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Survey on Steganogrphy using Reversible Texture Synthesis

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***Abstract**: Steganography is the art of hiding secret information inside an image. In this paper steganography regarding various technologies are studied in which steganography using a reversible texture synthesis with quality assessment is being focused. A texture synthesis process resamples a smaller texture image, which synthesizes a new texture image with a similar local appearance and an arbitrary size. The texture synthesis process into steganography to conceal secret messages is weaved. This paper focus on the survey of steganographic techniques established by different authors.*

Keywords—Steganography, texture synthesis.

I. INTRODUCTION

Steganography is considered a popular topic since Internet becomes the most common way of communication. The most important requirement of steganography is detectability; the concealed messages should be perfectly disguised under all statistical and visual analysis. Steganography is the art and science of hiding communication. A steganographic system thus embeds hidden content in unremarkable cover media so as not to arouse an eavesdroppers suspicion. The information hiding process in a steganographic system starts by identifying a cover medium redundant bits. The embedding process creates a stego medium by replacing these redundant bits with data from the hidden message. After embedding a secret message into the cover-image, obtain a so called stego-image. The main categories of file formats that can be used for steganography are: Text Steganography, Image steganography, Audio steganography, and Protocol steganography.

Textures are important for a wide variety of applications in computer graphics and image processing. Textures have been traditionally classified as regular and stochastic (without explicit texels).Texture synthesis has a variety of applications in computer vision, graphics, and image processing. An important motivation for texture synthesis come from texture mapping

Texture images usually come from scanned photographs, and the available photographs may be too small to cover the entire object surface. In this situation, a simple tiling will introduce unacceptable artifacts in the forms of visible repetition and seams. Texture synthesis solves this problem by generating textures of the desired sizes. A texture synthesis process resamples a smaller texture image, which synthesizes a new texture image with a similar local appearance and an arbitrary size and this combine the texture synthesis process into steganography to hide secret messages and conceal the source texture image and embeds secret messages through the process of texture synthesis. This allows to extract the secret messages and source texture from a stego synthetic texture.

Pixel-based algorithms [2] generate the synthesized image pixel by pixel and use spatial neighborhood comparisons to choose the most similar pixel in a sample texture as the output pixel. This output pixel is determined by the already synthesized pixels, any wrongly synthesized pixels during the process influence the rest of the result causing propagation of errors.

The steganography and reversible texture synthesis is based on Patch-based algorithms[1] which paste patches from a source texture instead of a pixel to synthesize textures. This method improves the image quality of pixel-based synthetic textures because texture structures inside the patches are maintained. A patch represents an image block of a source texture where its size is user-specified. This algorithm conceals the source texture image and embeds secret messages through the process of texture synthesis. This is to extract the secret messages and source texture from a stego synthetic texture.

Both Steganographic technique has advantages and disadvantages. In comparing them patch based technique is better because it provides reversible texture synthesis with image quality assessment.

II. LITERATURE REVIEW

Steganography is the process of hiding secret message with in a larger one in such a way that someone cannot know the presence or contents of the hidden message. The main purpose of steganography is secret communication between two parties. This work describes steganography using a reversible texture synthesis. This work offers three distinct advantages. First, the proposed system offers the embedding capacity that is proportional to the size of the stego texture image. Second, a steganalytic algorithm is not likely to defeat this steganographic approach. Third, the reversible capability of texture synthesis provide the functionality to allows recovery of the source texture. The major applications of the system included in military area and banking.

N. F. Johnson et al. [2] implements Spatial domain technique for steganography. This is one of the most common and easiest methods for message hiding. In this method, the message is hidden in the least significant bits (LSB) of image pixels. Changing the LSB of the pixels does not introduce much difference in the image and thus the stego image looks similar to the original image. In case of 24-bit images three bits of pixel can be used for LSB substitution as each pixel has separate components for red, green and blue. LSB insertion is a common, simple approach to embedding information in a cover file. But, it is vulnerable to even a slight image manipulation. Converting an image from a format like GIF or BMP, which reconstructs the original message exactly (lossless compression) to a JPEG, which does not (lossy compression), and then back could destroy the information hidden in the LSBs.

