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# An Efficient Approach in Image Secuirty using Secret Fragment Visible Mosaic Image

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**ABSTRACT***:* Images are frequently used for various purposes; these images are transmitted through the internet, so that the security of transmitted images plays a vital role here. The transmitted data may contains secret or confidential information, hence the security of the data from leakages or hackers while transmitting is utmost important. In order to achieve this many algorithms regarding data security have been proposed here. A novel approach termed mosaic fragment for the security of transmitted image has been presented. The secure image transmission is done by transforming a secret image using mosaic fragment visible images with almost same size as of the target image. The target image will be selected randomly, so mosaic image must look similar to target image, which will be used to hide secret image. In this paper a secret fragment mosaic image method, that will automatically created by integrating small fragments of given image to become target image in mosaic form has been used. For resulting mosaic image will perform colour transmission reversibly to reduce distortion and to recover the secret image exactly from input image. The proposed model demonstrates the effectiveness of the selected algorithm.

**KEYWORDS:** Mosaic Image, Secret Fragment Visible Mosaic Image, Reversible Color Transformation.

## I. INTRODUCTION

In a recent era, data hiding is one the most emerging and challenging research area. Marinating data privacy, authenticating users before accessing the sensitive data, data protection, copyright maintains is all main requirement comes under in data security. In today's internet world a huge amount of data transfer and receive in every minute. So maintaining a privacy or security for all multimedia is the most challenging. "Image" is one of the most essential multimedia, there are various sources and application areas which are frequently generate and transmit a set of images through internet in everyday to today life. This leads to the data security concepts, where it becomes necessary to maintain originality of input data while transmitting over the internet. There are multiple scenarios (with respect to application areas) where hackers are always looking to leak the sensitive data which transmitted over the network. In order to maintain the confidentiality of user data there must be necessary to meet secure data transmission over the communication network, to achieve this set algorithms has been designed to ensure the security.

Image encryption and data hiding are the two common methods recently used for securing the digital image during transmission. In Image encryption, the sender will make use of the natural property of image (i.e. spatial pixel correlation, high redundancy) and is a network key based on these property a noise image get generated. This noisy image is get transmitted over the network. The attacker come to know the encrypted data but unable to decrypt it unless he/she has correct key. Encrypted image is completely useless and sender not able to add any other information , in encryption the attacker come to know the presence of sensitive information that time he/she try to understand the randomness of encrypted data. This problem is over come by using data hiding techniques.

Data hiding, in which one more digital model is used to hide the sensitive data. The object which is used for covering the secret information is termed as 'Cover object'. Embedding secret data into a cover object such that the third person is unable to feel the presence of sensitive data in a cover object. This technique is termed as "Steganography" which miss lead the attacker. LSB, histogram shifting, recursive modification and wavelet transformation are frequent used algorithms in steganography. The main challenging thing involved in this technique is, when secret data is too large than it is difficult embed in a single cover image. So it is necessary to compress the secret data before embedding into a cover image.

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Mosaic images are the most emerging image data hiding technique in digital image processing. Which also need a target image or cover image and secrete data. The generated mosaic image is similar to target image. In this paper we propose a new method that generates mosaic images with large database, further will compare both secret and target image and find the most similar target image. Thus the resultant mosaic image can be used for covert communication or for secret image transmission. In this proposed paper will use secret fragment visible mosaic image method, which is automatically created by composing small fragments of a given image to become the target image in mosaic form, in order to achieve effect of embedding the given image visibly but secretly in the resulting mosaic image. For resulting mosaic image will perform reversible color transmission in order to reduce distortion and also to recover the secret image exactly from the cover/input image. Good experimental results demonstrate the feasibility and effectiveness of the proposed method.

Below section II presents the survey performed on multiple methods used of mosaic image creation and transmission. The respective problem statement is summarized in section III. Proposed system architecture is briefly presented in section IV. Section V briefly summaries the experimental results of the proposed system.

## II. LITERATURE SURVEY

S. Merlinet et.al, [01] has proposed Covert Image Transmission Technique Using Mosaic Image measures. They used secret-fragment-visible mosaic image technique with nearly reversible color transmission scheme. The secret and target images of same size are used. The division of both images is matched according to the standard deviation of the division. To ensure a positive standard deviation for the secret image, a pseudorandom Gaussian noise signal is added to the secret image. The experimental results show that the presented method has high embedding rate of with least distortion.

K. Naga Jyothi et.al, [02] has proposed An Algorithm Based on Secret-Fragment-Visible Mosaic Images for Secure Image Transmission Using Pixel Color Transformations. By using this pixel color transformation helps to get the lossless recovered image based on the untransformed color space values. Key generated in the code also helps to get the lossless data from the secret image. This same approach is performed on the videos to get the lossless data from the motion related videos.

Jaya.S et.al, [03] has proposed a secure mosaic image transmission by reversible integer color transformation technique a scheme of handling the overflows or underflows in the converted pixels color values by recording the color differences in the untransformed color space is also proposed. The efficiency of the image recovered after transmission is also calculated in order to check the performance of the proposed technique. The proposed method is applied to database as well as real time image. A concept of tethering is used in order to extend the limitations of the proposed method.

Deepak A. B. C et.al, [04] has implemented an approach for image authentication in disguise of another image using color transformation technique and mosaicking image. They have considered simple LSB substitution for hiding data required for image recovery in the receiver side. Shabana Vathelil Subair et.al, [05] has proposed hiding of the secret image by color transforming their characteristics similar to the blocks of the target image. Such technique is necessary so for the lossless recovery of the transmitted secret image. The appropriate information is embedded into the mosaic image for the recovery of the transmitted secret image.

## III. PROBLEM STATEMENT

The proposed system presents the generation of mosaic images by using multiple computer vision algorithms. The process is not limited with generation of mosaic image; it is further extended for extracting the secret images. A revere operation is employed for to de-embed the mosaic images. The application of reverse color transformation will presents an secret image which is hided in a target image.

## IV. PROPOSED SYSTEM

The proposed architecture for mosaic image creation and extraction of secret image from mosaic image is depicted in below Figure 1(a) and 1(b). Initially the based on the user data analysis a secret image and target image been

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selected. Selection of target image and secret image is the main key point of in a mosaic image creation. Once both images get selected than selected input images are passed for preprocessing functional block. Pre-processing functional mainly include to resizing function. In mosaic image creation it is necessary to maintain same size for both target image and secret image.

Further the processed source image is segmented into small piece of tiles and processed target image is segmented into an equal number of blocks with same size (i.e. no. of blocks equal to no. of tiles). The application of splitting technique efficiently divides given image into a multiple slices. The main problem in the splitting technique is how to choose a appropriate divided blocks of target image for each of the tile of secret image, in order to make it easy will calculate the mean of standard deviation of the pixels of the block as a similarity measure value to select most appropriate block B for each of the tiles T of secret image.

Next, in order to create the mosaic image will use sorted sequence of standard deviation to form resultant image. That is we fit the first tile in sequence S tile into the first block in sequence S target, and accordingly fit the second tile in Stile to second block in S target and process continues. In this way will keeps on fitting each of the tiles T of secret image to form resultant mosaic image. It will look somewhat similar to the selected target image. Thus will get the noise free mosaic image, his will use to recover the secret image.Figure 1(b) represents the proposed architecture for recovery of secret image. As the target and secret image color characteristics are different from one another it may happen that the resultant mosaic image may contain some distortion due to its color differentiations.

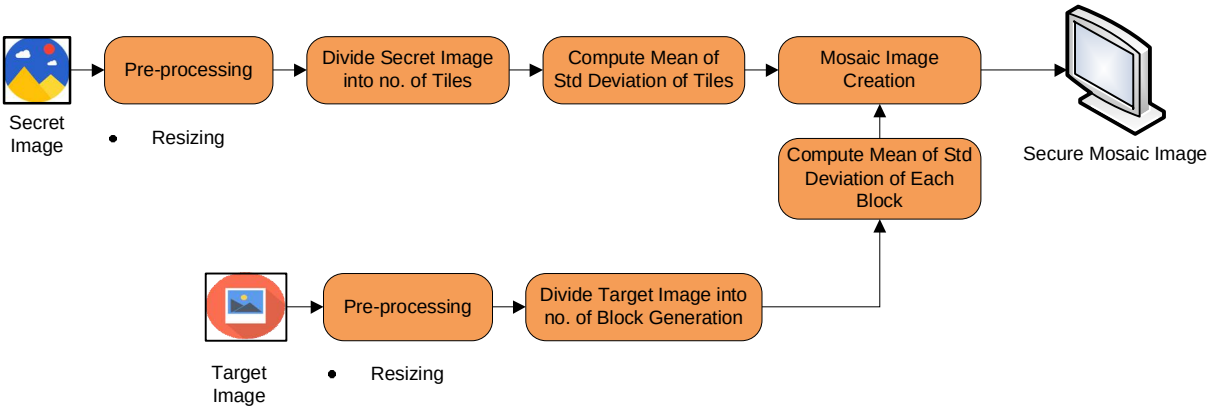


Figure 1(a): Block Diagram of Proposed Architecture for creating Mosaic Image

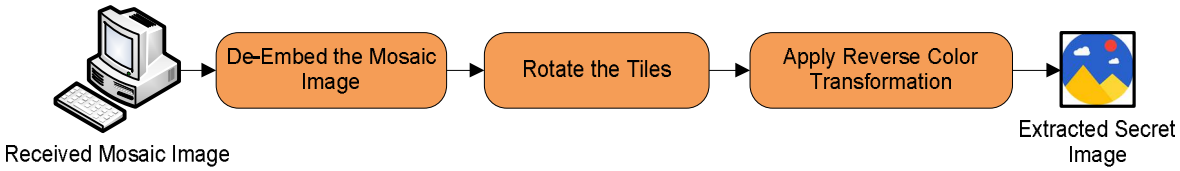


Figure 1(b): Block Diagram of Proposed Architecture for Recovery of Secret Image

So to reduce this distortion reversible color transformation is proposed so that the resultant mosaic image should look identical to that of target image. After transforming color characteristics of target and secret image, in order to enable better fitting of tile block to that of target block , we have to rotate resulting mosaic image with minimum RMSE i.e. (root mean square error) value with respect to target image. Finally we can recover the secret image in better efficient way.

### *A. Creation of Mosaic Image*

Pre-processed secret and target image is divided into small pieces called as tiles. For creating secret fragment visible mosaic image by proposed algorithm there is requirement that the number of blocks of target image should be same in size and number to that of secret image. So we divide both the target image and secret image by using same splitting

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*B. Reverse Color Transformation*

As the target and secret image color characteristics are different from one another it may happen that the resultant mosaic image may contain some distortion due to its color differentiations. So to reduce this distortion reversible color transformation is proposed so that the resultant mosaic image should look identical to that of target image.

For color transformation, let us consider T and B as two pixel sets described by $\{P_1, P_2, P_3 \dots \dots \dots P_n\}$ and $\{P_1, P_2, P_3 \dots \dots \dots P_n\}$ respectively, where T is used to represent secret image block and B is used to represent target image block. Let us further consider that each pixel $P_i$ is represented by color $(r_i, g_i, b_i)$ and each pixel $P_i'$ is represented by color $(r_i, g_i, b_i)$. Next we have to compute mean and standard deviation of T and B respectively by using formula given below.

$$\mu_c = \frac{1}{n}\sum_{i=1}^{n} C_i \quad ,\mu'_c = \frac{1}{n}\sum_{i=1}^{n} C'_i \tag{1}$$

$$\sigma_c = \sqrt{\left(\frac{1}{n}\sum_{i=1}^{n}(C_i - \mu_c)^2\right)}$$

$$\sigma'_c = \sqrt{\left(\frac{1}{n}\sum_{i=1}^{n}(C'_i - \mu'_c)^2\right)} \tag{2}$$

Where in this equations $C_i$and $C'_i$denotes C channel values of each pixel $P_i$and $P'_i$ respectively, with c= r, g, or b and C= R, G, or B. In next step we have to compute new color $(r''_i, g''_i, b''_i)$ for each $P_i$ in T by using formula given below

$$C''_i = q_c\,(C_i - \mu_c) + \mu'_c \tag{3}$$

Where qc is the standard deviation coefficient calculated by using $\left(q_c = \frac{\sigma'_c}{\sigma_c}\right)$ and c = r, g, or b. Now to compute original color value that is $(r_i, g_i, b_i)$ of $P_i$ we have to use inverse of (3) which is given by

$$C_i = \left(\frac{1}{q_c}\right)(C'_i - \mu'_c) + \mu_c \tag{4}$$

After performing color transformation by using formula given in above section it may be possible that new tile T' obtained after color transformation contain some pixels that might have overflow/underflow values. We have to deal this overflow/underflow values for that we have to convert all the pixel values above than 255 to 255 and pixel values less than zero to zero. To recover the color of original tile block T we have to record residual value that is the difference between original pixel values and converted one and record them as well.

*C. Rotating Blocks to Allow it to Fit Better*

As the target and secret image color characteristics are different from one another it may happen that the resultant mosaic image may contain some distortion due to its color differentiations, so to reduce this distortion reversible color transformation is done. After transforming the color characteristic of secret image tile T to that of corresponding target block B, to further improve the color characteristic and to enable better fitting of tile block T to that of target block B, we have to rotate resulting tile image T' yielded after color transformation into one of four directions i.e. 0°, 90°, 180°, 270° and compute the RMSE values Rotate tile into the optimal direction with the smallest RMSE value which yield rotated version of T' with minimum RMSE i.e. (root mean square error) value with respect to target image .

