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Literature Review on Image Media Diversity in a Security Survival for Digital Image Sharing Schemes

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ABSTRACT: The conventional Visual Secret Sharing Schemes (VSS schemes) hide a Secret image in shares which appear as noiseless picture. VSS schemes suffer from a transmission risk problem while sharing Secret Images because it increases interception risk during transmission of the shares. To avoid this problem, the proposed natural-image-based VSS scheme (NVSS scheme) shares secret images via various carrier media to protect the secret as well as the participants during the transmission phase and also to reduce the transmission risk problem. The NVSS scheme involves one digital secret image, n-natural images and one carrier image. The natural images can be any photo or picture in digital form. Using these natural images, key is generated. With the help of this generated key and secret digital image, a noisy share is created. The natural images are transmitted using different carrier media. Hence the transmission risk is reduced.

KEYWORDS: Visual secret sharing scheme, Extended Visual Cryptography scheme, natural images, natural shares, secret digital image, etc.

I. INTRODUCTION

Visual Cryptography (VC) is a method that hides a secret image into n number of shares and securely shares secret images in non-computer-aided environments. Butthis increases the transmission risk problem.Thus, sharing visual secret images in computer-aided environments has become an important issue today.The proposed natural image based visual secret sharing (NVSS) scheme use diverse media for hiding secret image and reduces the transmission risk problem. The carrier media in the scheme contains digital images, printed images, hand-painted pictures, etc.We also apply digital watermarking to natural shares to maintain integrity of images.

In the conventional technique, ‘n+2’ images are used for secret sharing (n for natural images, one carrier image, and one secret image). The natural images ‘n’are distributed to participants. The key is required for encryption of secret image and is generated from ‘n’ natural images. At receiver side, anyone who holds fewer than ‘n’ natural images cannot generate a key. By stacking ‘n’natural images, the key reveals and we can decrypt the secret image [1]. Conventional shares consist of many random and meaningless pixels which satisfy the security requirement for protecting secret contents, but they suffer from two drawbacks: first is a high transmission risk because noise-like shares.Second is the number of shares increases; it becomes more difficult to manage the shares. Thus, the risk to both the participants and the shares increases, which increases the probability of transmission failure. The shares contain noise-like pixels. These shares can be embedded in another carrier image by the process called steganography.

In proposed NVSS scheme, we handle ‘n’natural images and two images as one carrier image, another one as a secret image. Itcan share a digital secret image over n-1 arbitrary natural images and one share.Instead of changing the natural images it extracts the features from each natural image and generates the numeric key. To increase the securitylevel, the generated shares can be concealed by the data hiding technique during transmission. In this paper, we develop encryption, decryption, share hiding, share extraction algorithm for NVSS scheme. The possible ways to hide the generated shares are also discussed. The proposed scheme provides three level securities, reduces transmission risk and increases the contrast of the natural image.

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II. LITERATURE REVIEW AND RELATED WORK

In Visual cryptography (VC) Scheme, the problem of encrypting written material (printed text, handwritten notes, pictures, etc.) can be decoded directly by the human visual system. If one of the shares has been corrupted from unauthorized user. The Receiver couldn't form the Recovered Image after receiving all Shares by receivers. They have to do the merging process to get back the Recovered images. But the Recovered images have the noisy share look and not a clear look. These studies had serious side effects in terms of pixel expansion and poor display quality for the recovered images. Hence, researchers M. Naor and A. Shamir make a tradeoff between the quality of the shares, the quality of the recovered images, and the pixel expansion of the images [1].

The problem occurred in the VC scheme can be overcome by the Extended Visual Cryptography scheme invented by C. N. Yang and T. S. Chen.This VC schemes work on the share management problem. To get the better solution K. H. Lee and P. L. Chiu uses a meaningful cover image concept. This type of VC scheme uses binary images. For the purpose of managing shares this technique first construct the meaningful share using an optimization technique. And in next step, they will use cover images that can be added in each share directly by using the stamping algorithm. As this VC scheme uses binary image, they are not able to maintain the quality of recovered image. The algorithm is used by this method is easy to maintain for both sender and receiver because they know that in which cover image is hidden. It is easy for receiver also to combine cover image and extract secret image [2][3].

A Simulated Annealing Algorithm for General Threshold Visual Cryptography Schemesis developed by Pei-Ling Chiu and Kai-Hui Lee. In this, an optimization technique is proposed in order to encrypt binary secret images. They first formulate the problem as a mathematical optimization model which maximizes the contrast of recovered images. Then they develop a simulated based algorithm to solve this problem. Furthermore, they try to promote the contrast by slightly releasing the density-balance constraint. The experimental results show that the proposed optimization-based approach significantly outperforms previous methods in terms of both the pixel expansion factor and the display quality of recovered images [4].

The technique used for halftone technique by error diffusion method is developed by Z. Wang, G. R. Arce, and G. D. Crescenzo, which takes one gray scale image and converts it into binary image by applying Halftone technique. In this binary share images, put secret image pixel into each share image by applying void and cluster algorithm. The reconstructed image is obtained by superimposing two share images. It is a very good method but still there is a tradeoff between pixel expansion and contrast loss of original image. The size of pixel in this method is same as original image pixel size, so it reduces the problem of pixel expansion [5] [6].

