



An Approach of Reversible Data Hiding Based on Histogram Shifting: A Review

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Abstract— Audio ,video and graphics ,all these three media forms a part of multimedia and they contain essential information. We have employed a scheme for reversible data hiding in encrypted domain in which we use image as a cover medium. Here histogram shifting technique has been employed for data hiding purpose. This paper shows the many objectives and perspective of implementing separable reversible data hiding. It has got three steps. In the first step; a content owner with the help of encryption key encrypts the image. Then in the second step, a data-hider uses a data-hiding key and compresses the encrypted image. In the third and the last step additional data is extracted and the original image is recovered. The activities of extracting the additional data and recover the original images actually depends upon the key possess by the receiver. Now there is separation of these two activities according to availability of keys Many image encryption algorithms based on chaotic maps which have been proposed has got certain demerits such as , if some of them are time consuming , some of them are complex , some have little key space. In this paper we proposed a 3D chaos which is based on hybrid encryption technique and reversible data hiding in encrypted image where for the first time we have used 3D chaotic encryption algorithm.

Keywords— Histogram shifting, Reversible data hiding, Image encryption.

I. INTRODUCTION

Multimedia has advanced a lot in the last few decades. This multimedia data consist of many images, audio, video, text, etc. Digital images are the most important information carriers which are helpful for biometric authentication, medical science, online personal photograph album, etc. Image encryption method differs from text encryption method. A large number of image encryption algorithms has been proposed which are based on chaotic systems. There are many number of image encryption algorithms based on chaotic maps like the Logistic map. Higher dimension chaos functions are very much secured from cryptanalytic attacks . There are actually two types of image encryption process called as position permutation and value transformation. In Position permutation technique ,image position is permuted without changing pixel value of the original image and in value transformation technique, the pixel value replaced by another pixel value without changing position. Here, XOR operation is useful for value transformation technique which is used to create linear independency between two or more secure variable. The XOR Encryption actually means that it is not possible to reverse the operation without knowing the initial value of one of the two arguments. Finally to improve the security performance of the image encryption algorithm, we proposed the concept of shuffling the positions of pixels in the plain-image and then finally changing the gray values of the shuffled image pixels.

In data hiding methods, the host image cannot be recovered back to the original image after extraction of hidden data and so it is permanently distorted due to embedded data. But it can be specifically applied in some applications such as medical image sharing, multimedia management and remote sensing. In data hiding technique a problem for any distortion may occur due to data embedding and it is intolerable and the availability of the original image is in high demand. So in order, to resolved this, a solution named as “reversible data hiding” (RDH), where the host image can be fully restored without any distortion. In recent years , a number of RDH methods has been proposed. So the lossless compression method, Difference Expansion (DE) method, Histogram Modification (HM) based method etc are clasified. All these methods are used but they actually shown at increasing the Embedding Capacity (EC) as high as possible while keeping the distortion low. Now a days the need for encrypting the data has increased a lot .The cryptogenic codes carries the digital information in a more secured manner and thus meeting the need of security to a greater extent.

In this work, we have proposed reversible data hiding in encrypted image and hybrid encryption technique by using pixel rotation and XOR based encryption technique using 3D chaos for secured and more enhanced multimedia communication.

II. RELATED WORK

The proposed research is based on a Reversible Data Hiding concept by using Histogram Shifting method. In this method after shifting the pixels of the host image in a predefined order with the help of Histogram, the data which is to be hidden is embedded into the host or cover image. The data is smoothly recovered by reversing the shifting process, after embedding the data pixels in the host image. So the data can be recovered very easily without any loss in the data. On the receiving side, the original image perfectly restored and the hidden message can be extracted. This paper

construct a general framework to HS-based RDH is proposed. According to this framework, one just needs to define the shifting and embedding functions and then to obtain a RDH algorithm, we facilitate the design of reversible data hiding. Furthermore, by incorporating this framework with the help of PEE and pixel selection techniques, they are also introduced two novel of RDH algorithms. So the proposed framework has a potential to provide RDH algorithms. However, the proposed framework may design different RDH algorithms. Some HS-based algorithms such as the one based on adaptive embedding and the location-map-free methods cannot be derived by the proposed framework[1].

In this literature survey, reversible data hiding technique is used to increase the hiding capacity which is based on histogram shifting. This approach is used for two predictors methods such as center prediction method and JPEG-LS median edge predictor (MED) method. From the experimental results, the terms of embedded capacity and PSNR value has proposed the scheme outperforms some of the previous works. Finally, the results provided to prove that the PSNR value and embedded capacity of the proposed scheme are better than that of previous literatures for signal-level, multi-level and the computation complexity of the proposed scheme. It is also very small as it just deals with the shifting and searching operations. The advantage of this paper is the Simple Less computation and drawback is data compression is not efficient[2].

This survey has discussed about a 3D chaos based simple encryption technique with combination of position permutation techniques and value transformation techniques. For image encryption technique is not a new concept of pixel position permutation and XOR operation for value transformation. This algorithm is use for low, medium and high security purpose by controlling its complexity[3].