## V. EXPERIMENTAL RESULTS

The depicted figures demonstrate the experimental results of our proposed work. Fig.2 (a) indicates secret image, Fig.2 (b) represents target image, both considered as input images. These images will be processed by pre-processing

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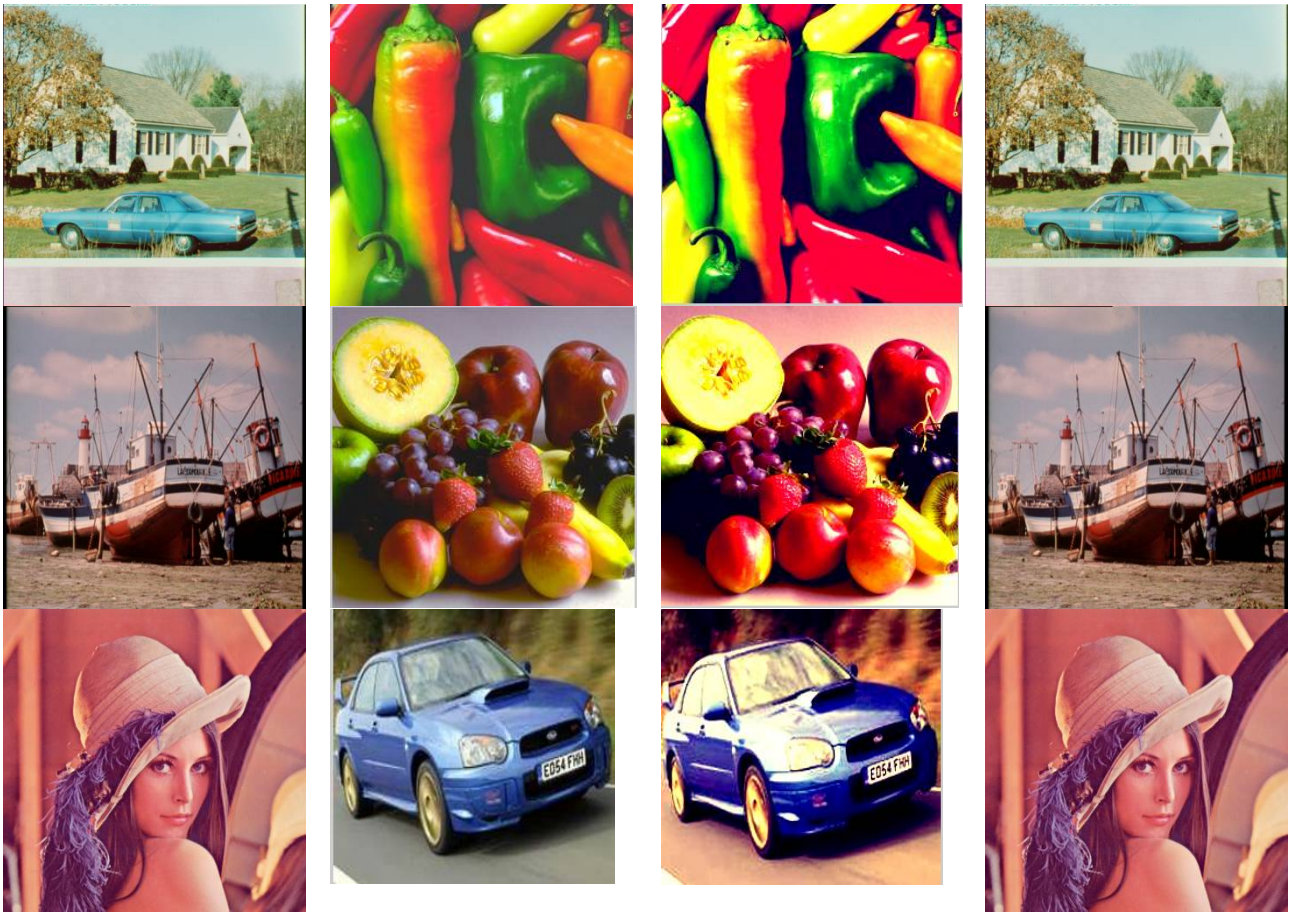
technique, in a pre-processing functional block the size of secret image and target image make with equal size. This resized image is divided into a number of blocks. Further standard deviation is computed for all blocks or tiles of secret image and target image. The resultant outcome depicted in Fig (c), indicates mosaic image, Fig.2 (d) represents extracted secret image by using reverse colour transformation. The proposed model gives best results compared to other conventional methods.



(a) Secret Image (b) Cover Image (c) Mosaic Image (d) Extracted Secret Image

Fig.2: Results of proposed Work

## VI. CONCLUSION

A novel approach for the creation of secret fragment visible mosaic image has been presented in this paper. The proposed technique will allows user to randomly select any target image of their choice in order to create mosaic image. Apart from this user can also select secret image and target image with almost the same size to create mosaic image. The processes resultant mosaic image will be used for the security of information being transmitted. The ensuing mosaic image is used to recover the secret image without any deformation. The implementation of reversible colour transformation on mosaic image is done in order to minimize the root mean square error. The original secret image can be recovered near lossless from created mosaic images. The future work involves direction to applying presented approach to images of colour models other than the RGB.

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