A REVIEW ON HIDING AND EXTRACTION OF BINARY IMAGE USING ADVANCED VISUAL CRYPTOGRAPHY

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ABSTRACT

Maintaining the secrecy and confidentiality of an image is a vibrant area of research, different techniques being used for this, one of them is cryptography. Cryptography is the science of maintaining private information whether communicated over secured or unsecured channel from unofficial access, of ensuring data privacy, integrity and authentication, and other tasks. The basic premise of cryptography contains plain text and cipher text. Sender encrypts the message using the secret key and then sends it to the receiver. The receiver decrypts the message to get the secret information. Similar to cryptography Visual Cryptography (VC) is a technique which encrypts the image and converts it into unreadable format with the help of key by decrypting the image we get original secret image. Encryption is the process of transforming the image into some other image using an algorithm so that any unauthorized person cannot recognize it. Visual cryptography, degree associate rising cryptography technology, uses the characteristics of human vision to rewrite encrypted photos. Visual cryptography provides secured digital transmission that is utilized just for just the once the initial photos are typically utilize by pattern this theme. In this we have reviewed about visual cryptography & its applications in various areas.

Keywords: Visual Cryptography, Cryptography, Stegnography, Share

INTRODUCTION

The security of information is presently one in every of the foremost pressing problems to that several researchers have paid plenty of attention. The security of information is presently one in every of the foremost pressing problems to that several researchers have paid plenty of attention [5]. To achieve security two techniques are most widely used. These techniques are nothing but the Cryptography and Steganography. The visual cryptography (VC) planned by Naor and Shamir [2] could be a technique that safely shares a secret image to several participants. A (k,n) VC theme encodes a secret image into noise-like shares (called transparencies or shadows). Any k or a lot of shares visually reveal the key image after they area unit superimposed along. Whereas any smaller than k shares disclose no data of the key image. The charm of VC is that the decryption method needs neither machine device nor crypto logical information, and therefore the secret image is reconstructed simply via the human sensory system. Hence for the

applications during which the computing devices for secret writing don't seem to be in the market or too expensive VC becomes a reliable and handy technique to accomplish the sharing of digital pictures. However, the VC technique would be abundant enticing if a lot of data is hidden at intervals the cryptography method [2]. Hiding data in binary image, though difficult, is getting higher demands from our everyday life. An increasingly large number of digital binary images have been used in business [3].

Numerous confidential data like military maps and business identifications are transmitted over the net [1]. Whereas pattern secret photos, security problems ought to be taken into thought as a result of hackers could utilize weak link over communication network to steal data that they need .To touch upon the security problems with secret photos, varied image secret sharing schemes are developed. Secret Sharing permits sharing secret data among a bunch of participants such secret writing is potential providing the entire participants unit gift with their shares. Secret are divided into any choice shares. An area of secret data is termed a share. Whereas secret writing the data, it's all the shares on transparency then produce them in correct order. There unit varied secret sharing schemes [1].

Visual cryptography is a class of technique to embed a hidden secret image in a set of binary share images [7].The effective and secure protections of sensitive information are primary concerns in commercial, medical and military systems. It is also important for any information process to ensure data is not being altered. Encryption methods are popular approaches to ensure the secrecy and integrity of the protected information. However, one of the important vulnerabilities of encryption techniques is the single-point-failure. For example, secret information is impossible to recover if the decryption key is lost or the encrypted content is corrupted during the transmission. To address these problems, in particular for large information content items such as secret images (satellite images, medical images), an image secret sharing scheme is a good alternative to remedy these types of vulnerabilities[7]. Visual colour methods used same technique to decompose the colour secret image into three images such as cyan magenta yellow then

halftone technique used to translate the three colour images into halftone images a colour halftone image can be generated [8].