Tzung-Her Chen and Kai-Hsiang Tsao proposed a visual secret sharing technique based on random grid visual secret sharing algorithm. In this method, secret image and natural image pixel is divided into two grades; grade1 and grade2 depending on which pixel is move on which grade. At the receiving end, grade1 and grade2 is combined, then move the pixel in grade1 and grade2 depending on which pixel belong to which grade. It does not introduce any pixel expansion. To achieve two meaningless random grids G1 and G2, the first random grid G1 is achieved by selecting the color white or black. Then, the grid pixel of G1 and grid pixel of G2 is resolved. G1 and G2 stacked results are always fully black although the private is black and white or black with ½ probabilities. In this way the private is recognizable through stacked random grid [7].

The technique used for halftone technique is error diffusion method which takes one gray scale image and converts it into binary image by applying Halftone technique. In this Color extended visual cryptography using error diffusion invented by I. Kang, G. R. Arce, and H. K. Lee, thebinary share images, put secret image pixel into each share image by applying void and cluster algorithm. The reconstructed image is obtained by superimposing two share images. It is a very good method but still there is a tradeoff between pixel expansion and contrast loss of original image. The size of pixel in this method is same as original image pixel size, so it reduces the problem of pixel expansion [8].

Kai-Hui Lee and Pei-Ling Chiu proposed natural-image-based VSS scheme (NVSS scheme) shares secret images via various carrier media to protect the secret as well as the participants during the transmission phase and also to reduce the transmission risk problem. In NVSS scheme, encryption and decryption algorithm is used. In the encryption process, printed image and digital image is taken as input along with the secret image. Inimage preparation step, printed image is first preceded in which we manually crop the image so that there is no irrelevant features remain in the image. After that printed and digital image features are extracted in feature extraction step, in this we convert an image pixel value into binary form. The numberso's and 1's are balanced in an image and then add the noise in it. Then pixel swapping is done in the next step in which XOR operation is performed between secret image and feature extracted. In the next step, encryption operation is performed using secret image, digital image and output of the previous step [9].

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III. PROPOSED WORK

Natural image based visual secret sharing (NVSS) scheme performs a three process.

(i) The feature extraction algorithm consists of three steps a) Binarization b) Stabilization c) chaos. In binarization process image is converted into 0's and 1's. Stabilization is used for searching black and white pixel from image. In last chaos introduce noise.

(ii) In encryption algorithm,with the help of secret image and feature extracted from natural image combine to form noise like share.

(iii) At last, generate the quick response code (QR code). Steganography and QR code is used to hide the information or the share.

The existing system uses the QR code to hide the information. QR code is the two dimensional code which encodes the meaningful information. Encoding process is the two-step process. First, transform pixel on the share into binary values and second, represent the values in decimal format. Today, QR code is widely used in commercial catalogs and flyers, in electronic media, and everywhere.

IV. COMPARATIVE ANALYSIS

The various schemes are used for hiding secret image. In Visual cryptography (VC) Scheme, the problem of encrypting the image has occurred. If one of the shares has been corrupted, the receiver couldn't form the recovered image. The merging process is to be used to get back the recovered images. But these recovered images have not a clear look. There are serious side effects in terms of pixel expansion and poor display quality for the recovered images [1].

In extended visual cryptography scheme, the noisy share is divided and adds one cover image with each share, so it creates suspicion to hacker that there is some secret image in the cover image. This scheme send noise like image in shares, but if receiver cannot get the share properly so, it is difficult for receiver to obtain secret image. Because of this, the security problem is created [2].

This type of VC scheme uses binary images. For the purpose of managing shares this technique first construct the meaningful share using an optimization technique. And in next step, they will use cover images that can be added in each share directly by using the stamping algorithm. As this VC scheme uses binary image, they are not able to maintain the quality of recovered image[3].

Different types of images are used for hiding secret image. In this paper, stimulated annealing algorithm is used only for binary secret image. It cannot maintain the contrast of gray and color image. Stimulated annealing algorithm is not working properly on brightness [4].

The pixel expansion problem can be considered in the Halftone VC scheme. It causes the appearance of some content information in reconstructed secret image, such as shape of the earth. It destroys the quality of secret image. It also affects the quality of shares [5].

It is a very good method but still there is a tradeoff between pixel expansion and contrast loss of original image [6].

At the receiving end, the receiver cannot get the image properly because when they move pixel in grade 1 and grade 2 that time image pixel value is mismatch. It also affects the brightness of original image [7].

In this paper, due to color inconsistency, low visibility of shares is produced. Due to matrix random permutation, color of encrypted pixel and contrast is degraded [8].

The NVSS scheme has various techniques namely Image preparation, feature extraction, steganography for hiding purpose and QR code formation. The high contrast of the recovered images and the wide rangeof QR code versions demonstrate the capability of the QR code [9].

V. CONCLUSION

This paper proposes Natural image based visual secret sharing scheme which hide secret image over n-1 arbitrary selected natural shares. That can share a digital image using diverse image media. Therefore, this is a total secure scheme. Regardless of the number of participants 'n'increases, the NVSS scheme uses only one noise share for sharing the secret image. By compared with conventional VSS schemes, the proposed NVSS scheme can effectively reduce transmission riskproblem.With the help encryption algorithm extended visual cryptography scheme for general access structure reduces the pixel expansion problem. The major contribution of this study is that it reduces the pixel expansion problem and to increase the contrast. The four major contributions are; first, this is the first attempt to share images via diverse media. Second, we successfully introduce hand-printed images for image sharing schemes. Third, this study proposes a useful concept and method. Fourth, we develop a method to store the noise share as the QR code.

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