A Survey on Secret-Fragment Visible Mosaic Images by Nearly Reversible Color Transformation

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Abstract— A new secure image transmission technique is projected, which transforms automatically a given large-volume secret image interested in a so-called secret-fragment-visible mosaic image of the identical size. The mosaic image, which looks analogous to a randomly particular target image and may be used as a disguise of the top secret image, is yielded by sorting out the secret image into fragments and transforming their color characteristics to be individuals of the corresponding blocks of the target image. skilled techniques are planned to conduct the color transformation method so so as to the secret image may be improved nearly lossless. A system of handling the overflows/underflows in the transformed pixels' color values by recording the color differences in the unreconstructed color space is also planned. The information requisite for recovering the secret image is embedded into the formed mosaic image by a lossless data hiding scheme with a key.

Key words: Color transformation, mosaic image, covert communication, data hiding

I. Introduction

In recent years hiding data in image has been proposed for the purpose of information assurance, authentication, fingerprint, security, copyright protection, data mining etc. In data hiding, pieces of information which are represented by various data are concealed in a cover media like image. In many cases, the cover media experienced some eternal deformation due to hiding data image and cannot be inverted back to the original data. In the previous some year image mosaic has turn into a popular topic in field of digital image processing and image based technique. Mosaic is a dissimilar category of art created by generating small pieces of any materials, such as glass, stone, tile, etc. It is pretend in antique period, but still used in many applications today. Creation of mosaic images by computer is a new research direction in recent years. Currently, images from various sources are often utilized and transmitted throughout the internet intended for various applications, such like confidential enterprise archives, online personal photograph albums, medical imaging systems, military image databases, document storage systems. These mosaic images usually contain private or confidential information so that they should be secluded since leakages during transmissions. Image transmission is a technique where not only meaningful mosaic images are created but also can transform secret image. With the use of proper overflows and underflows as well as pixel color transformations in the converted values of pixels' colors, secret fragment noticeable mosaic images with almost similar to selected target image. The original secret image is recovered nearly lossless from the created mosaic image [1]. LSB substitution with pixel adjustment process for hiding of data is proposed. The image quality of stego image can be improved with less complexity [2].Digital image in reversible way embeds convert invisible data hiding images by lossless data embedding. In this method one can improve the embedded data to restore the original image [3]. A traditional approach for quality appraisal based on poverty of structural information. In this paper objective technique for accessing perceptual image quality attempted to quantify the visibility of errors between a distorted image and a reference image [4]. This paper has proposed reversible hiding data image algorithm, which can be recovered by the original image without any distortion from the marked image once the secret data have been extracted. It is showed that peak signal-to-noise ratio of the marked image generated using this method is above 48 dB [5]. A spatial domain reversible watermarking provided that high data embedding bit-rate at a very low mathematical complexity has been discussed in the paper [6],[9]. A blind watermarking method based on the DWT has proposed in the paper. The values of PSNRs of the watermarked images are always greater than 40 dB as shown in results [7]. DE algorithm may cause distortions in the output image; moreover the algorithm cannot perform smoothly near the layer embedding capacity limit. In this paper a new embedding algorithm has proposed to overcome these problems. The mechanism effectively avoids embedding distortions resulting from the use of large differences in the previous difference image [8]. In the proposed scheme the difference between centre index and its neighbouring indexes in each sub-block of indexed table by using a palette colour replacement is used[10],[11]. A new type of digital art called secret fragment- visible mosaic image has been proposed in paper[1]. A new color scale and new gray scale have been proposed to define a new feature which then are used to define appropriate similarity measures for images and blocks for generating secret-fragment-visible mosaic images more effectively [12].A image steganography method has been proposed in this paper [13], which creates secret mosaic image from an arbitrarily selected target image.

II. Literature survey

In the tubular format, I shown the proposed work of the author with respective year in short as-

Sr. No	Year	Author	Proposed Work
1	2001	Chin-Chen,Min Shian Hwang,Tung Shou Chen[14]	Vector Quantization method achieved a low bit rate image compression.
2	2002	Young Chang hou Hou[15]	Gives backward compability with previous results in black and white VS to decrypt the image

3	2003	Soo Chang Pei Jing Ming Guo[16]	Combine WBEDE $ KAEDE in which large amount of information is embedded & maintain good quality of results.
4	2004	Sabu M Thampi[17]	Used LSB insertion discrete cosine transform technique to hide image
5	2005	Clemens Fruhwrth[18]	They proposed efficient algorithm for series of multiplication in a Galois field along with password based security analysis and TKS1.
6	2006	Zbicheng Ni,YunQing , Ansari,Weisu[5]	Embed a large amount of data using zero or smallest point of the histogram.
7	2007	Dihu Coltuc & Jean Marc Chassery[6]	Used data hiding technique like RCM having lower mathematical complexity
8	2008	Yongjian Hu,Heung Kyu lee,Kaiying Chen Jianwei[8]	Proposed algorithm which improve image quality by using Haar wavelet transform by reversible data hiding
9	2009	Inkoo Kang, Gonzalo R. Arce ,Heung Kyu lee[19]	In this, quantization error at each pixel is filtered and fed back to the future input for VS by using Matrices construction with VIP synchronization algo.
10	2010	Monisha Sharma[20]	They provide security function as well as visual check by using chaotic schemes
11	2011	I-Jen Lai ,Wen Hsiang Tsai[12]	Create a secret fragment visible mosaic image by fragmentation technique to better data security by Mosaic Image Creation Algorithm.
12	2012	Jagdeep Varma,Dr.Vineeta Khemchandani[22]	Add the merits of both VC & blind watermarking by avoiding any feature from original image.
13	2013	Anupita u.Mande,Manish N. Tibdewel[23]	They introduce color error diffusion technique for generating Half tone shares which are extra pleasant to human eyes
14	2014	Ya Lin Bee , Wen Hsiang tsai[1]	They converts secret image into a significant mosaic image with the identical size by reversible color transformation.

Table 1:

III. Survey of Different Mosaics

A. *Jigsaw Mosaic Images:*

The Jigsaw Image Mosaic formation is a solution to problem, known a randomly shaped container image and a set of arbitrarily-shaped image tiles, plug the container completely possible with tiles of analogous color.

Fig.1: (a) Original image (b) Jigsaw Mosaic Image

In this mosaics picture tiles of random shape are used to create the final arbitrarily-shaped picture called Jigsaw Mosaic Images. Input is considered as a container image of arbitrary shape and a situate of image tiles of arbitrary shape, then packs the container as efficiently as achievable among tiles of similar color to the container taken from the input position as optionally deforming them slightly to get a extra visually pleasing effect.

B. *Analysis on Multiresolution Mosaic:*

When more than two images are going to combine, the overlapping is formed and it get difficult to get idea of image combination. To reduce this difficulty, an image mosaic processing technique can be applied to great extend. To mosaic an image is to merge overlapped images therefore so as to the mixed image contains no obstructive boundaries in the conversion section while preserving the broad appearance of the original images. An image mosaic is usually done into two stages. In the first stage, the equivalent points in the two to be-combined images are identified and registered. This step is typically referred toward as image registration. Inside the second stage, we get the blended images intensities after the equivalent points have been registered. Not each and every one applications of image mosaicing want registration, such as in movie unique effects.

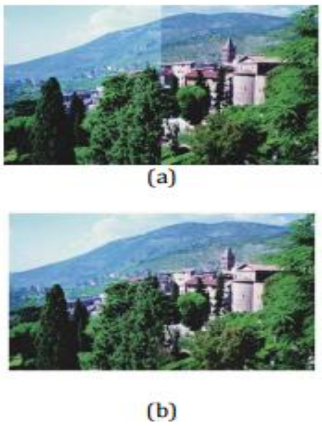

Fig. 2: (a) image with overlapped boundary (b) image without boundary

C. Mosaic Images Using Voronoi Diagram:

A Voronoi diagram is a geometric formation that represents nearness information regarding a set of points or objects. Specified a set of sites or objects, the plane is partitioned with assigning to every point its adjacent site. The points, whose adjacent site is not distinctive, form the Voronoi diagram. This technique consists of two processes. In the first process, the mosaic image is involuntarily generated by forming the most favorable Voronoi diagram so that the error among the original image and the resulting image becomes as minute as possible. The second method allows the user to put in different effects to the mosaic image created by the first step. The second process is intended in accordance through our observation of stained glass windows since stained glass is one of the applications that use mosaic images.

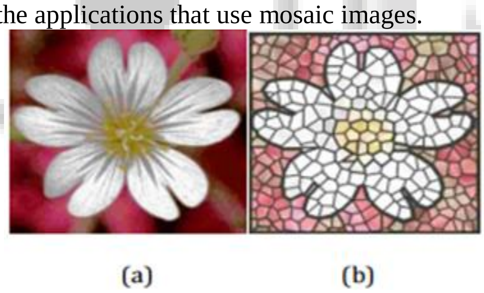

Fig. 3: (a) original image (b) Final image

D. Secrete Fragment Visible Mosaic Images:

In this mosaic, transforms a secret image in a consequential mosaic image through the same size and looking like a preselected objective image. The conversion process is controlled by a secret key, and only with the key can a person recover the secret image almost lossless since of the mosaic image. A new type of computer art image known as secret-fragment visible mosaic image is proposed, which is created by composing small fragments of a known image to develop into a target image in a mosaic form. These effects hide the images and keep it secret.

