DATA EXTRACTION AND IMAGE RECOVERY

Also we are maintaining privacy in our system with the use of two keys:1]encryption key

2]data hiding key

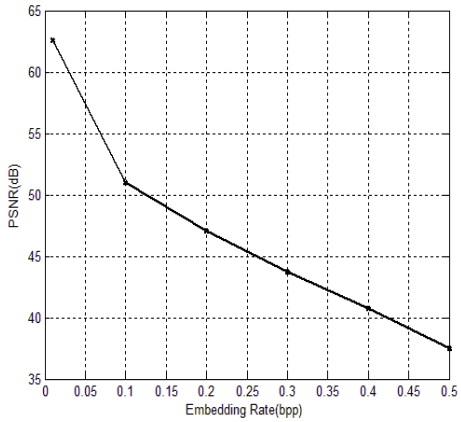
If the receiver have only encryption key, then only image can be get. Data can not recovered.

If receiver have only data hiding key, then only hided data can get, image does not recovered.

But if receiver have bath the keys then both image as well as embedded data can be recovered.

IV] RESULT

Here is table showing encrypted image, message hiding process and decrypted image.



Also we are having some graphs showing PSNR vs embedding rate of different images.

IV.CONCLUSION

RDH is a new technology in encrypted images which draws enormous attention due to its ability to uphold the content owners privacy and maintain integrity of data also real reversibility of data is realized, that is data extraction and image recovery are free from any error because of these requirements from cloud data management. In Proposed methods we implement RDH by vacating room before encryption in encrypted images, which is exactly opposed to the existing method of RDH. In existing systems we were vacating room after encryption. But due to Proposed system, data hider gets an extra space for data hiding and make it more effortless by creating space in previous stage. So one can take all the benefits of previous RDH technique for images. And also very good performance without any error or loss. Also maintain the privacy and quality of data. So in this Manner we can kept our data secure and this can be implemented where no loss of data is allowed. Also it achieves real reversibility, separate data from encrypted version of image and also highly improve the quality of marked decrypted images.

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