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Secure Picture Transmission Technique Using Mosaic Picture By RCT

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Abstract: A new secure picture transmission technique that changes naturally a given enormous volume secret picture into a secret-fragment-visible picture is called a mosaic picture of an exactly similar size. The mosaic picture, which looks to be like a discretionarily choose target picture and may be used as a disguise of the secret picture, is yielded by separating the secret picture into sections and changing their shading attributes to those of the comparing pieces of the target picture. Skillful techniques are invented to lead the shading change process so that recovered secret pictures may be almost losslessly. A scheme for handling overflows/underflows in the converted pixels shading values by recording the shading contrast in the untransformed shading space is proposed in addition. The data needed for improving the secret picture is embedded in the created mosaic picture by a lossless information concealing plan using a key.

Keywords: mosaic picture,picture encryption, data hiding , secure picture transmission.

I. INTRODUCTION

Currently, pictures from different sources are frequently used and are transmitted through the web for different applications, such as online personal photograph albums, private enterprise archives, restorative imaging framework, medical imaging system, military picture databases. These pictures generally contain secure or confidential data so that they ought to be protected from leakages during transmissions. Recently so many techniques have been proposed for secure picture transmission, for which two basic techniques are data hiding and picture encryption.

Picture encryption is a method that makes use of the characteristic property of an picture, such as strong spatial correlation and high redundancy, to get a scrambled picture. The scrambled picture is a noise picture i.e it is a useless document, which can't give extra data before unscrambling and this may stir an assailant's attention during transmission because of its irregularity in structure.

An alternative method for secure picture transmission is the data hiding that hides a secret message in a cover picture so that one cannot recognize the presence of the secret picture. But the important issue of this method is that if anyone wants to hide a secret picture in a cover picture with an identical size, the secret picture must be exceptionally compacted ahead of time. However for many applications, such as transmitting medical pictures, legal documents, and military pictures etc. that contains private information, in such cases, data compression operations results in a loss of important information.

In this paper, we proposed an approach for secure picture transmission, which transmitted secret pictures into significant mosaic pictures of the same size and which look like a preselected target picture. The transformation method is measured by a secret key and with the secret key person can recover the secret picture nearly losslessly from the mosaic picture. The mosaic picture is the result of the arrangement of the fragments of a secret picture in disguise of another picture called the target picture which is preselected from the database.

A mosaic picture is a process of generating pictures or decorative arrangements. They are created by cementing together insignificant pieces of glass, stone and other hard materials of various colors. Mosaic contains more number of small pictures called tile pictures. Mosaic picture can be created by dividing the original picture into many tiles and for every tile, find another picture with similar content from an picture database. Finally, we have to build the mosaic picture by exchanging all tiles by their similar pictures.

Firstly the given secret picture is divided into rectangular fragments called tile pictures, then which are fit into same blocks in the target picture, called as target blocks, according to a homogeneous condition based on color variations. Next, the color characteristic of every tile picture is changed in to that of the corresponding target block in the target picture, which results in a mosaic picture which looks like the target picture. The proposed method is new so that a meaningful mosaic picture is created, in contrast with the picture encryption method that creates meaningless noise pictures.

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Also, this method can transform a secret picture into a significant mosaic picture without compression, and data hiding method must hide a highly compressed version of the secret picture into a cover picture when the cover picture and the secret picture have the same data volume.

II. RELATED WORK

1. "A New Secure Picture Transmission Technique via Secret-fragment-Visible Mosaic Pictures by Nearly RCT"
In this paper, Ya-Lin Lee shows a method for the transmission of the secret picture securely and lossless. This technique transforms the secret picture into a mosaic tile picture having the same size as that of the target picture which is previously selected from a database. This color transformation is controlled and the secret picture is recovered losslessly from the mosaic tile picture with the help of the extracted applicable information generated for the recovery of the picture.[1]
2. "Secret-fragment-visible mosaic picture -A new computer art and it's application to information hiding", I. J. Lai and Tsai, proposed, a new technique of computer art picture is called secret-fragment-visible mosaic picture proposed which is created automatically by setting small pieces of a given picture in a mosaic form, and then embedding a secret picture in the resulting mosaic picture. This type of data hiding is helpful for covert communication and secure keeping of secret pictures.
In this paper, the database is used to choose the target picture. After selection, the secret picture and target picture are preprocessed and splitting into tiles and blocks. Secret picture tiles are made to fit into the target blocks and create a mosaic picture. The drawback of this technique is the use of database for target picture selection, that requires extra memory to store mosaic picture and mosaic picture can be similar to selected target picture.[2]
3. C. K. Chan and L. M. Cheng, proposed a "Hiding data in picture by simple LSB substitution [3]", it is a method of hiding the secret data in a cover picture so that unauthorized person will not realize the presence of a hidden data.
This paper shows, 8-bit grayscale pictures are chosen as cover media and are called cover pictures. LSB is one of the common data hiding methods, which replaces the LSB's of cover picture with message bits.
Experimental results show that with extra computation complexity we can get the enhanced picture quality.
The drawback here, is when the size of storing messages is increased, the picture quality of the cover picture is degraded.
4. Y. Hu, proposed a "Difference expansion based reversible data hiding using two embedding direction [4]", recent difference expansion embedding method performs only one layered embedding in a different picture due to which there will be degradation in the picture. So in this paper proposed a new difference expansion embedding algorithm based on Harr wavelet transform, which make use of two embedding directions horizontal and vertical difference picture for data hiding which specifies the algorithm and makes it flexible to different types of pictures.
The proposed algorithm doesn't have the original layer embedding capacity limit. It can perform well at different embedding rates.

