Secret-Fragment-Visible Mosaic Image-Creation and Recovery via Color Transformation

Remya R P[1] Harikrishnan M P[2]
[1]P.G. Student [2]Assistant Professor
[1,2]Department of Electronics & Communication Engineering
[1,2]Al-Azhar College of Engineering and Technology, Thodupuzha (Kerala), India

Abstract— Secret-fragment-visible mosaic image which automatically transforms the secret image into a meaningful mosaic image of the same size. The mosaic image looks like to an arbitrarily selected target image. It may be used as a camouflage of the secret image and yielded by dividing the secret image into fragments and transforming their color characteristics to the corresponding blocks of the target image. Some technologies are designed to conduct the color transformation process so that the secret image may be recovered. The information required for recovering the secret is embedding into the created mosaic image. Good experimental results are showing the feasibility of the proposed method.

Key words: Color Transformation, Image Encryption, Data Hiding, Image Transmission, Mosaic Image

I. INTRODUCTION

Now a days, various source images are transmitted and used through the internet for various applications, such as military applications, photography, document storages etc. Currently there are two methods have been proposed for the transmissions, ie; image encryption and data hiding.

The image encryption is the process to transmit the image securely so that no unauthorized user can able to decrypt the image. Video encryption, image encryption, chaos based encryption is the applications in many fields including the medical imaging, internet communication, transmission. The evolution of encryption is towards to the future possibilities. The image data has the special properties such as high redundancy and high correlation among the pixels. Encryption techniques is used to protect secret information. Encryption is defined as the conversion of plain message, is called a cipher text which cannot be read by the people without decrypting the encrypted text. Decryption is the reverse process of encryption which process in the conversion of the encrypted text to the original plain text, so that it can be read.

In this paper, the proposed method says, a new technique for secure image transmission is defined, which transforms a secret image into a meaningful mosaic image. They have the same size and looking like a preselected target image. The transformation process which is controlled by a secret key. This key can a person recover the secret image from the mosaic image. The proposed method is by Lai and Tsai [1], in which a new type of computer art image, called secret-fragment-visible mosaic image is proposed. The mosaic image is the result of the fragments that a secret image in disguise of another image. It is called the target image. The weakness of Lai and Tsai [1] is the requirement of a large image database so that the image can be sufficiently similar to the selected target image. The user is not allowed to select their image for use as the target image. Therefore in this study to remove this weakness of the method while keeping its merit. The aim is to design a new method that can transform a secret image into a secret-fragment-visible mosaic image of the same size. The visual appearance of the freely selected target image without the need of a database.

II. IMPLEMENTATION

The idea of the proposed method is shown in the fig: The proposed method includes two main phases 1) mosaic image creation and2) secret image recovery.

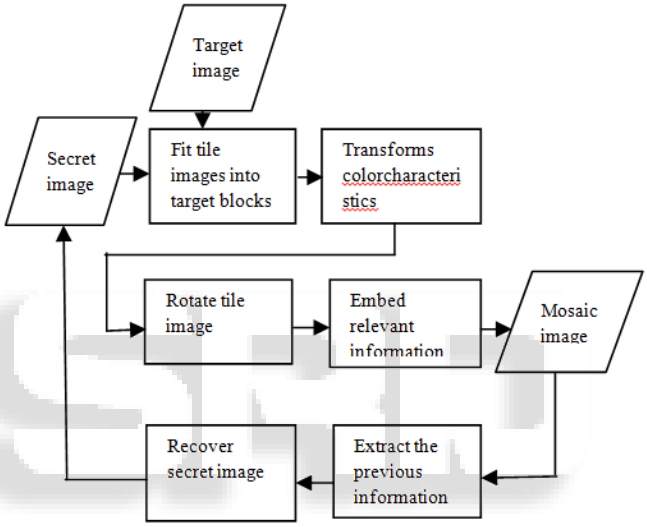

Fig 1: Flow diagram of the proposed method.

