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Research Article

A NEW SECURE MOSAIC VIDEO GENERATION BY USING HAAR BASED WAVELET TRANSFORMATION

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ABSTRACT

A new secure image transmission technique is proposed, which transforms automatically a given large-volume secret image into a so-called secret-fragment-visible mosaic image of the same size. The mosaic image, which looks similar to an arbitrarily selected target image and may be used as a camouflage of the secret image, is yielded by dividing the secret image into fragments and transforming their color characteristics to be those of the corresponding blocks of the target image. Skillful techniques are designed to conduct the color transformation process so that the secret image may be recovered nearly losslessly. A scheme of handling the overflows/underflows in the converted pixels' color values by recording the color differences in the untransformed color space is also proposed. The information required for recovering the secret image is embedded into the created mosaic image by a lossless data hiding scheme using a watermarking technique. Good experimental results show the feasibility of the proposed method.

INTRODUCTION

In today's life providing security has become more cumbersome because of all the malicious possibilities in data transmission, so we need a system which makes data transmission more a new method of combining art image generation and hiding a secret image into this cubism like image to enhance the camouflage effect for various information-hiding applications is proposed. First, a new type of computer art, called line-based Cubism-like image, which keeps a characteristic of the cubism art created by extract prominent lines and regions. For creating the mosaic video we need two video named as "source" and "target" audio files. The first process is picking the target and the source audio for mosaic creation. Picking of target audio is similar to that of the selected source audio but not the same. Then converting the lager source video into several small video for secret purpose. The splitting is used to place the source video into target video. After that using the separate algorithm to find the most similar part of target image for placing the source tile video. This would be done for all the split source video. Then we are composing these audio in a mosaic form for hiding the secret information. The mosaic video is same as that of the target audio but this contain the tile source audio not hear. The output video will send to the destination, in destination re-mosaic process is held based on the some algorithm. The tile images are retrieving first for constructing the source image as send by the sender. After that the tile images are combined to create a original Video signal is basically any sequence of time varying images. A still image is a spatial distribution of intensities that remain constant with time, whereas a time varying image has a spatial intensity distribution that varies with time. Video signal is treated as a series of images called frames. An illusion of continuous video is obtained by changing the frames in a faster manner which is generally termed as frame rate.

LITERATURE SURVE

In the proposed system initially the source image is converted into Cubism-like-art image by extracting prominent lines and regions. Yi-Zhe Song, Paul L. Rosin, Peter M. Hall and John Collomosse [3] proposed a method to simple shapes (e.g. circles, triangles, squares, super ellipses and so on) are optimally fitted to each region within a segmented photograph. Stipple Placement using Distance in a Weighted Graph is proposed by David Mould [4] provides extra emphasis to image features, especially edges. Regarding lossless data hiding, several techniques have been proposed. Xiaomei Quan and Hongbin Zhang proposed "Lossless Data Hiding Scheme Based On Lsb Matching [4] deals data hiding based on bit change. A lossless data hiding method based on histogram shifting and encryption is proposed by Nutan Palshikar and Prof. Sanjay Jadhav, and C. Liu in Lossless Data Hiding using Histogram Modification and Hash Encryption Scheme [5] A novel scheme for separable reversible data hiding in encrypted

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images developed by Nutan Palshikar, Prof. Sanjay Jadhav in Separable Reversible Data Hiding in Encrypted Image [6]. A new secure image transmission technique which automatically transforms a given large-volume secret image into a so-called secret-fragment visible mosaic image of the same size [7].

Existing Architecture

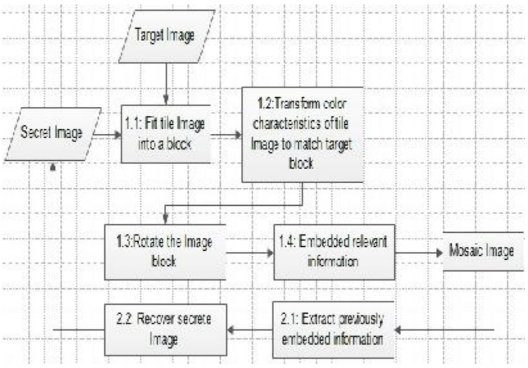


Fig 1 Existing Architecture

Phase 1−creation of a secret-fragment-visible mosaic image using the tile 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.

