Different Methods of Mosaic Image Creation for Secure Data Transmission

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Abstract*: Nowadays multimedia data from different sources are required to transmit through the web for very pertinent applications. This multimedia data may contain confidential data so they must be protected during transmission to avoid leakage. Multimedia data includes high percentage of images. The protection of this multimedia data is done by visual cryptography. There are so many different skilful techniques design to conduct for protection of this confidential image data from unauthorized access. One technique in visual cryptography is mosaic image creation, in which is a picture that has been divided into equal sized rectangular tiled sections, each of which is replaced with another photograph that matches the target photo. In this paper we study different method of creating mosaic image for secure image transmission.*

Keywords: *Visual cryptography, mosaic images, color transformation, image encryption, mosaic image, secure image transmission.*

I.   Introduction

Visual cryptography technique allows the visual information to be encrypted in such a way that their decryption can be performed by human visual system. Visual cryptography was mainly introduced for the problem of secret sharing. Secret sharing is one of the major problems to be considered in cryptography. Secret sharing is one type of key establishment protocols [1]-[2]. Visual cryptography is introduced by first in 1994 Noar and Shamir [3]. They proposed visual secret sharing scheme, where an image is divided into n shares so that only someone with all n shares could decrypt the image, while someone with any n-1 shares can retrieve no information about the original image. Each share is printed on a different transparency and decryption is performed by overlaying the shares when all n shares are overlaid, the original image gets visible [4]. The main objective is to communicate securely in such a way that the secret message is not visible to the observer. That is unauthorized person should not be able to identify in any sense between target image and secret image. For the data hiding, visual cryptography and visible mosaic image creation plays a very important role.

II.   Mosiac Image

Mosaics are one form of art in which a large image is formed by a gathering of small images called tiles. First target image is selected; the given secret image is then divided into rectangular tiles, which then are fit into similar blocks in the target image. Next, the colour characteristic of each tile image is transformed to be that of the corresponding block in the target image, resulting in a secret mosaic image which looks like the selected target image [5].Various mosaics can be created for an image depending on the choice of tiles and the restriction in their placement. Mosaicing of image can be classified broadly into two methods such as direct method and feature based method. Direct Method uses information from all pixels. It iteratively updates an estimate of homography so that a particular cost function is minimized. Direct methods [6] attempt to iteratively estimate the camera parameters by minimizing an error function based on the intensity differences in the area of overlap. But this type of methods needs initialization, either by correlation or by manually setting some corresponding points. Sometimes phase-correlation is used to estimate the a few parameters of the homography. Feature based methods [7] mosaic the images by first automatically detecting and matching the features in the source images, and then warping these images together. Feature Based Methods are in general more accurate. It can handle large disparities.

The images are mosaic in the number of way. By creating mosaic image a new technique for secure image transmission is proposed, which transforms a secrete image into mosaic images which look like similar to target image. The transformation of the images is controlled by a secret key, and only the person recover the secret image which known about that image from the mosaic image. The type of mosaic image used to secure data called as secret fragment mosaic image. The mosaic image is the result of rearrangement of the fragments of a secret image in disguise of another image called the target image.

III.   Literature Survey

Kim and Pellacini *et al* 2002. has proposed jigsaw image mosaic it also called as puzzled image mosaic, composed of tiles selected from a database which is equal shape image [8]. It creates many arbitrary shapes called tiles in kinds of puzzle image. The generation of a Jigsaw Image Mosaic is a solution problem: given an arbitrarily-shaped container image and a set of arbitrarily-shaped image tiles, fill the container as compactly as possible with tiles of similar color.

Yoshinori Dobashi and Toshiyuki Haga *et al* 2002. has proposed the voronoi diagram to add various effects to the mosaic image, such as simulation of stained glasses [9]. The mosaic image is generated by using the sites and edges of the Voronoi diagram. We use graphics hardware to efficiently generate Voronoi diagrams.

Ming-Shing Su, Wen-Liang Hwang, and Kuo-Young Cheng *et al* 2004. has proposed multi resolution mosaic images [10]. To combine images such that no obstructive boundaries exist around overlapped regions and to create a mosaic image that exhibits as little distortion as possible from the original images. Finding the ideal image after combing is difficult and to overcome this difficulty proposed system.

Battiato, Blasi, Farinella and Gallo *et al* 2007. has proposed digital mosaic framework in which divide mosaic images into four types, including crystallization mosaic, ancient mosaic, photo-mosaic, and puzzle image mosaic [11]. The first two types are obtained from decomposing a source image into tiles and reconstructing the image by properly painting the tiles, and so they both may be called tile mosaics.

I-Jen Lai and Wen-Hsiang *et al* 2011. has proposed a method to create secrete fragment visible mosaic image for secure image transmission[12]. The mosaic image is the result of rearrangement of the fragments of a secret image in disguise of another image called the target image preselected from a database. Recover from embed information of secrete image.

LI Jing *et al* 2013. has proposed a method of remote viewing image mosaic technology based on fuzzy cellular automata corner detection in substation, to improve the effect of remote video monitoring system using fuzzy cellular automata viewing the mosiac image[13].

Lukac and Plataniotis *et al* 2014. has proposed method indexes captured images directly in the single sensor digital camera, mobile phone and pocket device by embedding metadata information in the CFA domain [14]. Single sensor digital camera captured indexed.

