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Survey on Steganography for Texture Synthesis

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ABSTRACT

Steganography works by adding secret messages in a file, that file can be a photo, audio or video file. When two parties communicate secret data they use the method steganography to embed the secret message into a file. There are several steganographic methods are available. The main goal of steganography is the message carried by the stego media should not sensible to other person. In this paper we are using steganography in texture image. We propose a novel methodology for steganography utilizing a reversible composition amalgamation. Texture synthesis process uses composition and combination it resamples a littler patches, which creates another composition picture with nearby same local appearance and arbitrary size. To hide the secret message then combines the steganography and texture synthesis process. This paper is a survey of steganography for texture synthesis provides review and analysis of existing steganography methods used for texture images and also describes information drawn from the literature.

Keywords: Steganography, Image Processing, Texture Synthesis.

I. INTRODUCTION

In the most recent decade several advances growth have been made in the region of computerized media, and much concern has emerged with respect to steganography for advanced media. Steganography [1] is a particular system for data concealing procedures. It installs messages into a host medium with a specific end goal to hide mystery messages so as not to stimulate feeling by a busybody [2]. A run of the mill steganographic application incorporates incognito interchanges between two gatherings whose presence is obscure to a plausible assailant and whose accomplishment relies on upon distinguishing the presence of this correspondence [3]. By and large, the host medium utilized as a part of steganography incorporates important computerized media, for example, advanced picture, content, sound, feature, 3D model [4], and so on. A substantial number of picture steganographic calculations have been explored with the expanding prominence and utilization of computerized pictures. Most image steganographic algorithms adopt an existing image as a cover medium. The expense of embedding secret messages into this cover image is the image distortion encountered in the stego image. This leads to two drawbacks. As the cover medium the algorithm adopts an existing image mostly in steganographic image. The image distortion encountered in stego image is expense of embedding secret message in this cover image. This includes two drawbacks first, since the size of the cover image is fixed, the more secret messages which are embedded allow for more image distortion. Consequently, a compromise must be reached between the embedding capacity and the image quality which results in the limited capacity provided in any specific cover image. Recall that image stego analysis is an approach used to detect secret messages hidden in the stego image. A stego image contains some distortion, and regardless of how minute it is, this will interfere with the natural features of the cover image.

In this paper, steganography is used with the reversible texture synthesis. A texture synthesis process converts the original image into new synthesized texture image [5], which has similar local appearance and arbitrary size of the original image. This Paper combines the texture synthesis process into steganography to hide the secret message into source texture. In particular, in contrast to using an existing cover image to hide messages, our algorithm conceals the source texture image and embeds secret messages through the process of texture synthesis. This allows us to haul out the covert messages and the source texture from a stego synthetic texture. To the best of our knowledge, steganography taking advantage of the reversibility has ever been presented within the literature of texture synthesis.

II. LITERAUTE SURVEY

J. Fridrich, M. Goljan, and R. Du [6] proposed a pattern for discovering least significant bit (LSB) non sequential embedding in digital images. By the lossless capacity in LSB and shifted LSB plane the length of secret message can discover.

The method analysing lossless data embedding capacity in the LSBs by Placing the LSBs in the decreasing order of lossless capacity in the LSB Plane randomly. Thus, the lossless capacity used to measure the degree of randomization of the LSB plane. Most images have random LSB plane and their structure is not easily recognizable. Capturing randomization degree constrained to the LSB plane using classical statistical quantities is unreliable. LSB plane is nearby related to other bit planes and lossless capacity measures the relationship. So, using this technique can easily detect that message is embedded in the images.

M. F. Cohen [7] generated tiles for image and texture generation. These tiles are Wang tiles which contain set of square tiles; each tile is having color coded edges. Matching color of adjacent ages tile the plane with appropriate samples. Advantage of this method is that it overcomes the memory consumption problem because it creates small set of tiles from sample patches of source image which produce highly compressed representation; therefore this method is used to overcome the memory consumption problem of large image. Small set of tiles are created from a source image, so we can achieve high compact representation of texture.

If the Wang tiles are rich enough and there is no recurring at regular interval, anything can fill inside the tiles. Now these filled tiles create large expenses of non-periodic texture. This can create less uniform texture if two source images contain distribution of different densities.

