

Secret Image Protection using Image Fusion

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ABSTRACT: In the recent past images are being thought about for process in numerous fields. In this paper an algorithm is developed to protect the secret image whose confidentiality must be maintained and attest the distributor who must distribute that secret image to a multiple users. For authentication purpose the palm print of the dealer is fused with the secret image. In this paper Dual Tree Discrete Wavelet Transform is applied to the secret image as well as to the palm print, coefficients obtained from both images are fused using Image Fusion technique. DTDWT is used to overcome the drawbacks of DWT. Image fusion is a technique or a process of combining relevant information from set of images into a single image, the resultant image obtained will be more complete and informative than the input images. The fused image obtained is divided into number of shares based on threshold secret sharing technique. This gives both confidentiality as well as authentication of the dealer who has sent image. During decryption secret image is known and the palm print of the dealer has to be reconstructed from the shares collected from authorized users, finally verification is done.

KEYWORDS: DTDWT, Image fusion, Threshold secret sharing, Reconstruction.

I. INTRODUCTION

In the field of drug store, military, land fields and afterward on, clusters of pictures should be prepared to encourage the best possible data in regards to the issue a patient has because of restorative field, to collect the information in regards to the terrorists amid a military field, to ask the information in regards to the fields that offer pleasant yield or mining inside of the field of earth science. Everyone inside of the higher than field use numerous assortments of pictures gathered from different sources and are handled abuse entirely unexpected picture prepare devices as per the need. The photos are regularly of 2 sorts: general ones and essential ones. The general pictures are open to any or all though vital pictures can't be gotten to by all. Some of the time the photos are frequently utilized as a district of the division of cryptography as data to be encoded or as a key for coding and coding of the information. In each the cases the picture ought to be secure from the unapproved customers essentially in partner degree open framework like net. In this way the protection accept a fundamental half while dealing with fragile or secret data amid a framework. Coding gives mystery to the delicate information anyway it ordinarily needs a key for every coding and coding of the data.

The key can be either symmetric key or open key. Both encryption and unscrambling require same key while utilizing symmetric key though while utilizing open key distinctive keys are utilized for both encryption and decoding. On the off chance that solitary proprietor has the key then it prompts numerous issues, for example, the proprietor may lose the key, he won't be available at the season of crisis. To evade every one of these issues the key is shared among the required number of approved clients, this is done utilizing limit mystery sharing system which is presented by Shamir [7].

Approved individuals are perceived to whom the secret key must be doled out. Assume there are N number of clients $U = \{u_1, u_2 \dots u_n\}$ and let K be the key which must be partitioned among N number of clients $\{k_1, k_2 \dots k_n\}$. These keys $\{k_1, k_2 \dots k_n\}$ are relegated to the $\{u_1, u_2 \dots u_n\}$ clients separately. In limit secret sharing technique (m, n), where m is the edge and n is the quantity of shares. At whatever point any client asks for the key it is vital that in any event m number of shares are required to do decoding prepare. It can't complete the decoding prepare regardless of the possibility that it gathers m-1 number of shares. This gives privacy to the secret picture. In any case, it gives confirmation just when it gathers the right share from the approved client.

The Discrete Wavelet Transform has two disadvantages they are move invariant and poor directional selectivity[6]. These two downsides are overcome utilizing Dual-Tree Discrete Wavelet Transform. DTDWT has been successfully used as a part of various applications for instance, picture denoising, surface examination, and development estimation. To use an overabundance change for weight gives off an impression of being restricting to the goal of weight which is to abatement whatever reiteration however much as could sensibly be normal. In any case, if coefficients of an overabundance change are adequately insufficient, weight can even benefit by the exhibited reiteration since most coefficients are right around zero.

II.RELATED WORK

Image combination methods can enhance the quality and also increase the use of this information. Deepak Kumar Sahu, M.P.Parsai [2] has presented a review on a percentage of the image fusion strategies for picture combination like, primitive combination (Averaging Method, Select Maximum, and Select Minimum), fusion based on Discrete Wavelet transform, and Principal segment examination (PCA) based combination and so on. Correlation of the considerable number of methods finishes up the better approach for its future exploration.

Image Fusion is a method that integrates [3] complementary data from multiple images such that the combined picture is more suitable for preparing undertakings. The work begins with the investigation of beginning ideas for image fusion. R.J.Sapkal, S.M.Kulkarni introduces, the combination of pictures from various sources utilizing multiresolution wavelet change with pre-processing of Image Fusion is proposed. The image fusion has more finish data which is helpful for human or machine discernment. The combined picture with such rich data will enhance the execution of picture examination calculations for medicinal applications.

Mohammad Pooyan et.al [4] presents a novel methodology for wavelet pressure of ECG signals based on the set dividing in progressive trees (SPIHT) coding calculation. SPIHT algorithm has made conspicuous progress in image compression. Here we utilize a changed adaptation of SPIHT for one dimensional signs. We connected wavelet change with SPIHT coding calculation on various records of MIT-BIH database. The outcomes demonstrate the high productivity of this technique in ECG pressure.