Anjali Tiwari et al. [3] presented a Pixel Value Differencing (PVD) method [3] that is proposed to enhance the embedding capacity without introducing visual artifacts into stego images. In PVD based schemes, the number of embedded bits is determined by the difference between the pixel and its neighbor. The larger the difference amount is, the more secret bits can be embedded. Usually, PVD based approaches can achieve more imperceptible results compared with typical LSB-based approaches with the same embedding capacity.

Pixel Mapping Method (MPP) algorithm embedding pixels are selected based on some mathematical function which depends on the pixel intensity value of the seed pixel and its 8 neighbors are selected in counter clockwise direction. Before embedding a checking has been done to find out whether the selected embedding pixels or its neighbors lies at the boundary of the image or not. Data embedding are done by mapping each two or four bits of the secret message in each of the neighbor pixel based on some features of that pixel.

N. F. Johnson et al. [2] propose masking and filtering. In this technique hide information by marking an image. This is same way as to paper watermarks. These method embed the information in the more significant areas than just hiding it into the noise level. The hidden message is more integral to the cover image. Watermarking techniques can be applied without the fear of image destruction due to lossy compression as they are more integrated into the image.

Yu-Ming et al. [4] proposed Representation Rearrangement Procedure (RRP). This technique is the high-capacity steganographic approach for three dimensional (3D) polygonal meshes. Here, use the representation information of a 3D model to embed messages. This system successfully combines both the spatial domain andthe representation domain for steganography. In the spatial domain method, every vertex of a 3D polygonal mesh can be represented by at least three bits using a modified multi-level embed procedure (MMLEP). In the representation domain method, the representation order of vertices and polygons and even the topology information of polygons can be represented with an average of six bits per vertex using the representation rearrangement procedure (RRP). This consists of two separate procedures: an embedding procedure and an extraction procedure.

L. Liang et al. [5] Patch-based sampling algorithm [11] is fast and it makes high-quality texture synthesis a real-time process. For generating textures of the same size and comparable quality, patch-based sampling is in orders of magnitude. This sampling algorithm works well for a wide variety of textures ranging from regular to stochastic. By sampling patches according to a nonparametric estimation of the local conditional MRF density function, avoid mismatching features across patch boundaries.

Geetha. P et al. [6]**,** proposed a method in which the message is embedded into a host medium and which conceals the secret message efficiently. The steganalytic algorithm used to cause the cover communication between the patches. And used to extract the source texture, secret message from original image .This image looks similar to the original image. In line based cubism like image segmentation technique is used to embed the data but it only stores the limited data. Here, a stenography using reversible texture synthesis technique is defined. The image is said to be stego image after embedding the data on cover image. Reversible texture synthesis process of re-samples a smaller textures os original image and produce the output which is similar to the local appearance of source image. This provides an advantage in arbitrary size of texture synthesis which improves embedding efficiency. Secondly, it provides the source texture without any modification. Reversible data hiding to provide the capacity of better embedding proces**s.** Finally, steg analytic algorithm is used to extract the source texture.

Munshidha K K et al. [7] proposed a reversible steganographic algorithm using texture synthesis is employed in this paper. Given an original source texture, this scheme can produce a large stego synthetic texture concealing secret messages. This can exquisitely weave the steganography into a conventional patch-based texture synthesis. The method provides reversibility to retrieve the original source texture from the stego synthetic textures, making possible a second round of texture synthesis if needed. Visually plausible stego synthetic textures are produced. The explained algorithm is secure and robust against a Regular Singular (RS) steganalysis attack. The method can take advantage of all traditional RDH techniques for texture images and achieve excellent performance without loss of perfect secrecy.

III CONCLUSION

The steganographic algorithm using reversible texture synthesis is analysed. In this an original source texture produce a large stego synthetic texture in which secret messages are embedded. The system also provides reversability to retrieve the original source texture from the stego synthetic textures. It offers some advantages such as the embedding capacity that is proportional to the size of the stego texture image, a steganalytic algorithm is not likely to defeat the steganographic approach and the reversible capability of texture synthesis provide the functionality to allows recovery of the source texture. Also, the presented algorithm is secure and robust against an RS attack.

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