VISUAL CRYPTOGRAPHY MODEL

The model for visual cryptography is given by Naor &Shamir as follows: A printed page of cipher text and a printed transparency (which serve as a secret key). The original clear text is revealed by placing the transparency with the key over the page with the cipher, even though each one of them is indistinguishable from random noise. The model for visual secret sharing is as follows. There is a secret picture to be shared among n participants. The picture is divided into n transparencies (shares) such that if any m transparencies are placed together, the picture becomes visible. If fewer than m transparencies are placed together, nothing can be seen. Such a scheme is constructed by viewing the secret picture as a set of black and white pixels and handling each pixel separately. The most traditional visual cryptography schemes are used for black and white images. Recently, some visual cryptography schemes for gray or color images have been proposed. Verheul and Tilborg [6], present a secret sharing scheme for images with c colors. The principle of this scheme is to transform one pixel of image to b sub-pixels, and each sub pixel is divided into c color regions. In each sub-pixel, there is exactly one color region colored, and all the other color regions are black. The color of one pixel depends on the interrelations between the stacked sub-pixels. A major disadvantage of this scheme is that the number of colors and the number of sub-pixels determine the resolution of the revealed secret image. If the number of colors is large, coloring the sub-pixels will become a very difficult task [6]

ALGORITHMS OF VISUAL CRYPTOGRAPHY

The algorithms used for visual cryptography methods are as follows

Visual Cryptography for binary images: There are two main steps of visual cryptography: share generation and extraction of original key image.

Algorithm of Share generation:

Step 1: Take the binary image (two tone image) as a key image.

Step 2: Divide the binary images in to two shares as shown in figure 3.
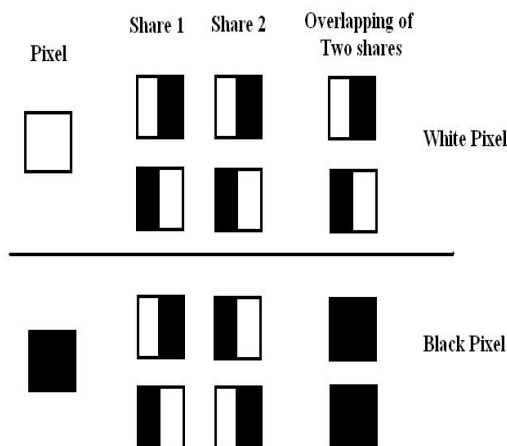
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Fig. 3 Visual cryptography with 2 sub pixel construction [4].

Apply the same procedure for converting each pixel from original image into two sub pixels.

Algorithm for reconstruction of original image:

Step 1: Take the two shares (Shares are random noise images).

Step 2: Overlap the two shares to get the original image. Overlapping is simple OR operation or EX-OR operation.

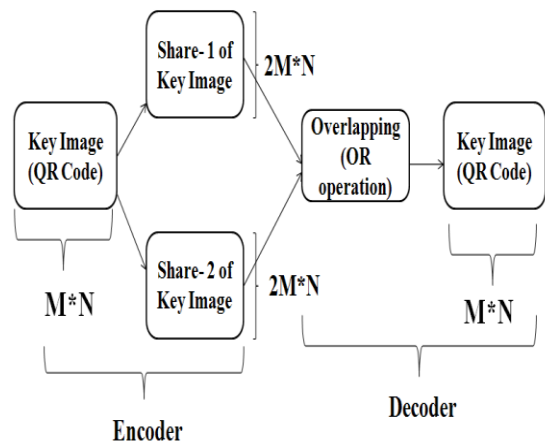Figure 4 shows the block diagram of visual cryptography (2, 2) schema as follows

Fig. 4 Block diagram of visual cryptography (2, 2) schema [4]

2) Visual Cryptography for colour images: [4]

Algorithm for share generation:

Step 1: Take the colour image (RGB image).

Step 2: Take the number of shares 'n' and minimum number of shares 'k' to be required to reconstruct the final image, 'k' must be less than or equal to 'n'

Step 3: Calculate reconstruction factor, recons = (n-k) +1

Step 4: Select the one pixel from original image and convert it into 32 bit binary string

Step 5: take the 1st bit of binary string if it is 1 then in (n-k) +1 number of shares in that position of that pixel there will be 1. In the remaining shares in that position of pixel there will be 0. A random number generator is used to select (n-k) +1 number of shares. Repeat the same procedure for all bits in the 32 bit binary string to reproduce the pixel share.