Stage 1.1 −searching a target image most similar to the secret image.

Stage 1.2 −fitting the tile images in the secret image into the blocks of the target image.

Stage 1.3 –create a blank image to create a mosaic Image.

Stage 1.4−embedding the tile-image fitting information into the mosaic image for later secret image recovery. And the second phase includes two stages of operations:

Stage 2.1 −retrieving the previously-embedded tile image fitting information from the mosaic image.

Stage 2.2 −reconstructing the secret image from the mosaic image using the retrieved information.

Proposed methodology has been divided into 2 phases.

Mosaic Image Creation

Fig 1 shows In this first phase, Shamir secret sharing algorithm is used by which a secret is divided into parts, giving each participants its own unique part, some of the parts or all of them are needed in order to reconstruct the secret counting on all participants to combine together, the secret might be impractical and therefore sometimes the threshold scheme is used. Now fitting the tile images of the secret image into the target blocks of a preselected target image. After this transforming the color characteristic of each tile image in the secret image to become that of the corresponding target block in the target image and rotating each tile image into a direction with the minimum RMSE value with respect to its corresponding target block. After the rotation embedding relevant information into the created mosaic image for future recovery of the secret image. In this way we get the output secret fragment visible mosaic image.

Secret Image Recovery

In this second phase, extracting the embedded information for secret image recovery from the mosaic image, and recovering the secret image using the extracted information by secret image recovery algorithm. In this phase result will be calculated and optimize if required result is in the form of delay and accuracy

Existing System

In traditional methods secret text can be hidden into image which is called as Steganography. In this method only text data can be encrypted but not image. Secret images can be hidden using water marking principles. Water marking is very simple process and it is weak that anyone can decrypt easily. Mosaic image technique is one of the efficient techniques to hide the secret images. This methodology needs another image which is said to be cover image. Creating mosaic image is also an art of computer. In Existing steganography techniques may be classified into three categories – image, video, and text steganography's and image steganography aims to embed a secret message into a *cover image* with the yielded *stego-image* looking like the original cover image. Many image steganography techniques have been proposed [1-4], and some of them try to hide *secret images* behind other images [3-4]. The main issue in these techniques is the difficulty to hide a huge amount of image data into the cover image without causing intolerable distortions in the stego-image.An alternative to avoid this problem is data hiding that hides a secret message into a cover image so that no one can realize the existence of the secret data, in which the data type of the secret message investigated in this paper is an image. Existing data hiding methods mainly utilize the techniques of LSB substitution, histogram shifting, difference expansion, prediction-error expansion, recursive histogram modification and discrete cosine/wavelet transformations.

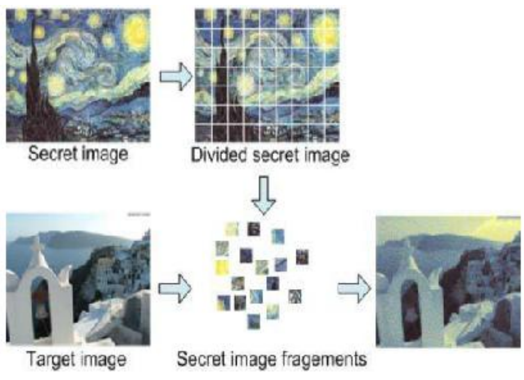
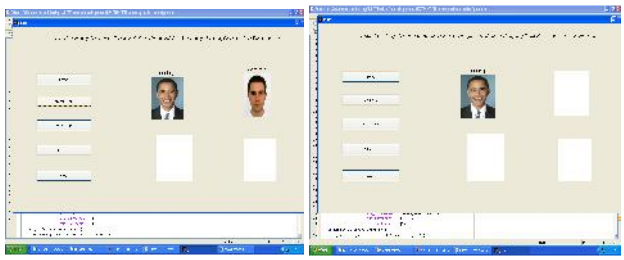


