Secret-Visible Mosaic Image: an Efficient Steganography for Covert Communication

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Abstract:- Image transfer through the network is an important issue in the present time scenario. In this system combination of small cells of secret data to form a target in mosaic sense here Secret-fragment visible mosaic image is proposed. In this method through the image from far appears to be original and made of different pixels but actually the image will be done using fragments. When generation of mosaic image is started original image is sub divided into many tiles images. Before image is getting split, check the host image and the secret image is of same size. Find the best tile image for embedding in the targeted image cells. Placing data of the tile image fitting sequence in the target which is an image is placed into unevenly selected pixel informed mosaic image. Information which is enclosed will be made as a text key file. Image fitting sequences will be present in a key file. Receiver can't retrieve the embedded data without this key.

Keywords:- *mosaic image, data hiding, and secret communication.*

I. INTRODUCTION

The method of hiding secret information into tile image or so that none can estimate the existence of the hidden information is called steganography. Existing steganography techniques may be classified into three categories text, images, and video steganography, and image steganography aims to embed a hidden information into a *tile image* with the yielded *stego-image which will be* looking like the original cover image. Many image steganography processare proposed, and some of those try to hide *secret pictures* behind other pictures. Mosaic is a way of creating artwork composing small pieces of materials, such as tile, glass, stone, etc... Considering this type of image which is mosaic in nature, we can see all fragments of original image. In this case fragments areso small in size and unevenly distributed in position so that the viewer can't categorize how the original image look like. By this image can be said that it is secretly hidden in the outcome of mosaic image, but small tiles of images are visible to viewer. As it is fragmented and embedded into the image it is called secret fragment visible. Mosaic image is the result of odd rearrangement of tiny fragments of hidden image in terms of another image called cover image. Building same an effect of image steganography. Problem of embedding a largeamount of image data after a cover image is created *accordingly* by the type of mosaic image. This particular type of data hiding is new and it can't be seen so far.

II. PROPOSED METHOD

A. Proposed flow is as said below

Phase 1−Formation of a secret-fragment-visible mosaic image using the cover images of a secret image and the selected similar target image as input;

Phase 2 −recovery of the secret image from the created secret-fragment-visible mosaic image. The first phase includes three stages of operations:

Method 1.1 –Consider a Secret image which will be most similar to that of Cover image.

Method 1.2 –Making Secret image into number of small blocks which can be fitted inside cover image.

Method 1.3 –Formation of blank image is made to fill the newly created mosaic image.

Method 1.4−The small block information will be kept in tile image for the recovery of the secret image.

Method 2.1 – After the image is made mosaic with hidden data now the secret image should be recovered.

Method 2.2 –Using the provided information from encrypted mosaic image hidden data should be taken out.

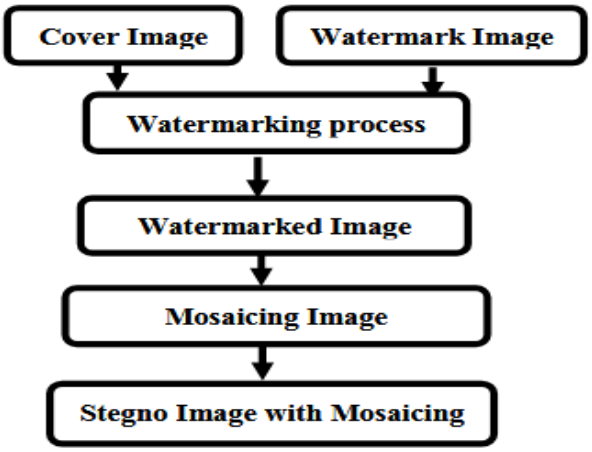

Figure1. Transmitter scheme

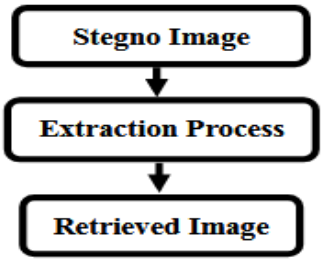

Fig 2:- Proposed method.

B. Image similarity and target image selection

Initial step in this project is in selecting image like target image and secret images must look almost similar for that of source image. Consideration of target image is the main process of the project due to the generation of mosaic image starts from the target image. This algorithm is like that of compression algorithm. The outcome of both the values of cover and secret image will show the ratio of how similar they are. Color of the input image. The second step is to split source image. Split the source image into number of small blocks like secret and the cover image should be having similar cells and similar cell sizes to form a mosaic else if the color doesn't match the intruder can see the difference and secure data can be hacked.

C. Mosaic generation

Generation of mosaic image from a given image starts with splitting the given image into small segments of 4x4 or 8x8 or 16x16.Different splitting algorithms are used for splitting the image which are target and secret these images will be split into different size fragments. Both target and secret images will be split into same size of cells so that the information can be easily embedded into the system. If the size of the block is less lie if it is 4x4 then the quality of image will also be good and exact. We can find best suitable image for the particular secret image.