Step 6: Apply the same procedure of all pixels as mentioned in step 5 to generate shares.

Algorithm for reconstruction of original image:

Step 1: Take any 'k' number of shares to generate original image.

Step 2: Take 1st pixel of each share then convert them into 32 bit binary string.

Step 3: Perform the OR operation on 32 bit string of all shares to get original image pixel. Repeat the same procedure for each pixel from share.

Step 4: Repeat the procedure mentioned in step 3 to get original image by overlapping all 'k' shares. Less than 'k' number of shares should not retrieve the original image.

APPLICATION OF VISUAL CRYPTOGRAPHY

A QR Code application

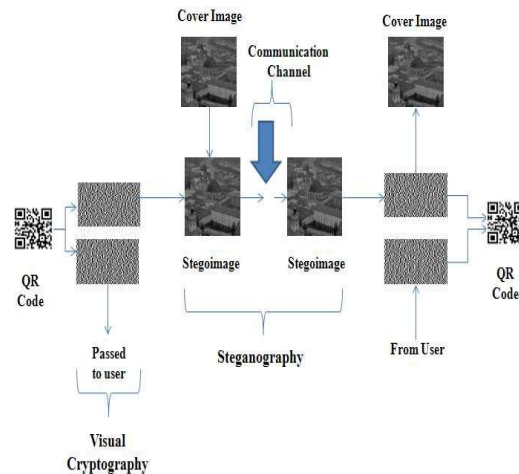The block diagram of QR Code application is shown in fig 5.

Fig. 5 Visual Cryptography and Steganography for QR code application [4]

B. Banking application

The block diagram of banking application is shown in fig 6. In banking application, the bank logo or key image is divided into multiple shares using visual cryptography for colour images. Then each share is hidden into bank customer image or cover image using steganography technique. Then at the time of access of particular joint account by multiple account holders extract each customer share using

extraction technique of steganography and overlap the customer shares to get bank logo or key image. Then comparison can be made with certain threshold and then decision can be taken whether access is allowed or is denied. Depending on presence of number of customers the access permissions are given using k out of n visual cryptography schemas for colour images.
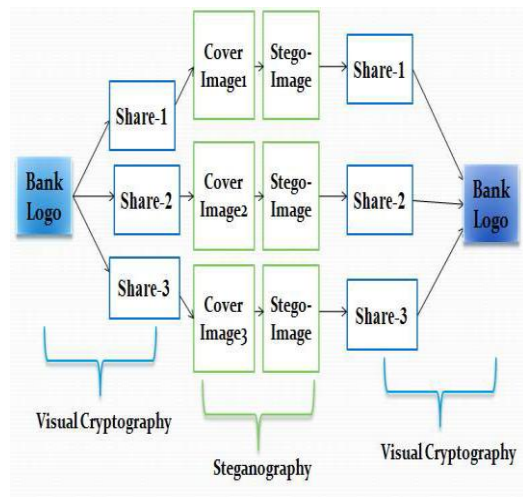

Fig. 6 Visual cryptography and Steganography for banking application [4]

CONCLUSION & FUTURE SCOPE

Visual cryptography (VC) is a cryptographic technique which allows visual information (pictures, text, etc.) to be encrypted in such a way that decryption becomes a mechanical operation that does not require a computer. Visual cryptography is the current area of research where lot of scope exists. Currently this particular cryptographic technique is being used by several countries for secretly transfer of hand written documents, financial documents, text images, internet voting etc. It provides one of the secure ways to transfer images on the Internet. The main advantage of visual cryptography is that it exploits human eyes to decrypt secret images with no computation required. Visual cryptography is used in many applications like bank customer identification, biometric security & remote electronic voting etc. In this paper we have reviewed about visual cryptography schemes & its various applications.

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