Ya-Lin Lee and Tsai *et al* 2014. has proposed method of secrete fragment visible mosaic image for the secure transmission of the data using key [15]. Processing the key can reconstruct the secret image by retrieving the embedded information, while a hacker without the key cannot.

IV.   Different Mosaic Techniques

A.   *Jigsaw Mosaic Images [8]*

Jigsaw Image Mosaic, where image tiles of arbitrary shape are used to compose the final picture. A jigsaw image mosaic is one kind of puzzle image. In this mosaics image tiles of arbitrary shape are used to compose the final arbitrarily-shaped picture called Jigsaw Mosaic Images. Takes a container image of arbitrary shape as input and a set of image tiles of arbitrary shape; it then packs the container as compactly as possible with tiles of similar color to the container taken from the input set while optionally deforming them slightly to achieve a more visually pleasing effect. The authors approach the problem by defining a mosaic as the tile configuration that minimizes a mosaicing energy function and introduce a general energy-based framework for mosaicing problems.
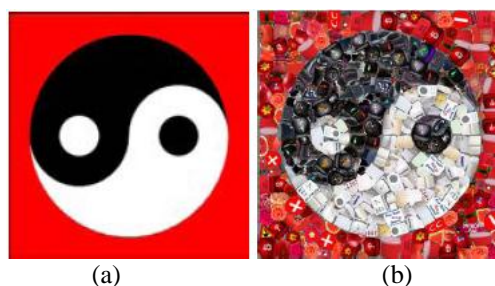

(a)   (b)

Figure 1. (a) Original image (b) Jigsaw Mosaic Image.

B.   *Mosaic images using Voronoi Diagram [9]*

A Voronoi diagram is a geometric structure that represents proximity information about a set of points or objects. Given a set of sites or objects, the plane is partitioned by assigning to each point its nearest site. The points, whose nearest site is not unique, form the Voronoi diagram. Method consists of two processes. In the first process, the mosaic image is automatically generated by creating the optimal Voronoi diagram so that the error between the original image and the resulting image becomes as small as possible. The second process allows the

user to add various effects to the mosaic image created by the first step. The second process is designed in accordance with our observation of stained glass windows since stained glass is one of the applications that use mosaic images. One important feature is that there are color variations in each region of the stained glass. In the Voronoi diagram placing the sites at random and filling each region with a color sampled from the image. This approach tessellates the image with tiles of variable shapes and but it does not attempt to follow edge features; the result is a pattern of color having a cellular-like look.
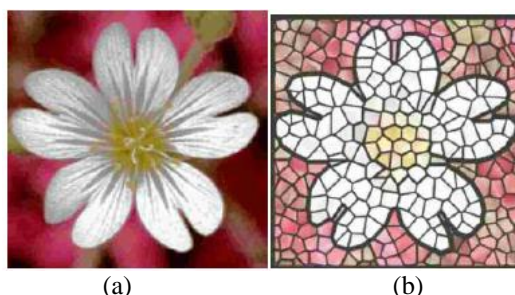

Figure 2. (a) Original image (b) Final Image.

C. Analysis on Multiresolution Mosaic [10]

When two or more images are overlapped to form a single mixed image, finding an ideal image combination can be difficult. An image mosaic processing technique can be applied to greatly reduce this difficulty. To mosaic an image is to combine overlapped images so that the mixed image contains no obstructive boundaries in the transition region while preserving the general appearance of the original images. An image mosaic is typically completed in two stages. In the first stage, the corresponding points in the two to be combined images are identified and registered. This stage is usually referred to as image registration. In the second stage, the intensities of the images are blended after the corresponding points have been registered. Not all applications of image mosaicing require registration, such as in movie special effects.

Figure 3. (a) Image with overlapped boundary (b) image without boundary.

D. Secrete Fragment Visible Mosaic Images [15]

In this mosaic, transforms a secret image into a meaningful mosaic image with the same size and looking like a preselected target image. The transformation process is controlled by a secret key, and only with the key can a person recover the secret image nearly lossless from the mosaic image. A new type of computer art image called secret-fragment visible mosaic image is proposed, which is created by composing small fragments of a given image to become a target image in a mosaic form. These effects hide the images and keep it secret. To create a mosaic image of this type from a given secret color image, the one color scale is transformed into a new color scale, based on which a new image selecting from a database as a target image is the most similar to the given secret image. Secret image is first divided into rectangular shaped fragments, called tile images, which are fitted into a target image.
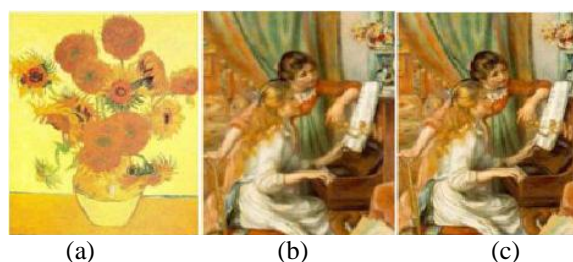

Figure 3. (a) Secrete image (b) Target image (c) Secrete fragment visible mosaic image.

V. Conclusion

In today's world where nothing is secure, the security of images is very important. Image mosaicing is useful for a variety of tasks in vision and computer graphics .Due to the wide range of applications, image mosaicing is one of the important research area in the field of image processing. Here we have presented some techniques used in image mosaicing.

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