Patch base sampling technique algorithm for texture synthesis. These algorithm works for regular to stochastic textures. This patch based texture generates the patches having same size and comparable quality. This algorithm works faster than pixel based sampling technique. L. Liang, C. Liu [8] present the MRF Markov Random Field as their texture model to sampling patches and avoid the mismatching feature across patch boundaries.
This patch based sampling technique creates the patches of the input sample texture to generate synthesized texture. These patches of input texture carefully paste into synthesized texture to avoid mismatching around patch boundaries. This technique is used to avoid garbage found in source texture.

Another method for texture synthesis is image quilting; in this method new image is created by stitching small patches of existing image. This process is called as image quilting. A. A. Efros and W. T. Freeman [9] present Image quilting for texture synthesis and transfer. Image quilting is very fast and simple algorithm used for texture synthesis. This is also a patch based texture synthesis which divides the image into patches. The size of the patch is user specified.

Algorithm defines the square block from the input source image which is overlapped. To form the new texture image from input texture image select the random patches from the input image and tile them. Next find the overlapped blocks placed in the new image, now search a block in a source texture which allows a neighbour with overlap region. Then calculate the error in overlap region of that block with another block. Then it finds the minimum cost path and finds boundary of the new block.

Data hiding technique hides the data in an image and the reversible data hiding technique retrieves the hidden message as well as the original image without any distortion. In paper [10] Z. Ni, Y. Q. Shi, N. Ansari, and W. Su proposed the reversible data hiding algorithm to retrieve the original image back after extracting the embedded secret data from an image. This algorithm uses the grayscale values of the image pixel to embed the secret message. Histogram of an image is drawn with the minimum and maximum grayscale values and then grayscale values are slightly modified for inserting data into an image. As compare to other reversible data hiding technique this technique embeds more data. This algorithm can use on a wide range of images. This technique is applicable on different types of images and can embed large amount of data but this technique uses the original source image to embed the secret message.

X. Li, B. Li, B. Yang, and T. Zeng [11], have used a Histogram shifting (HS) technique for reversible data hiding (RDH). This technique is used to achieve original image back with low distortion and high capacity after the hidden data have been extracted. Achieve the high capacity and low distortion using histogram based reversible data hiding technique. RDH algorithm designed by simply shifting and embedding task. First divide the source image into blocks, each block is individual and each individual block contains n pixels. Then they count the frequency of pixel array of each individual block and by using the frequency generate the n-dimensional histogram for implementing the data embedding scheme.

A. A. Efros [12] presented a texture synthesis by non-parametric sampling. The texture synthesis produces a new image outward from an initial seed, referring one pixel at a time. This method produces good outcome for a wide variety of synthetic and real-world textures. In this scheme algorithm work pixel by pixel to capture the high frequency information as likely. A Markov random field model texture is generated .assuming that the brightness values of the pixel which are probably distributed, the brightness values of special neighbourhood and the other rest of the images are free. The neighbourhood pixels of the pixel are designed like the square window. The algorithm first discovers all the neighbourhood of the sample image that are likely to the pixels neighbourhood and then arbitrarily choses one neighbourhood. That neighbourhood's centre becomes the newly synthesized pixel.

R. Rejani [13] has used existing RGB values for pixel pattern based steganography. It hides the message within an image with minimum changes using the existing RGB values. The secret message and its key both are embedded in image. Along with the image the key is also used to decrypt the message stored at pixel level. This approach is improved technique of steganography to inserting the secret message bit in an image metadata fields constructed on RGB values. The stego image generated after embedding the message is exactly looks same as original image because pixel in an image is changed only its character and only metadata is modified.

Most of the existing steganographic algorithms have some drawbacks. They use the source image directly to embed the secret message therefore the size of the cover image is fixed, so if we want to embed the more secret message then it will result into more distorted image. Hence compromise between embedding capacity and image quality expected. Another drawback is steganalytic algorithm defeats the existing steganographic approaches.

To overcome these drawbacks Kuo-Chen Wu and Chung-Ming Wang [14] have proposed an approach for steganography using a reversible texture synthesis. In this texture synthesis process source image is synthesized into new texture image from a smaller texture image which has the similar local appearance and an arbitrary size. This method waves the texture synthesis with steganography to hide the secret message. So we get the embedding capacity which is proportional to the size of stego texture image. This steganalytic algorithm does not defeat the steganographic approach and we recover the original source image without distortion.

Information hiding techniques have recently become important in a number of application areas. Digital audio, video, and pictures are increasingly furnished with distinguishing but imperceptible marks, which may contain a hidden copyright notice or serial number or even help to prevent unauthorised copying directly. A new method of combining art image generation and data hiding to enhance the camouflage effect for various information hiding applications is proposed.

The patch-based sampling algorithm synthesizes high-quality textures for a wide variety of textures ranging from regular to stochastic. Moreover, the patch-based sampling algorithm remains effective when pixel-based non-parametric sampling algorithms fail to produce good results. For natural textures, the results of the patch-based sampling look subjectively better

III. Steganography for reversible texture synthesis

Texture synthesis and steganography are two different approaches. Texture synthesis process synthesises the original texture image into new texture image which has the same similar local appearance and an arbitrary size. Steganography is used to hide the secret message in synthesized image. Steganography based reversible texture synthesis combines these two processes steganography and texture synthesis to conceal the secret message and the source texture.

Steganography and steganalytic algorithms respectively used to hide the secret message into source image and extract the secret message embedded in stego image. This method describes two procedures message embedding procedure and message extracting procedure.

A. Message Embedding Procedures:

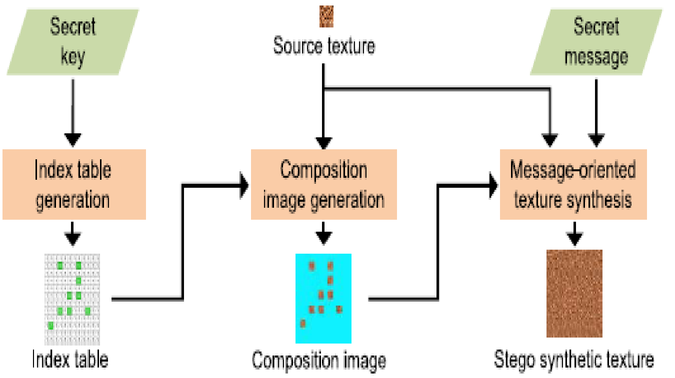

Fig.1 The flowchart of the message embedding procedure

Message embedding procedure works by creating the blocks of an image which is called as source patches. Then as per the dimensions given by the operator index table is generated to record the locations of the corresponding source patches. Then a blank image workbench is established. Size of a workbench is equal to the synthetic texture. The source patches are stored in the index table with their ID's; by refereeing their ID's paste these patches into the workbench to produce a composition image. Then compute the MES (mean square error) of the overlapped region between the synthesized area and candidate patch. The candidate patch having the smallest MES is the most similar patch to the synthesized area in the working location. Then select the patch whose rank is equal with decimal value of n-bit secret message. As shown in fig.1 source texture, composite image and secret message produce stego synthetic texture.

B. Message Extraction Procedure

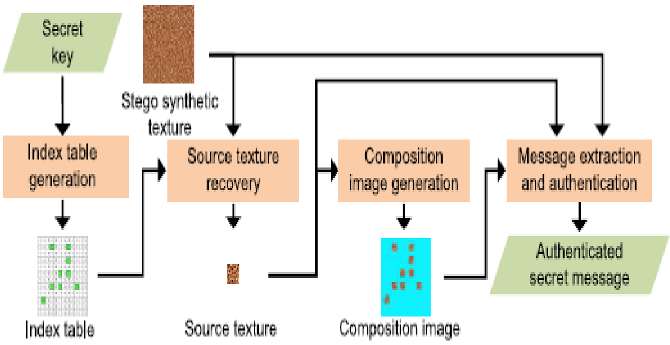

Fig.2 The flowchart of the message extracting procedure.

Receiver gets the secret key and stego synthetic texture from the sender. The index table is generated same like embedding procedure. Then recover the source texture using the index table and stego synthetic texture. Recovered source texture is also same like previous source texture. Then applying the composition image generation paste the source patches into work benches to produce composition image witch is also same like composition image in embedding procedure.

Then finally message extraction and authentication step executes. In this step candidate list is generated based on the overlapped area by referring to the current working locations. It produces the dame number of candidate list with their corresponding ranks. Then in match authentication step refer the workbench with current working locations and stego synthetic texture at the same working location. Then search the candidate list to determine the list of the kernel region is same list as the stego kernel region. Same patch is called as a matched patch and this rank represent the decimal value of the secret bit.

This methodology offers three points of interest. In the first place, following the surface union can incorporate a subjective size of composition pictures; the installing limit which our plan offers is relative to the extent of the stego composition picture. Also, a stego scientific calculation is not liable to annihilation this steganographic methodology since the stego composition picture is made out of a source surface instead of by changing the current picture substance. Third, the reversible ability acquired from this plan gives usefulness to recoup the source composition helpfulness to recover the source surface.

At the point when creating a hopeful patch, it has to guarantee that every applicant patch is one of a kind; else, it may extricate a mistaken mystery message. In this execution, they utilize a banner component. First check whether the first source composition has any copy hopeful patches. For a copy applicant patch, set the banner on for the first.

IV. CONCLUSION

In this paper different data hiding techniques are discussed. Among all the technique the steganography using reversible texture synthesis technique presented by Kuo-Chen Wu and Chung-Ming Wang performs well. It uses the new texture image in contrast to using existing cover image to hide the message. This is the reversible data hiding technique which extracts the original source texture and secret message from the stego synthetic texture and making conceivable a second round of surface combination if necessary. Study shows that previous steganographic algorithms have many drawbacks as they are using the original image as cover image, in this paper new synthesized image is used as the cover image so it can retrieve the original image back with no distortion after extracting the secret data. Hence the previous drawbacks can be solving using this reversible texture synthesis. This method accomplishes image retrieval, separate data extraction and reversibility.

V. REFERENCES

[1] N. F. Johnson and S. Jajodia, "Exploring steganography: Seeing the unseen," Computer, vol. 31, no. 2, pp. 26–34, 1998.

[2] Provos and P. Honeyman, "Hide and seek: An introduction to steganography," IEEE Security Privacy, vol. 1, no. 3, pp. 32–44, May/Jun. 2003.

[3] F. A. P. Petitcolas, R. J. Anderson, and M. G. Kuhn, "Information hiding survey," Proc. IEEE, vol. 87, no. 7, pp. 1062–1078, Jul. 1999.

[4] [4] Y.-M. Cheng and C.-M. Wang, "A high-capacity steganographic approach for 3D polygonal meshes," Vis. Comput., vol. 22, nos. 9–11,pp. 845–855, 2006.

[5] S.-C. Liu and W.-H. Tsai, "Line-based cubism-like image—A new type of art image and its application to lossless data hiding," IEEE Trans. Inf. Forensics Security, vol. 7, no. 5, pp. 1448–1458, Oct. 2012.

[6] J. Fridrich, M. Goljan, and R. Du, "Detecting LSB steganograph in color, and gray-scale images," IEEE MultiMedia, vol. 8, no. 4,pp. 22–28, Oct./Dec. 2001.

[7] M. F. Cohen, J. Shade, S. Hiller, and O. Deussen, "Wang tiles for image and texture generation," ACM Trans. Graph., vol. 22, no. 3, pp. 287–294, 2003.

[8] L. Liang, C. Liu, Y.-Q. Xu, B. Guo, and H.-Y. Shum, "Real-time texture Synthesis by patch-based sampling," ACM Trans. Graph., vol. 20, no. 3, pp. 127–150, 2001.

[9] A. A. Efros and W. T. Freeman, "Image quilting for texture synthesis and transfer," in Proc. 28th Annu. Conf. Comput. Graph. Interact. Techn., 2001, pp. 341–346.

[10] Z. Ni, Y.-Q. Shi, N. Ansari, and W. Su, "Reversible data hiding,"IEEE Trans. Circuits Syst. Video Technol., vol. 16, no. 3, pp. 354–362,Mar. 2006.

[11] X. Li, B. Li, B. Yang, and T. Zeng, "General framework to histogramshifting-based reversible data hiding," IEEE Trans. Image Process.,vol. 22, no. 6, pp. 2181–2191, Jun. 2013.

[12] A. A. Efros and T. K. Leung, "Texture synthesis by non-parametric sampling," in Proc. 7th IEEE Int. Conf. Comput. Vis., Sep. 1999, pp. 1033–1038.

[13] R. Rejani,D. Murugan and Deepu V. Krishna—Pixel pattern based steganography on images‖ journal on image and video processing, feb 2015, volume: 05, issue: 03

[14] Kuo-Chen Wu and Chung-Ming Wang—Steganography Using Reversible Texture Synthesis ‖IEEE Transaction on Image Processing, VOL. 24, NO. 1, Jan 2015

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