A Review on reversible data hiding in encrypted images by reserving room before encryption

Aswathy Soman[1]
PG Scholar, Department of Computer Science
College of Engineering Perumon
Kerala, India

Sowmya K S[2]
Assistant Professor, Department of Information Technology
College of Engineering Perumon
Kerala, India

Abstract: Data hiding is the process of hiding data in another data. Reversible data hiding is a technique in which both the data's can be recovered without any distortion. In all existing methods data's are embedded by reversibly vacating room after encryption, but it provides some distortion in the data. This paper implements RDH by reversibly vacating room before encryption. By using new RDH method, it provides the efficiency of the image. It provides real reversibility and also errors are rare in this proposed method. It is used in cases where both the data's have same importance. The techniques used here is data encryption, data hiding, data extraction and image recovery. The proposed method is used in many fields such as military, medical fields and law forensics.

Keywords: reversible data hiding, data encryption, difference expansion, histogram shift.

I. INTRODUCTION

Data hiding is the process of hiding data in a cover media. So the data hiding process links two different sets of data, a set of embedded data and the cover data. Reversible data hiding (RDH) is a technique in encrypted images by which the original cover can be losslessly recovered after the embedded message is extracted. This RDH approach is used in medical field, defense and forensic lab, where no degradation of the actual data is accepted. So RDH in encrypted images is widely used research topic.

Reversible data embedding has drawn lots of interest recently. Several reversible data hiding techniques are used for reserving room in encrypted images. In lossless data embedding [1], the distortion caused by embedding can be completely removed. It provides a general framework for RDH. Here first extract the features of the original image and compress it losslessly and sparse space is used for data embedding. Another efficient method of reversible data hiding is based on Difference Expansion (DE) [2]. In difference expansion, first calculates the difference between the neighboring pixels and these difference values are used for embedding data. Next method for reversible data hiding is based on prediction error expansion (PEE) [3].It is an improvement of difference expansion in which prediction error is used for data embedding. Another popular method of reversible data hiding is based on histogram shift [4]. In histogram shift, first generate the histogram of the original image. And data's are embedded by shifting the histogram of gray values.

II. RESERVING ROOM BEFORE ENCRYPTION (RRBE)

The new idea in reversible data hiding is implemented as shown in fig1, Reserving Room before Encryption (RRBE) [5]. Standard RDH algorithms are used for reserving room in RRBE to achieve better performance. All the previous method uses the technique of Vacating Room after Encryption (VRAE). It empty out the room from the encrypted image. In Vacating Room after Encryption content owner first encrypts the original image using an encryption key. After that content owner reserves space on the original image and send it to the data hider by embedding data into the encrypted image. This method cannot provide good image quality and also real reversibility is not achieved in this case. But in RRBE first content owner reserves

space on the original image. Various RDH methods are used for reserving space in the original image. Then the image is encrypted by using an encryption key. This encrypted images is sent to the data hider for embedding additional data. So the encrypted images with the embedded information are send to the receiver side. At the receiver side, data's are recovered by using data hiding key and encryption key.

Reserving Room before Encryption consists of reserving room in image, encryption of image, data embedding in encrypted image, extraction of data and image recovery. To reserve room in an image various RDH techniques are used.LSB replacement, difference expansion, histogram shift are the various RDH techniques.
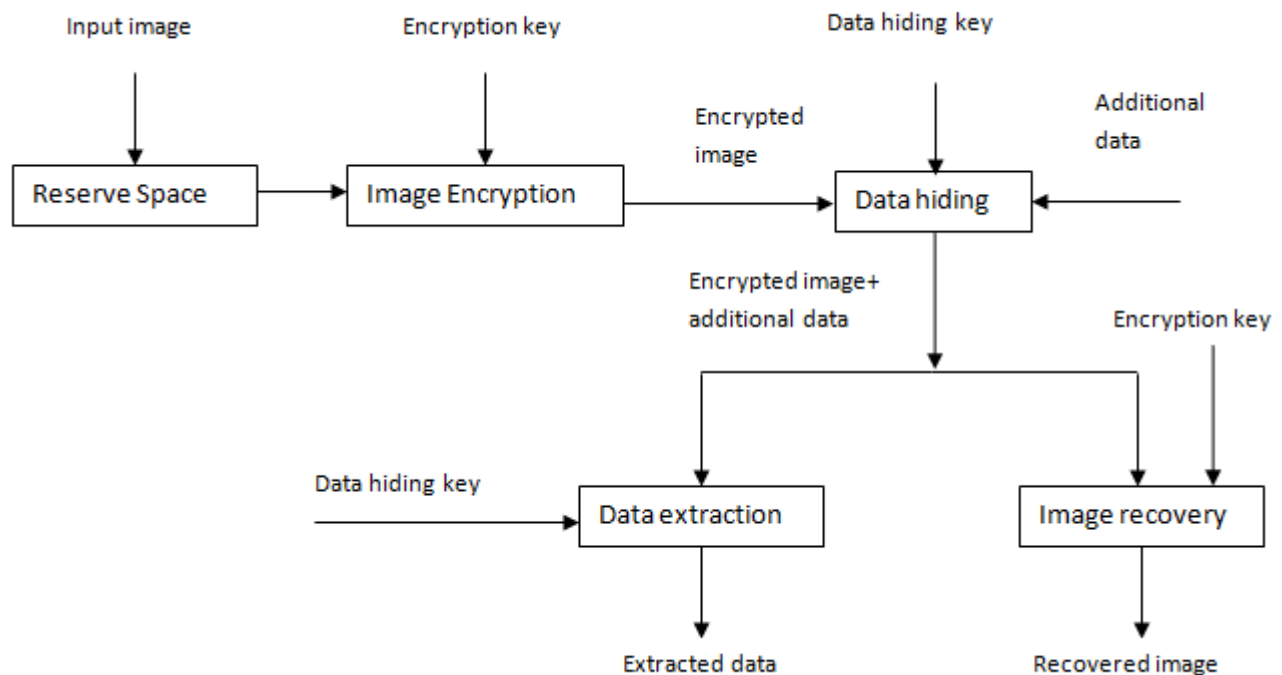

Fig 1: Reserving Room before Encryption

A. Reserving room

In this step the content owner first vacate the room i.e. creating space in the image before encryption of image. Reversible Data hiding methods are used for vacating the room. Here the order of encryption and vacation room is reversed to achieve real reversibility and it also provides excellent performance.

B. Image Encryption and hiding

After reserving space in the original image the content owner encrypts the image by using an encryption key. This key is present at the content owner side and after producing the encrypted image the content owner hands over it to the data hider to embed additional data. By using the data hiding key the data hider can add additional information into the encrypted image. The data hiding key is available at the data hider and receiver side.

C. Data extraction and recovery

After hiding additional information into the encrypted image the marked encrypted image is send to the receiver. The receiver or the authorized third party can extract the data by using the data hiding key. And with the help of encryption key the receiver decrypts the image.

III. CONCLUSION

In recent days security is a big threat in the transmission medium. Therefore it is very important to take security into consideration. Reversible data hiding draws more attention because of its ability to protect user's privacy and also real reversibility is achieved. The main drawback of all data embedding techniques is that distortion causes to original image. This distortion due to noise cannot be removed completely. Several reversible data hiding techniques are emerged in recent times. This reserving room before encryption method can increase the security of the data while transmitting the data through the networks. And also data extraction and recovery can be done separately i.e. real reversibility is achieved.

ACKNOWLEDGEMENT

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