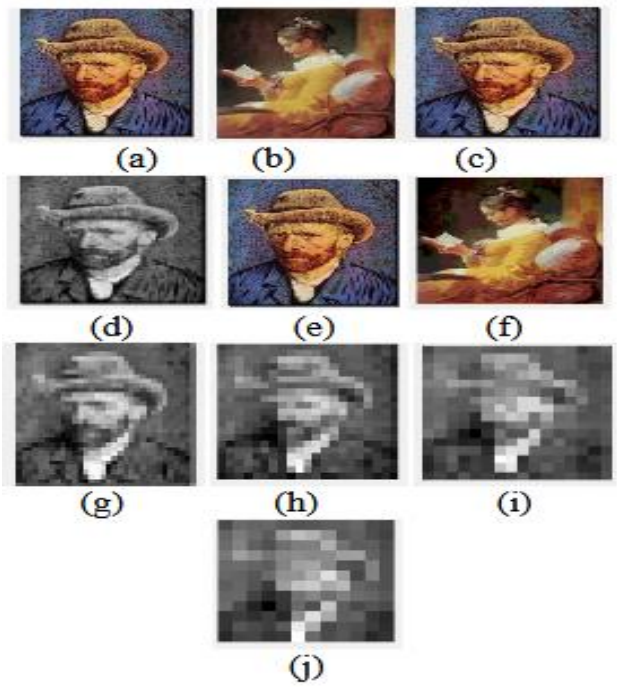

Fig 3:- Experimental result of mosaic image creation. (a) Cover image. (b) Secret image. (c) Embedded image. (d) Secret fragment visible mosaic image created by (a) and (b) with tile image size 8x8 (e) Input stego-image. (f) Recovered secret image. (g)-(j) Mosaic images created with different tile image sizes: 16×16, 24×24, 32×32, and 40×40.

D. Reconstruction of secret image

The last step in this project the outcome image at the receiver will be same as that of the sender side. Before entering the part of reconstruction let's get the data which will be embedded in the image. In De embedding process the random key will be sent with the mosaic image so that the information will be properly embedded accordingly. Using that key initially a sequence of data will be generated and then the information of the image which will be filled in the LSB part of the image will be taken out. According to the random values the tiles will be taken out from the mosaic image and the part of reconstruction start. All the fragmented images will be joined to form the final image.

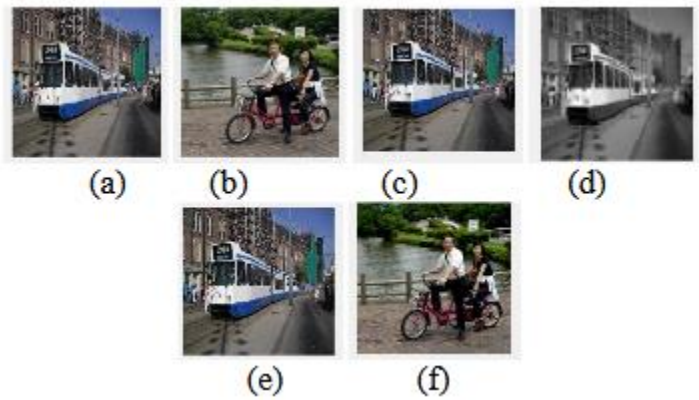

Fig 4:- Proposed method. (a) Target image. (b) Secret image. (c) Embedded image. (d) Secret fragment visible mosaic image created by (a) and (b). (e) Input stego-image. (f) Recovered secret Image.

III. EXPERIMENTAL RESULTS

The quality of the image will be dependent on processing time and quality. The cover image is made into number of small fragments, If the size of each fragment is small then the quality of image will be high .For consideration, if the image is split into 16x16 matrixes finding the exact position of the information which will be embedded will be difficult, if the image splitting is done at 4x4 then the information can be embedded into the image and quality of the image will also be good. So if the image is titled at small sizes then the accuracy and the embedding quality will be more.

S.NO	Tile size	Proposed method			Conventional method		
		RMSE	PSNR	COMPUTATI-ONAL TIME	RMSE	PSNR	COMPUTATI-ONAL TIME
1	8X8	5.5826	40.662	82.749	0.9	48.588	95.989
2	16X16	6.8844	39.752	82.749	0.8	49.099	95.989
3	32X32	7.7762	39.223	82.749	0.8	49.099	95.989

Table 1. Various parameters comparison with different tile image size of recovered secret image with original image. Which is applied on figure 3

S.NO	Tile size	Proposed method			Conventional method		
		RMSE	PSNR	COMPUTATI-ONAL TIME	RMSE	PSNR	COMPUTATI-ONAL TIME
1	8X8	6.6250	40.162	82.494	0.9	48.588	96.11
2	16X16	6.2765	40.154	82.494	0.8	49.099	96.11
3	32X32	6.7948	39.809	82.494	0.8	49.099	96.11

Table 2. Various parameters comparison with different tile image size of recovered secret image with original image. Which is applied on figure 4

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