Fig 2 Creation of secret-fragment-visible mosaic image

Existing Model Image Processing



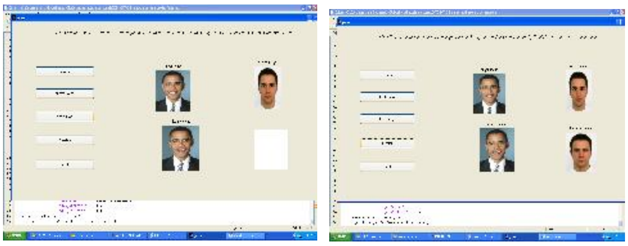


Fig 3 Existing Model

Disadvantages of Existing System

- A main issue of the methods for hiding data in images is the difficulty to embed a large amount of message data into a single image.
- Most image compression methods, such as JPEG compression, are not suitable for line drawings and textual graphics, in which sharp contrasts between adjacent pixels are often destructed to become noticeable artifacts.

Proposed System

In this paper, a new technique for secure image transmission is proposed, which 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 losslessly from the mosaic image. The proposed method is inspired by Lai and Tsai, in which a new type of computer art image, called secret-fragment-visible mosaic image, was proposed. 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. But an obvious weakness of Lai and Tsai is the requirement of a large image database so that the generated mosaic image can be sufficiently similar to the selected target image.

Advantages of Proposed System

- The user is not allowed to select freely his/her favorite image for use as the target image. It is therefore desired in this study to remove this weakness of the method while keeping its merit, that is, it is aimed to design a new method that can transform a secret image into a secret fragment-visible mosaic image of the same size that has the visual appearance of any freely selected target image without the need of a database.

Modules

- Select Target Image
- Image Splitting.
- Creating Mosaic Image.
- Embed Process.
- Retrieve Secret Image.

Select Target Image

Selecting the secret image for creating mosaic image, after that picking the most similar target image for the selected source image. We have an efficient image similarity algorithm for comparing similarity value between both the images. The value returned here display's the how the match the both the images are.

Image Splitting

Then we have create the tile images for creating a mosaic image, for that we want to split the source image into particular size small image called as tile. The tile images are compared with the target image to getting the position for placing the tile into the target image.

Creating Mosaic Image

Then we have to find the position which is perfectly matching for each every tile of secret image. After finding the position of each tile, then we have to create a new blank image for placing the tile in it. Then placing the tile images based on the information presented in the fitting sequence. Then we can generate the duplicate tile images for completing the image as target image.

Embed Process

Then embedding the fitting sequence file into the created mosaic image by using a secret novel algorithm to hide the fitting sequence information.

By using this fitting sequence the receiver can able to reconstruct the original image as it send by the sender. The fitting sequence containing the information about the image name and where it is perfectly matched in target image position.

Retrieve Secret Image

After receiving the mosaic image, we can first de-embedding the fitting sequence file, because with help of this only we split the tile images presented in the mosaic image.

Then we have to split the mosaic created image based on the information presented in fitting sequence and named it as, the name itself presented in file.

Then finally compared the images got from the mosaic image, we got the image that sender can send.

PROPOSED MEYHODOLOGY

Haar Wavelet

A Haar wavelet is the simplest type of wavelet. In discrete form, Haar wavelets are related to a mathematical operation called the Haar transform. The mathematical pre requesites will be kept to a minimum; indeed, the main concepts can be understood in terms of addition, subtraction and division by two. We also present a Linear algebra implementation of the Haar wavelet transform, and mention important recent generalizations. Like all wavelet transforms, the Haar transform decomposes a discrete signal into two sub signals of half its length.

The Haar wavelet transform has a number of advantages

- It is conceptually simple and fast
- It is memory efficient, since it can be calculated in place without a temporary array.
- It is exactly reversible without the edge effects that are a problem with other wavelet transforms.

- It provides high compression ratio and high PSNR (Peak signal to noise ratio).
- It increases detail in a recursive manner.

The Haar Transform (HT) is one of the simplest and basic transformations from the space domain to a local frequency domain. A HT decomposes each signal into two components, one is called average or trend and the other is known as difference (detail) or fluctuation. Data compression in multimedia applications has become more vital lately where compression methods are being rapidly developed to compress large data files such as images. Efficient methods usually succeed in compressing images, while retaining high image quality and marginal reduction in image size

Digital Watermarking

Digital watermarking includes a number of techniques that are used to imperceptibly convey information by embedding it into the cover data. Here the cover data taken is a video sequence and watermarking is thus called Video Watermarking. Video watermarking is a field that is rapidly evolving in the area of multimedia and interest of the people in this field is increasing day.

Major Factor

1. Privacy of the digital data is required and copying of a video is comparatively very easy.
2. Fighting against the “Intellectual property rights breach”.
3. Tempering of the digital video must be concealed.
4. Copyright protection must not be eroded.

Transform Domain Watermarking

A watermarking algorithm using transform domain techniques focus on embedding information in the frequency domain of the video as opposed to the spatial domain. The most popular transforms, where the frequency domain watermarking algorithms work, are Discrete Fourier Transform (DFT), Discrete Cosine Transform (DCT) and Discrete Wavelet Transform (DWT). These are applied to transform a frame of the video into the frequency domain where the coefficients of the digital frame are separated into different priorities in accordance with the human perception system. The watermark bits are embedded by modulating the magnitude of these coefficients. Watermarking in the transform domain is applied in three steps as explained below.

1. ***Forward Transform****:* The frame of the video is first transformed to a domain that facilitates data embedding.
2. ***Embedding:*** The subset of the transform coefficients is modified with the prepared signature

Data. One can employ a model of human perception to weigh the strength of the embedding modifications. By choosing a suitable frequency transform domain and selecting only certain coefficients (low- to mid frequency range), a lot of human visual system (HVS) modeling can be done implicitly. The better the transform approximates the properties of HVS, the easier it is to put more energy in the embedded signal without causing perceptible distortion.

Inverse Transform*:* The modified coefficients are inversely transformed to produce a watermarked frame.

F_L	F_L	F_L	F_M	F_M	F_M	F_M	F_H
F_L	F_L	F_M	F_M	F_M	F_M	F_H	F_H
F_L	F_M	F_M	F_M	F_M	F_H	F_H	F_H
F_M	F_M	F_M	F_M	F_H	F_H	F_H	F_H
F_M	F_M	F_M	F_H	F_H	F_H	F_H	F_H
F_M	F_M	F_H	F_H	F_H	F_H	F_H	F_H
F_M	F_H	F_H	F_H	F_H	F_H	F_H	F_H
F_H	F_H	F_H	F_H	F_H	F_H	F_H	F_H

(a)

16	11	10	26	24	40	51	61
12	12	14	19	26	58	60	55
14	13	16	24	40	57	69	56
14	17	22	29	51	57	80	62
18	22	37	56	68	109	103	77
24	35	55	64	81	104	113	92
49	64	78	87	103	121	120	101
72	92	95	98	112	100	103	99

(b)

Fig. 4 Definition of DCT regions and Quantization values used in JPEG compression scheme

Figure 4(a) shows the three regions in the frequency Domain. FL is used to denote the lowest frequency components of the block, while FH is used to denote the higher frequency components. FM is chosen as the embedding region as to provide additional resistance to lossy compression techniques, while avoiding significant modification of the cover video.

Discrete Cosine Transform

Discrete cosine transformation [2, 3, 4] (DCT) transforms a signal from the spatial into the frequency domain by using the cosine waveform. DCT concentrates the information energy in the bands with low frequency, and therefore shows its popularity in digital watermarking techniques. The DCT allows a frame to be broken up into different frequency bands, making it much easier to embed watermarking information into the middle frequency bands of a frame. The middle frequency bands are chosen such that they have minimized to avoid the most visual important parts of the frame (low frequencies) without over-exposing themselves to removal through compression and noise attacks (high frequencies).

Two-dimensional DCT of a frame with size M x N and its inverse DCT (IDCT) are defined in Equations 1 and 2, respectively.

