Reversible Texture Synthesis: A New Method of Steganography

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***Abstract* - Steganography is popular for nowadays since internet becomes most common way of communication. It forces people to establish passive attitude for protecting data to secure data to avoid being victims. The most important requirement of steganography is un-detectability; the concealed messages should be perfectly disguised under all statistical and visual analysis. So, the novel approaches for steganography using reversible texture synthesis used. Reversible texture synthesis is process of algorithmically constructing a large digital image from a small digital sample image by using its structural content. Traditional way of using an existing cover image to hide messages was unable to extract source texture. This method conceals the source textures and embeds secret messages. And it's reversibility able to extract source texture and secret texture without distortion. Plus point over traditional method is it provides the embedding capacity which proportional to size of stego structure image and steganalytic algorithm is not likely to defeat traditional steganographic approach.**

***Index Terms* — Steganography, Texture Synthesis, Patch, Embedding etc.**

I. INTRODUCTION

Reversible Steganography scheme has the ability to embed the secret data into a host image and then recover the host image without losing any information when the secret data is extracted. No modification is done in the digital representation of the cover image when reversible data hiding method is used. Some of the techniques used are Reversible data hiding, Sequential recovery and Multilevel Histogram modification, Steganographic techniques for JPEGs, Reference pixel distribution and Interpolation mechanism. In contrast to using an existing cover image to hide messages, the algorithm conceals the source texture image and embeds secret messages through the process of texture synthesis. That will be advantageous in providing various numbers of embedding capacities, produce a visually plausible texture images, and recover the source texture. Proposed an image reversible data hiding algorithm which can recover the cover image without any distortion from the stego image after the hidden data have been extracted.

II. GOALS AND OBJECTIVE

A major goal of the proposed system is to the goal of the project is, the sender should transfer secret data which is embedded in the texture, and at the receiver side the receiver should get source texture and authenticated secret message separately. The objective is to create a tool that can be used to hide data inside a 24 bit color image. The system should be easy to use, and should use a graphical user interface and should effectively embed the secret message in the texture and de-embed at the receiver side. The system should also take into account the original content, to theoretically more effectively hide the message. etc.

III. EXISTING SYSTEM

There are many techniques available for Information Hiding. A good data hiding method should be capable of evading visual and statistical detection while providing an adjustable payload. Impossibilities of data hiding is commonly achieved by exploiting the weakness of the human auditory and visual systems, using the techniques, for example changing the least-significant bits of pixels of cover image to embed information, or shifting lines, words, or characters by a small amount in an image containing text. Other works hide information by adding redundant data, or making use of alternative representations of electronic data. For example hidden information can be added in a text document by adding tabs and spaces at the end of the line. The different combinations of the color palette entries in a GIF image can be used to embed secret data into the image. Sometimes the cover media will experience some distortion due to data hiding and cannot be inverted back to the original media. That is, after the hidden data have been extracted out some permanent distortion occurs to the cover media. A typical steganographic application includes covert communications between two parties whose existence is unknown to a possible attacker and whose success depends on detecting the existence of this communication. Existing steganographic algorithms adopt an existing image as a cover medium. The disadvantage of embedding secret messages into this cover image is the image distortion encountered in the stego image. There are mainly two drawbacks. First, since the size of the cover image is fixed, the more secret messages which are embedded allow for more image distortion. Also there is restriction on embedding capacity and the image quality which results in the limited capacity provided in any specific cover image. This will interfere with the natural features of the cover image. No significant visual difference exists between the two stego synthetic textures and the pure synthetic texture.

IV. Proposed System

Reversible Steganography scheme has the ability to embed the secret data into a host image and then recover the host image without losing any information when the secret data is extracted. No modification is done in the digital representation of the cover image when reversible data hiding method is used. Some of the techniques used are Reversible data hiding , Sequential recovery and Multilevel Histogram modification , Steganographic techniques for JPEGs , Reference pixel distribution and Interpolation mechanism. In contrast to using an existing cover image to hide messages, the algorithm conceals the source texture image and embeds secret messages through the process of texture synthesis. That will be advantageous in providing various numbers of embedding capacities, produce a visually plausible texture images, and recover the source texture. Proposed an image reversible data hiding algorithm which can recover the cover image without any distortion from the stego image after the hidden data have been extracted.

V. Features of the Proposed System

A. The embedding capacity is proportional to the size of the stego texture image.
B. A steganalytic algorithm is not likely to defeat our steganographic approach.
C. The reversible capability provides functionality which allows recovery of the source texture.
Instead of concealing secret message in existing cover Image, it is concealed throughout the process of texture synthesis.

VI. Implementation Modules

1. Index Table Generation Process:

The first process is the index table generation where an index table is produced to record the location of the source patch set SP in the synthetic texture. The index table allows to access the synthetic texture and retrieve the source texture completely.

2. Patch Composition Process:

The second process is to paste the source patches into a workbench to produce a composition image. First, a blank image as our work-bench is established where the size of the workbench is equal to the synthetic texture. By referring to the source patch IDs stored in the index table, then the source patches are pasted into the workbench. During the pasting process, if no overlapping of the source patches is encountered, then source patches are directly pasted into the workbench which overlap each other.Image quilting technique is employed to reduce the visual artifact on the overlapped area.

3 .Message-oriented Texture Synthesis Process:

After generation of an index table and a composition image, source patches are pasted directly into the workbench. Secret message will be embedded via the message-oriented texture synthesis to produce the final stego synthetic texture.