Rudra Pratap Singh Chauhan, Dr. Rajiva Dwivedi, Dr. Rajesh Bhagat [6] in their paper have shown the drawbacks of DWT they are shift invariance and directional selectivity and they proposed a new transform called DTDWT to overcome these two drawbacks.

Adi Shamir [7] in his paper has explained clearly about threshold secret sharing. He has shown it with the equations how it works. This paper also explains how decryption is carried when minimum number of shares is collected.

III.PROPOSED SYSTEM

Image fusion is basically a technique to combine the set of same type of images taken at different sources or angles to obtain the complete image with more information. Below Fig. 1 and Fig. 2 shows block diagram of proposed algorithm which is used for protecting the secret image whose confidentiality has to be maintained.

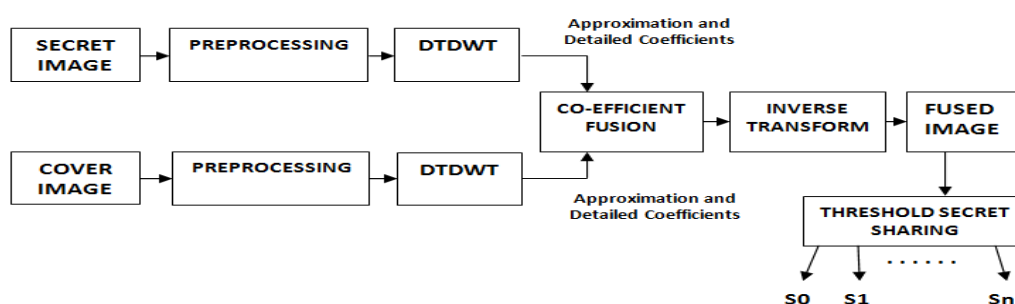


Fig. 1 Image Fusion Process

ENCRYPTION PROCESS:

Input image: Secret image as well as cover image is taken as input. Secret image is the one which needs to be protected and the cover image is known both during encryption as well as decryption process.

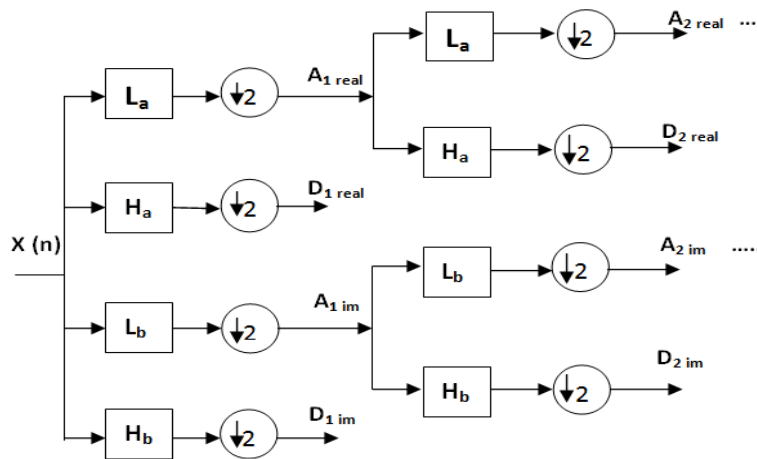


Fig. 2 DTDWT flow diagram

Coefficient Fusion: The coefficients obtained after DTDWT is applied on both secret image and cover images are fused. Each high-pass sub band from one filter bank is combined with the corresponding sub band from the other filter bank by simple linear operations: averaging or differencing. The size of each sub band is the same as that of 2D DWT at the same level.

Threshold secret sharing: The fused image obtained is divided and distributed to authorized users to obtain confidentiality and authentication. These are distributed to N number of users.

DECRYPTION PROCESS:

Fig. 3 shows the image reconstruction process. It involves reverse operation. The cover image is known during decryption process. Fused image is obtained from the authorized users who have the shares. At least $M < N$ number of shares are required to obtain the fused image. If shares collected are less than M, then decryption cannot be done.