IV. PROPOSED SYSTEM

In paper[1], a new technique for safe image transmission is proposed, which transforms a secret image into a meaningful mosaic image among the equivalent size and looking like a preselected target image. The transformation is controlled with a secret key and just among the key a person can improve the secret image nearly lossless as of the mosaic image. The Proposed method is inspired beside [12], in which a fresh type of computer art image, called secret fragment- visible mosaic image. The mosaic image is result of rearrangement of the fragments of a secret image in costume of an additional image called the target image preselected since a database. The weakness of [12] is that requirement of large image database so that the formed mosaic image can be sufficiently analogous to the selected target image. Using this method the user can not select his/her favourite image as a target image. Therefore to overcome this drawback; a new method has been designed that can transform a secret image into secret fragment visible mosaic image of the same size. As given in above fig. 4 fig (a) indicates secret image, fig (b)indicates target image and fig (c) indicates secret fragment- visible mosaic image. Once the target image has selected by the user, the specified secret image is first divided interested in rectangular fragments called tile images, which afterwards are fir into

Fig. 4: Result by the proposed method (a) Secret image (b) Target image (c) Secret-fragment-visible mosaic image created from (a) and (b) by the proposed method

similar blocks into the target image, called target blocks, as according to correspondence criterion based on color variations. The color characteristics of each tile image is transformed against a corresponding target block in the target image, which results in a mosaic image looking like a target image. The proposed method can transform a secret image into mosaic image without any compression, at the same time data hiding method must hide highly compressed version of the secret image into cover image when the secret image and the cover image have the same data volume.

V. IDEAS OF THE PROPOSED METHOD

The embedding of secret image interested in the target image in tile form and maintaining the visibility of the original target image. The proposed method includes two main phases as shown in fig. 2: 1) mosaic image creation 2) secret image recovery.

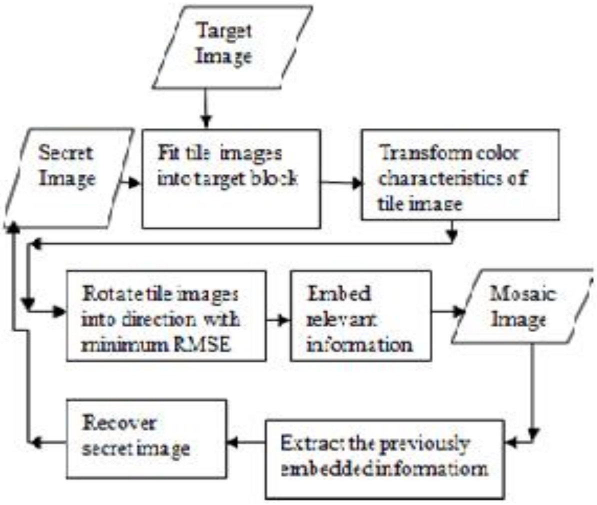

Fig. 5: Flow diagram of the proposed method.

A. Mosaic Image Creation :

– Fitting the tile images of the secret image interested in the object blocks of a preselected target image.
– Transforming the color characteristics of all tile image in the secret image towards turn into that of the corresponding target block in the object image.
– Rotating each one tile image into a direction with the minimum RMSE value with respect to corresponding object block.
– Embedding relevant information interested in the formed mosaic image for future recovery of the secret image

B. Secret Image Recovery:

– Obtaining the embedded information for secret image recovery from the mosaic image.
– Reverse transforming the color characteristic of all tile images into the secret image to become that of the corresponding target block in the target image.
– Reverse rotating each tile image into a direction by way of respect to its corresponding target block.
– Improving the secret image using the extracted information.

C. Performance Parameters:

1) MSSIM: To measure the mosaic effect, metric of mean structural similarity (MSSIM) has been adopted to compare the similarity of the mosaic image. If the MSSIM value of the created mosaic image with respect to the target image varies by some number, then it shows that the similarity of the details of the created mosaic image for which the target image is not good enough.
2) RMSE: The Root Mean Square Error (RMSE) (also called the Root Mean Square Deviation, RMSD) is frequently used to calculate the difference between values predicted by a model and the values actually observed from the environment that is individual modelled. These separate differences are also called residuals, and the RMSE serves to collective them into a particular measure of predictive power.

VI. CONCLUSION AND FUTURE SCOPE

Today's world where not anything is protected, the security of images is very important. In this paper I have surveyed different image hiding techniques in the span of 14years (2001- 2014). I conclude that all techniques are good for data hiding and also studied the idea of proposed method of the secure image transmission technique. Good mosaic image making results are sure only when the database is large in size so that the selected target image can be sufficiently similar to the input secret image. In future it may be may be directed to allowing users to select target images from a smaller sized database or even freely without using a database, as well as to developing more information hiding applications using the proposed secret-fragment-visible mosaic images.

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