4 . Source Texture Recovery, Message Extraction, and Message Authentication Procedure:

The message extracting for the receiver side involves generating the index table, retrieving the source texture, performing the texture synthesis, and extracting and authenticating the secret message concealed in the stego synthetic texture.

VII. Input and Output Format

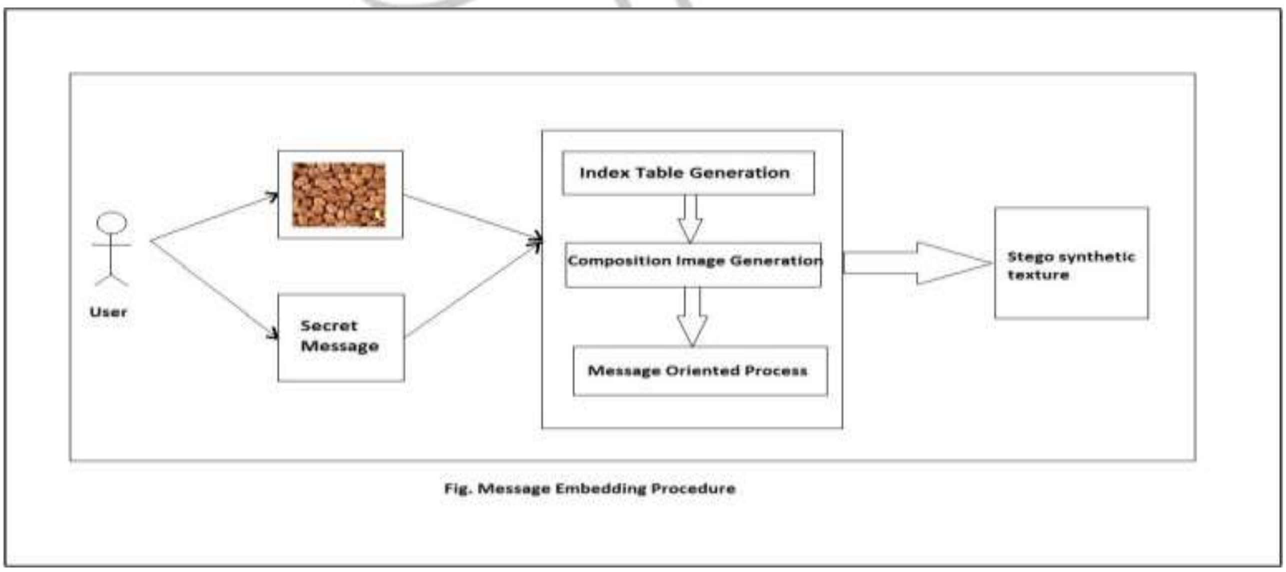

Figure 1:Message Extraction

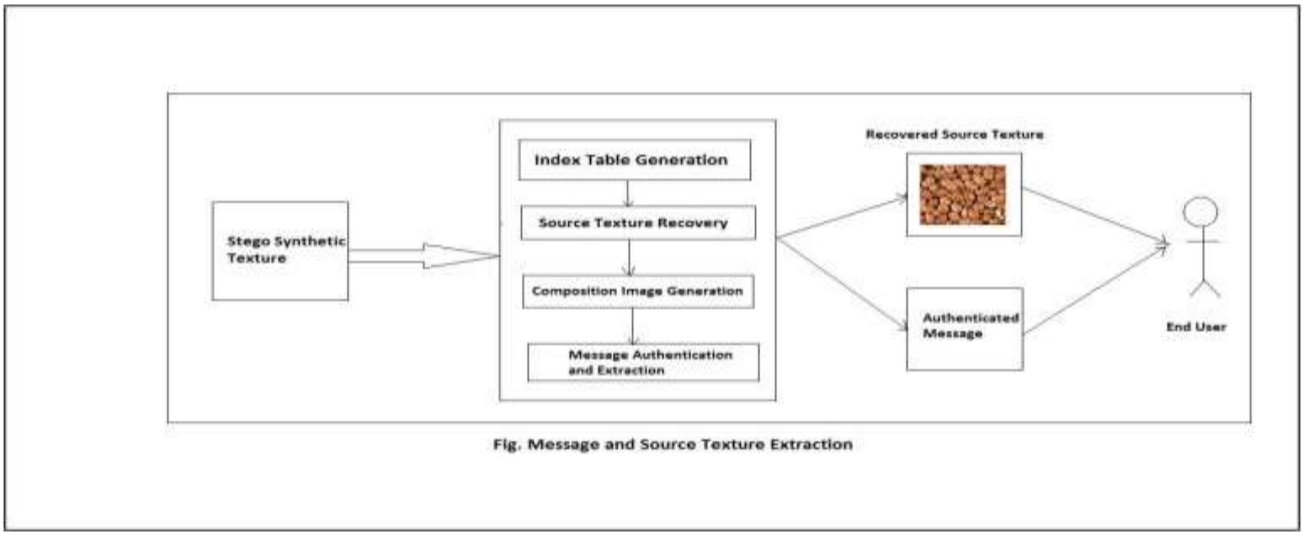

Figure 2:Message Extraction

VIII. Conclusion

A novel approach of reversible steganographic algorithm is proposed where process of texture synthesis is weaved with staganography. Given an original source texture, this approach can produce a large stego synthetic texture concealing secret messages.Conventional patch-based texture synthesis is used along with reversible staganography. