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# An Improved Method for Natural Image Based Visual Secret Sharing Using Lazy Wavelet

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**Abstract:** Nowadays the use of internet increases day by day. So the security of each and every information is very important. Cryptography plays a vital role in ensuring the security in modern era. Visual cryptography is one of the encryption mechanism that is quite popular. NVSS(Natural Image based Visual Secret Sharing) scheme is the scheme that used to share secret image over (n-1) natural shares .It reduces the problems of sharing to a limit. Conventional NVSS scheme suffers management problem and security problem. So, we proposed an efficient and secure method of NVSS scheme using Lazy Wavelet and LSB technique.

**Keywords:** NVSS scheme; visual cryptography; Lazy Wavelet; LSB.

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## 1. INTRODUCTION

Visual cryptography (VC) is one of the cryptographic schemes which can decode concealed images without any cryptographic computation. Basic scheme of VC was proposed by Naor and Shamir[1].Conventional visual secret sharing scheme use a unity of media as a carrier such as transparencies or digital media[2].There generate noise like share and after that divide the those shares and transmit to the receiver side. This scheme suffers management problem and pixel expansion problem.

EVCS scheme introduced by Ateniese et al[3] overcome management problem .In this scheme, they add cover image for each share. But it is very easy to detect in which cover where the image is hidden. In order to solve this problem, Naor and Shamir proposed Threshold VC scheme. Here, they firstly convert image into binary form. VSS technique based on random grid concept by Kafri and Keren was later anticipated by Tzang Her Chen and Kai Hsiang Tsao [4].In this scheme, secret image is encoded into 'n' shares in random grid pattern.

It solve the pixel expansion problem suffers in the conventional scheme.

Kai Hui Lee and Pei Ling Chiu proposed a scheme in which secret image is hide in shares [2].But it will arouse suspicion to hacker that there is a hidden image in shares and it suffers transmission risk. So they introduced a new scheme called Natural Image Based Visual Secret Sharing Scheme (NVSS) scheme [5] in which share secret image using diverse image media. Here, media that include (n-1) randomly chosen images are unaltered in encryption phase. Regardless of the number of participants 'n', the scheme uses only one noise like share for sharing secret image. Four contributions of these schemes are share images via heterogeneous carriers, introduce hand printed images for image sharing scheme, and proposes a useful concept and method for using unaltered images as shares in a VSS scheme and develop a method to store noise like share as QR code with digital signature. In conventional NVSS scheme, they hide noise like share using QR code and steganography. If image size is larger, then there generate more than one QR code for a secret image. So it is very difficult to manage QR code and it lead suspicious among attackers [6].

## 2. PROPOSED SCHEME

In this paper, we apply Lazy Wavelet Transform [7] and LSB technique in NVSS scheme for hiding secret image .It ensures more security compare to conventional scheme. The important thing of communication is information security .We can achieve information security only when it maintains the properties such as confidentiality, integrity and availability. Here, we can ensure confidentiality and availability because of taking diverse media as shares in this NVSS scheme. We cannot guarantee 100% integrity but then too it has just because we apply LWT in cover image for hiding our secret image.

In NVSS scheme, we share (n-1) natural images and one secret image to the receiver side. We can use diverse media as share in NVSS scheme such as digital media, printed media etc. Firstly, we extract the feature of (n-1) natural images using NVSS feature extraction algorithm. Then we XORed the feature matrices of (n-1) natural images and secret image using NVSS encryption/decryption algorithm. There by, we got noise like share. After that apply Lazy wavelet in cover image in which image is to be hidden. Then we get four sub band [ 8]and hide secret image in one of the sub band in cover image using LSB technique and send to the participants through diverse carriers, so that attacker can't decrypt it so easily. The sender side portion is given in fig.1.

In the recipient's side, they receive shares through various carriers such as mail, whatsapp, postal etc so that attacker can't get all shares together for stealing secret. Then apply LSB technique and Lazy wavelet to get the noise like share. After that we XORed the noise like share and (n-1) feature matrices and got secret image by using NVSS encryption/decryption algorithm. We can perform decryption by taking the reverse process of encryption because of XOR operation in this scheme.

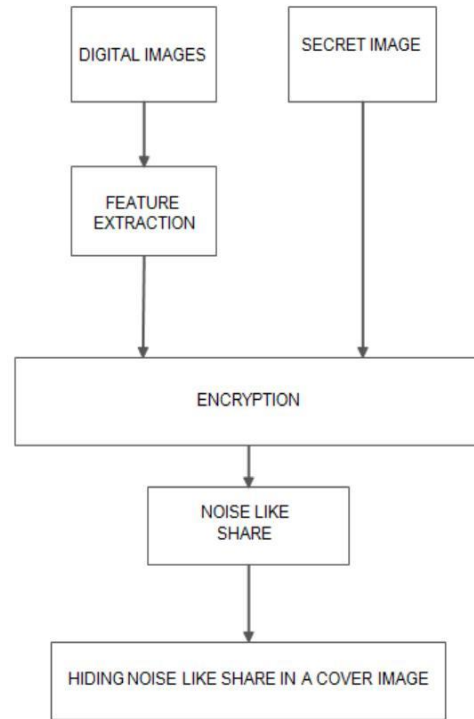


Fig.1 Sender side

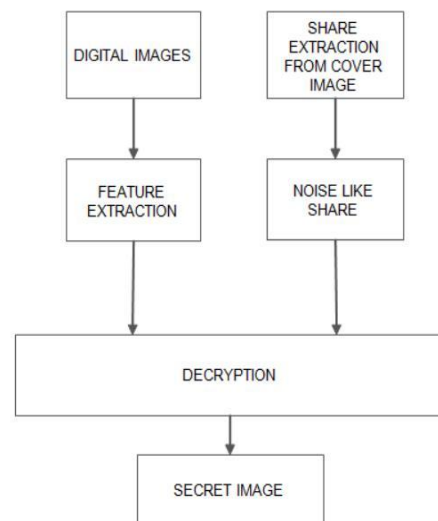


Fig. 2 Receiver side

### 3. METHODOLOGY

In this method, six modules are there. They are Image preprocessing, Feature Extraction, Encryption, Hiding Noise like share, Extraction of noise like share and Decryption.

In Feature extraction Process, we extract the feature of (n-1) natural images by using NVSS feature Extraction algorithm[5]. It consist of three steps such as binarization, stabilization and chaos. In binarization, we convert pixels in the image into binary form. i.e., a simple threshold function is used to detect the binary pattern of the pixel. In stabilization, balanced the number of black and white pixel. In chaos, add noise and thereby alter the original matrix so that it will not reveal the texture of image.

In Encryption, we apply NVSS encryption/decryption algorithm for (n-1) feature matrices and secret image. Here, XOR operation is performed between the feature matrices of natural image and secret image. Thereby, we got noise like share. Noise like share is similar to cipher text in traditional cryptography. So the security of noise like share is very important. Here, we use only one noise like share so that we cannot manage so many noise like shares like previous schemes [2]. In hiding process, we apply Lazy wavelet in cover image then cover image is divided into four sub bands in fig( 3) and hide in one of sub band using LSB technique. i.e., we replace LSB of sub band of cover image with LSB of secret image. In Share extraction process, we apply Lazy wavelet and LSB in order to get noise like share. In Decryption Process, we take the feature matrices of (n-1) natural images through various carriers and secret image and apply NVSS encryption/decryption algorithm in order to retrieve secret image.

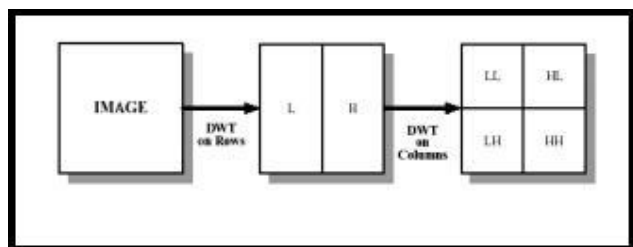


Fig.3 Applying Lazy wavelet in cover image

### 4. CONCLUSION

This paper proposes an improved method for NVSS scheme with lazy wavelet. It ensures security and solves the management issue to a limit compared to the conventional scheme. We can share secret image by hiding it in one of the sub band of cover image. If anyone finds out the hiding band, then there will be a chance of retrieval of secret image. So the hidden band needs to be secure.

### ACKNOWLEDGEMENT

We express our sincere gratitude towards all faculties and friends in Computer Science department who guided and encouraged us.

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