III. PROPOSED SYSTEM

The proposed method has two main phases shown by the block diagram of Fig.1
1. Mosaic picture creation
2. Secret picture recovery

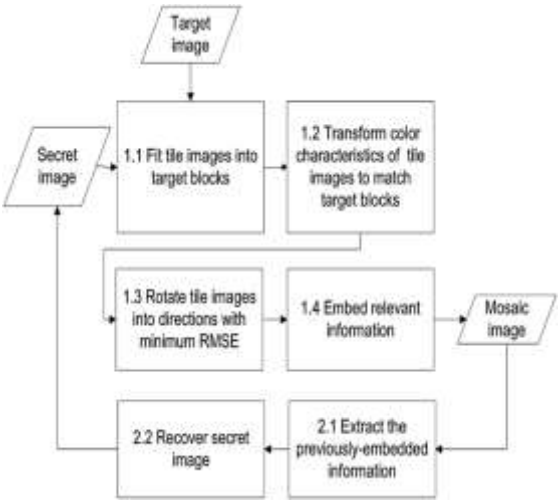

Fig.1 block diagram of proposed system

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In the first phase, a mosaic picture is gained, which comprises of fragments of input secret picture with color corrections as per similarity criterion based on color variations.[1]
The phase has four stages: 1) fitting the tile pictures of the secret picture in the target blocks of a previously selected target picture; 2) By changing a characteristic of the color of every tile picture in the secret picture to turn that of corresponding target block in the target picture; 3) rotating every tile picture into a direction with the minimum RMSE value concerning its corresponding target block; 4) implanting required data into the created mosaic picture for future recuperation of the secret picture.
In the second phase, the embedded data is extracted to recuperate the secret picture nearly losslessly from the created mosaic picture. The phase has two stages: 1) extracting the implanted information from the mosaic picture for regaining the secret picture, and 2) regain the secret picture using the extracted information.

Algorithm for Mosaic picture creation:
Input: a secret picture S, a target picture T, and a secret key K.
Output: a secret-fragment-visible mosaic picture F.
Step 1: Take the input s are secret picture, target picture and key.
Step 2: Generate the tile blocks for the secret picture and target blocks of the target picture.
Step 3: Determine the mean and standard deviation for each tile block and target block.

$$\mu c = 1/n \sum_{i=1}^{n} Ci$$

Where Ci - pixel value of c-channels such as red, green, and blue.
n- No of pixels

$$\sigma c = \sqrt{1/n \sum_{i=1}^{n} (Ci' - \mu c')2}$$

Step 4: Calculate the average standard deviation of each block and sort them.

$$Ci' = q_c(Ci - \mu c) + \mu c'$$

Where - standard deviation quotient
Step 5: Sort the tile blocks and target blocks according to sorted average standard deviations respectively.
Step 6: Map sorted tile blocks with the sorted target blocks. Step 7: Generate mosaic picture fitting tile box as per the mapped target blocks.
Step 8: Transform the color of all the pixels of every tile picture using means and standard deviations.
Step 9: Rotate each transformed tile to 90,180 and 270 degrees and then calculate root mean square error.
Step 10: To keep the rotation with minimum RMSE.
Step 11: Modify the mean and standard deviations for every tile block and mapped target block to binary.
Step 12: Transform tile rotation performed in binary.
Step 13: Concatenate the bit stream and compress it into data to be embedded into the corresponding tile box of the mosaic picture.
Step 14: We will finally get the output of mosaic picture.

Algorithm for Secret picture recovery:
Input: a mosaic picture F with secret key k and n tile pictures.
Output: the secret picture S.
Step 1: Extract the bit stream from mosaic picture F by performing a reverse operation.
Step 2: Decode the bit stream by using secret key K.
Step 3: Recover the desired secret picture S by rotating the tile pictures in a reverse direction.
Step 4: Use the extracted mean and standard deviation quotients to recuperate the original pixel values.
Step 5: Gain the results as the final pixel values, result in a final tile picture.
Step 6: Combine all the final tile pictures to form the desired secret picture S as output.

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IV. RESULTS

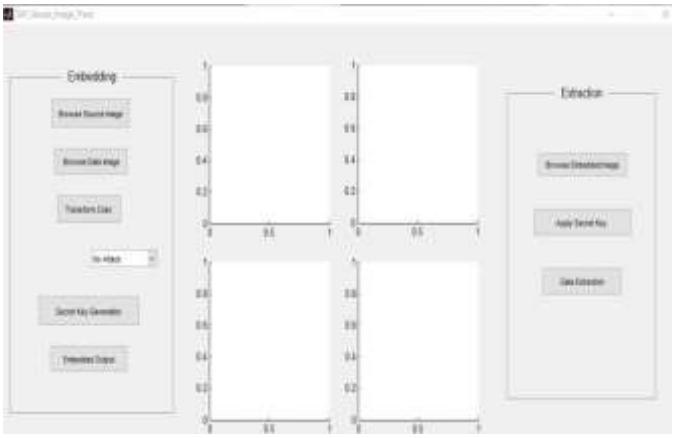

Fig. 2 GUI Screen

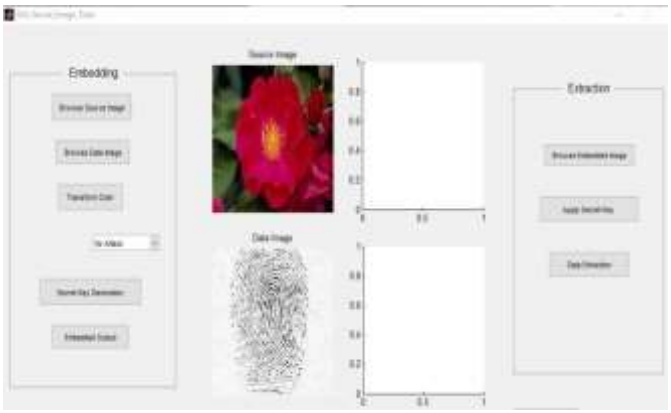

Fig.3 Source and data picture selected

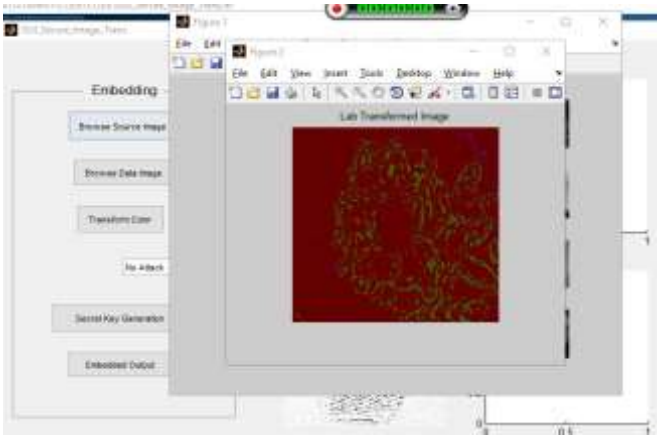

Fig.4 Color transform

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Fig.5 Secret key Encryption

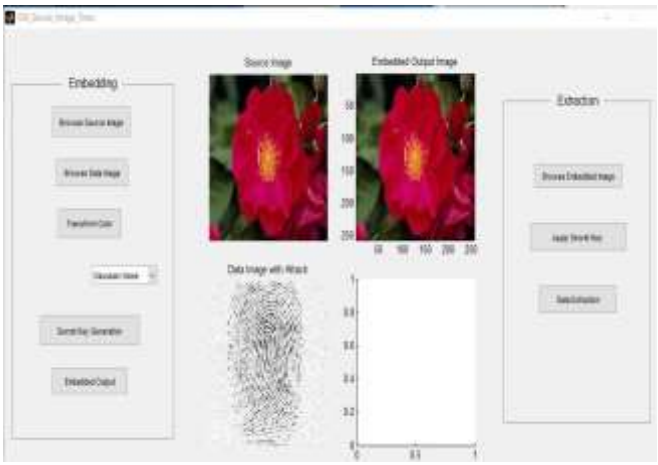

Fig.6 Output

V. CONCLUSION

A new secure picture transmission technique creates a meaningful mosaic picture and can also transform the secret picture into a secret-fragment-visible mosaic picture of a similar size and has the same visual appearance as the target picture which is pre-selected from the database. With this technique, user can select his/her favourite picture to be used as a target picture without the need of large database. Also the original secret picture can be recovered nearly losslessly from the created mosaic picture.

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