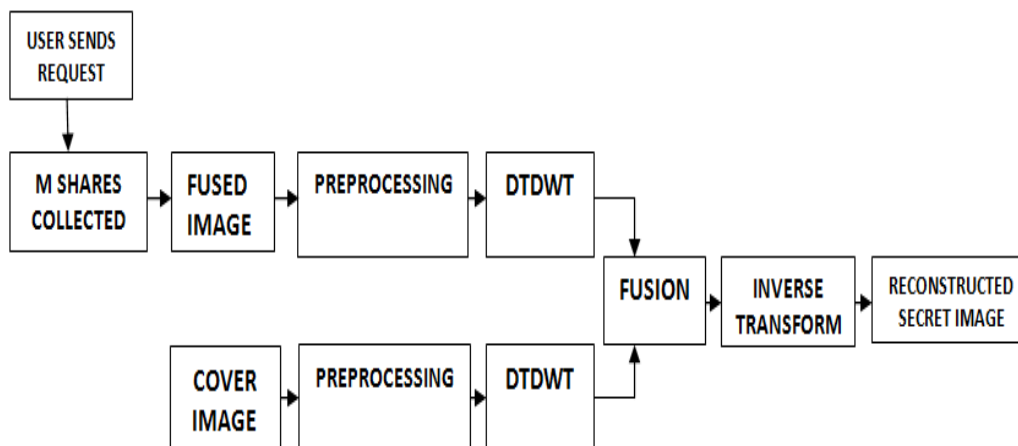


Fig. 3 Image Reconstruction Process

From the M shares collected fused image is constructed. Again similar to encryption process preprocessing is carried out for both fused image and host image. To the preprocessed image DTDWT is applied and the coefficients obtained are fused. After fusion inverse transform is applied and finally we get the secret image. In this way decryption process is carried out.

IV. RESULTS AND DISCUSSION

The image fusion joins the input images and collects useful information which gives the resultant image. Fig. 4 and Fig. 5 shows the input secret image and cover image.



Fig. 4 Secret Image



Fig. 5 Cover Image

These two are the inputs taken for the encryption process. To these two images DTDWT is applied and the coefficients obtained from both the images after transform is applied are fused together to obtain fused image. Fig. 6 shows the fused image obtained. This fused image is divided and distributed to authorized users.



Fig. 6 Fused Image

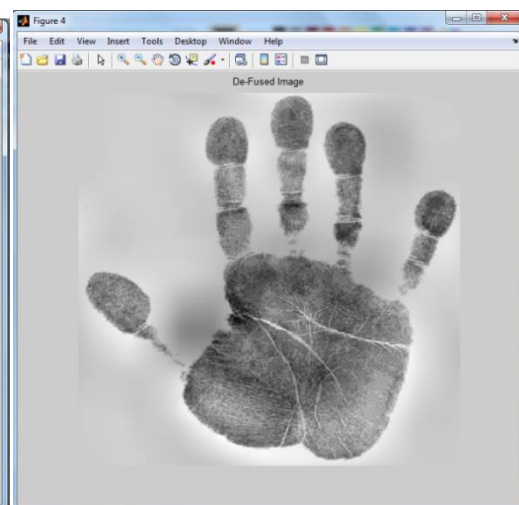


Fig. 8 Defused Image

To this fused image threshold secret sharing is applied, here visual cryptography method is used. While applying this method we can either choose horizontal or vertical. Fig. 7 shows the vertical shares obtained by applying Visual Cryptography to the fused image.

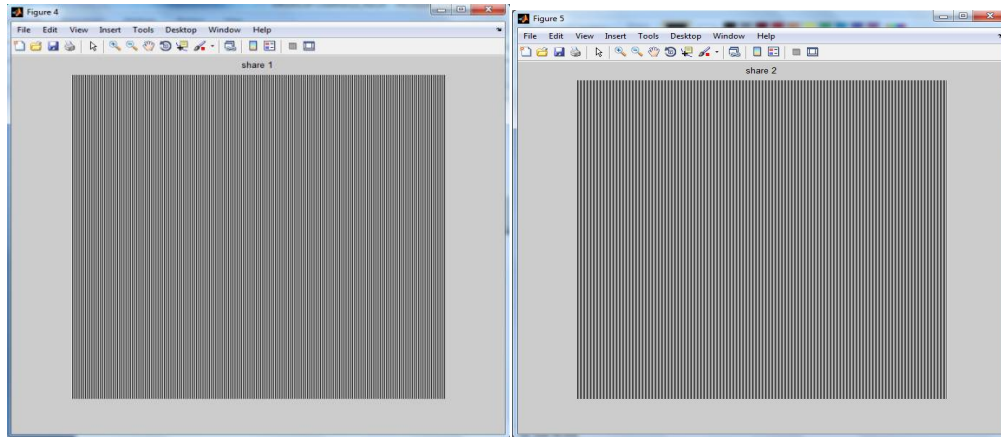


Fig. 7 Vertical Share 1 and share 2

During the decryption process the cover image is known and the fused image is obtained from the shares collected from authorized users. Even if one share is missing, then decryption cannot be carried out. To these images DTDWT is applied and the coefficients are fused similar to the encryption process.

V. CONCLUSION

An algorithm using Dual Tree Discrete Wavelet Transform is put forward in this paper. Image fusion is used to combine two images which give a better visual image suitable for processing. The drawbacks of using Discrete Wavelet Transform they are directional selectivity and shift invariance are overcome using DTDWT. Threshold secret sharing is used to provide both confidentiality and authentication to the secret image.

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