Step by step of the Implementation Algorithm. The first phase includes mosaic image creation.

1) Fitting the tile images into the target blocks of a preselected target image
2) Transforming the color characteristics[3] of the tile image in the secret image and the corresponding target block in the target image
3) Rotating each tile image into a direction with the minimum RMSE
4) Embedding the information into the created mosaic image for future recovery of the secret image.

The second phase includes secret image recovery

- Extracting the embedded information for secret image recovery from the mosaic image
- Recovering the secret image using the extracted information.

III. ALGORITHMS OF THE PROPOSED METHOD

There are two algorithms based on the above discussions

A. Algorithm 1: Mosaic Image Creation

Input: a secret-fragment-visible mosaic image F.
Steps:

- Stage 1. The tile images is fitting into the target blocks.

- Step 1. If the size of the target image is different from that of the secret image then change the size to be identical .
- Step 2.The means and the standard deviations of each tile images are calculated.
- Step 3.Sort the tile images according to the computed average standard deviation values of the blocks and map in order the blocks in the sorted to those in the sorted.
- Step 4.Create a mosaic image by fitting the tile images
- into the corresponding target blocks.
- Stage 2.The color transformation between the tile images and the target blocks are performed.
- Step 5. Create a counting table TB with 256 entries.
- Step 6. For each mapping $T_i \rightarrow B_{ji}$ in sequence L, represent
- the means μ_c and μ'_c of T_i and B_{ji}, respectively.
- Stage 3.The tile images rotation.
- Step 8.The RMSE values are calculated.
- Step 9:Compute Huffman table.

B. Algorithm 2: Recovery of Secret Image.

Input: a mosaic image F with n tile images and the secret key K.
Output: secret image S.
Steps:

- Stage 1: Extracting the secret image information.
- Step 1. Extract from F the bit stream I by a reverse version of the scheme proposed in [2] and decode them to obtain the data items: 1) the number of iterations is embedded; 2) the total number of used pixel pairs N_{pair} in the last iteration; and 3)for encoding the values of the residuals of the overflows or underflows Huffman table is calculated.
- Step 2. Extract the bit stream M'_t using the values of $N_i$and
- N_{pair} by the same scheme used in the last step.
- Step 3. Decryption of the bit stream M' into M_t by K.
- Step 4. Decompose $M_t$into n bit streams.
- Step 5. Decode M_i for each tile image Ti to obtain the following data items: 1) the block B_{ji} in F corresponding to T_i; 2) the optimal rotation angle θ° of T_i; 3) the means of T_i and B_{ji} and the related standard deviation quotients of all color channels; and 4) the overflow/underflow residual values in $T_i$decoded by the Huffman table HT.
- Stage 2. Recovering the secret image.
- Step 6. Recover one by one in a raster-scan order the tile images Ti
- Step 7. Compose all the final tile images to form the desired secret image S as output.

IV. RESULTS

Experimental results of the proposed system. In first phase the cover image is taken as the input image.

Fig. 2: Input image

In fig 2: the cover image is taken as the input image. A secret image, target image and secret key is the inputs.

Fig. 3: Target Image

Fig 3 is the target image. In this the tile image is fitting into the target image.

Fig 4: Output image

In this fig 4, the secret image is hide into the target image

Fig. 5: Recover image

In fig 5 the secret images is recover from the target image

V. CONCLUSION

A secret-fragment-visible mosaic image transmission method has been proposed, which can create meaningful mosaic image and also transforms a secret image into a mosaic image of same size for use as a camouflage of the secret image. The original data is hiding into the target image. This target image has the same size as the original image. There is no loss of data and error free. No noise is found in these images. Experimental results are shown, it refers the feasibility of the proposed method. The future works may be described by applying the proposed method to images of color models other than the RGB.

ACKNOWLEDGMENT

I would like to thank the reviewers for their helpful suggestions, which improved the quality of this review.

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