Two-dimensional DCT of a frame with size M x N and its inverse DCT (IDCT) are defined in Equations 1 and 2, respectively.

$$F(u,v) = \alpha(u)\alpha(v)\sum_{y=0}^{M-1} \square \sum_{y=0}^{N-1} f(x,y)$$

$$\cos\left[\frac{(2x+1)u\cdot\pi}{2\cdot M}\right]\cos\left[\frac{(2y+1)v\cdot\pi}{2\cdot N}\right] \qquad (1)$$

where

$\alpha(u) = \sqrt{1/M}$ for u=0;

$\alpha(u) = \sqrt{2/M}$ for u=1,2,3...M-1;

$\alpha(v) = \sqrt{1/N}$ for v=0;

$\alpha(v) = \sqrt{2/N}$ for v=1,2,3,...N-1;

$$f(x,y) = \sum_{v=0}^{N-1} \alpha(u)\alpha(v)F(u,v)$$

$$\cos\left[\frac{(2x+1)u\cdot\pi}{2\cdot M}\right]\cos\left[\frac{(2y+1)v\cdot\pi}{2\cdot N}\right] \qquad (2)$$

where x = 0,1,2,...M-1, y = 0,1,2,...N-1

Idea of Watermarking

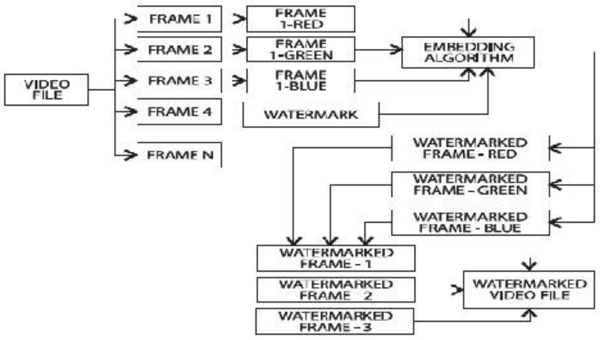


Fig 5 Watermarking Process

Figure 5 shows the idea of video watermarking at the sending end. Here, first of all frames is extracted from the video sequence. The next step is to divide the frame into its Red, Green and Blue part. Each part is then individually given to the embedding algorithm block where the other input is a watermark that is to be embedded. After each part is watermarked, the next frame is taken and the procedure is repeated until the last frame. After the watermark is embedded in every frame, all frames are mixed to make the watermarked video which is then transmitted in the channel.

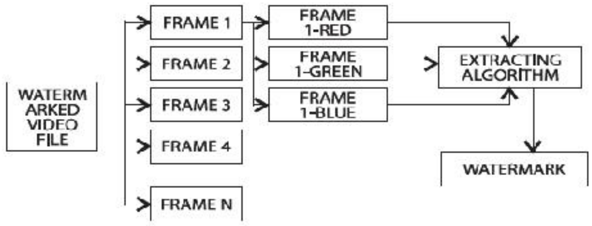


Fig 6 Extracting Watermarking Process

Figure 6 shows the idea of video watermarking at the receiver end. Here, a watermarked video is divided into the frames which are divided into the Red, Green and Blue part from where the watermark is extracted. This Procedure is repeated for all frames so as to recover the watermark.

$$MSE = \frac{1}{M \cdot N} \sum_{x=1}^{M} \sum_{y=1}^{N} \{(f(x,y) - f'(x,y))^2\} \quad (3)$$

$$PSRN = 10 \cdot \log \frac{255^2}{MSE}, \quad (4)$$

Where
MSE – Mean Square Error,
PSNR – Peak Signal to Noise Ratio,
f(x,y) – Original Frame of the Video,
f'(x,y) – Watermarked Frame of the Video.

The phrase peak signal-to-noise ratio, often abbreviated as PSNR, is an engineering term for the ratio between the maximum possible power of a signal and the power of corrupting noise that affects the fidelity of its representation. Because many signals have a very wide dynamic range, PSNR is usually expressed in terms of the logarithmic decibel scale. A higher PSNR would normally indicate that the reconstruction is of higher quality at the receiver end. PSNR is most easily defined via the Mean Square Error (MSE) which holds for two $m \times n$ Frames f and f' where one of the Frames is considered a noisy approximation of the other.