This paper presents a new algorithm of Lossless Secure data embedding algorithm in which the vital information can be embedded into the cover image while maintaining the security of the data to be embedded and preserving the quality of cover image. Here, during the process of the data embedding that are need to be considered the two main issues of cover image quality and embedded data security. SDEM-DCT (Scramble Data Embedding in Mid-frequency range of DCT) Algorithm consists of three major security levels. This level can be used to hide Credit Card Numbers of many customers inside the bank LOGO. It proposes a high capacity data hiding method. Also introduce a robust Scramble and Descramble Data embedding algorithms which name it MK randomize key Generator to have a more Security for embedded data. This method is securer than most of its predecessors. Finally, the results show that our method indeed that provides acceptable image quality and adjustable embedding capacity. Also show the distortion of the stego-image caused by this method at low embedding capacity is the same as that by other same algorithms[6].

III. PROPOSED WORK

The project work is based on following tasks:

- Reversible data hiding in encrypted image
- Hybrid encryption technique by 3D chaos

A. Reversible data hiding in encrypted image

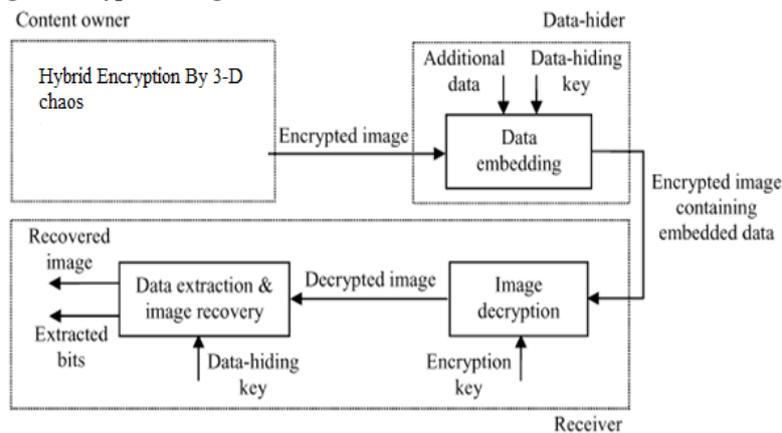


Fig.1 Block diagram of Reversible data hiding in encrypted image

The scheme is made up of image encryption, data embedding and data-extraction/image-recovery phases. Here ,the content owner encrypts the uncompressed image using an encryption key by chaotic encryption to produce an encrypted image. Next, the data-hider compresses the least significant bits (LSB) of the encrypted image using a data-hiding key in order to create a space which keep the additional data. At the receiver side, the data embedded in the created space can be easily extracted from the encrypted image which contain the additional data as per data-hiding key. Since the LSB only affected by data embedding, a decryption can result in an image similar to the original version with the help of encryption key. Finally, using both of the encryption and data-hiding keys, the embedded additional data can be easily retrieved and the exact original image will be recovered.

B. Hybrid encryption technique by 3D chaos

It consists of five stages to complete the overall encryption process. They are:

- 1) 3D Chaos generation: The process of chaos generation is given by an equation

$$x_{n+1} = \mu x_n (1 - x_n)$$

For $0 < x_n < 1$ and $\mu = 4$ is the condition to make these equation chaotic.

- 2) Chaos Histogram Equalization : This process we are need to equalize the histogram for highest security. If a gray image with MxN dimension. Where M is the no. of row and N is the number of column.
- 3) Row Rotation : A new approach of row rotation is introduced for the purpose of image pixel permutation. This rotation is same as a combination of lock of a briefcase. Suppose, rotate left when the chaos is even and rotate right if the chaos value is odd for the enhance security.
- 4) Column Rotation : Column rotation is also same as row rotation. Suppose, rotate up when the chaos is even and rotate down if the chaos value is odd for enhance security. After the rotation of row column the original image becomes encrypted. But in this case, the problem is unchanged histogram, which can leads to histogram attack. To avoid this attack we incorporate another step that changes the image pixel value.
- 5) XOR Operation : This is the last step of encryption process. XOR operation change the pixel value into new value and can't reverse without knowing chaos key. After that we XOR the chaos operation and row-column shifted image to get encrypted image.

IV. EXPECTED OUTCOME

By using the proposed method, the input image is encrypted using chaotic algorithm. And the data is hidden in encrypted image using reversible separable technique. Also the reverse operation of these is performed.

V. CONCLUSION

This paper proposes a new algorithm which is 3D chaotic algorithm by hybrid encryption technique for image encryption and reversible separable technique for data hiding . It is also analysed a low computation complexity. The original images are encrypted by an encryption strategy using encryption key. So a study about an encryption strategy is performed. So this methods for data embedding are also noticed. Lastly, also consider a new process for decryption of image. Hence, Encryption and Decryption process of an image by this algorithm protect the image from an unauthorized access to provides more security to an image and occupies minimum memory space. This work will be extended for videos for higher security. Also in the future, a comprehensive combination of image encryption and data hiding compatible with lossy compression deserves further investigation.

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