Proposed Architecture

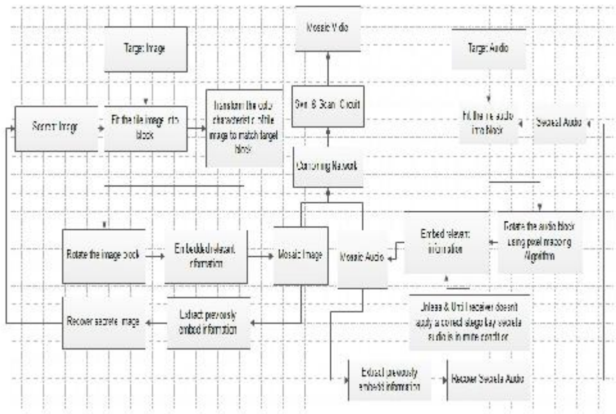


Fig 7 Proposed Mosaic video Architecture

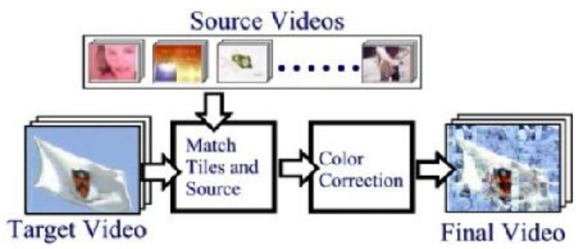


Fig 8 Mosaic Video Creation

Steps Creating Mosaic Video

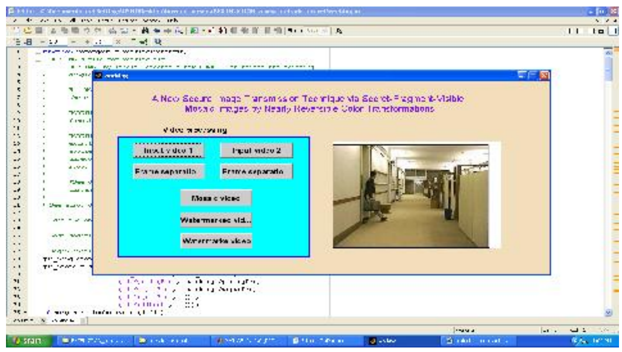
Fig 7, Fig 8 creating a video mosaic involves the Following steps:

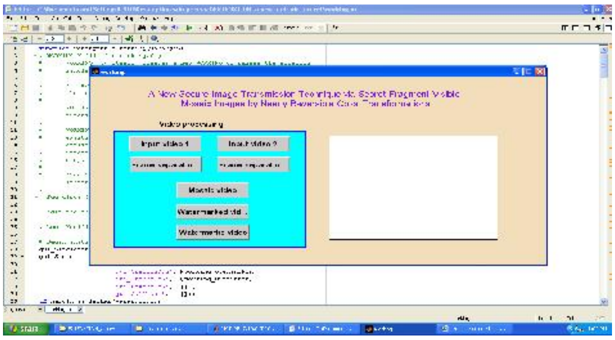
1. Select a target video, *T*.
2. Select a corpus of video sources, *S*.
3. Select a tiling structure. This may be a simple as an $n \times n$ grid of rectangles or a more complex tiling pattern.
4. For each tile of the target video:

For each frame of the target video:

1. Select the best frame *Sj* from the source videos matching the current tile in the current frame of *T*.
2. Color correct *Sj* to mimic the current tile in the Current frame of *T*.
3. Paste *Sj* into the tile for output.

Scrrenshots





Hardware Requirements

1. Processor i3 GHz.
2. Hard Disk 500 GB.
3. RAM :2 GB

Software Requirement

1. Operating system : Win 7,8
2. Coding Language : MATLAB
3. Tool :R 2007B

CONCLUSION

In this proposed system I have presented a new system for creating video mosaics an arrangement of small videos that suggests a larger, unified video sequence. We solve the main challenge of providing both visual matches and temporal stability in a computationally efficient way, while still being flexible enough to accommodate a variety of matching criteria.

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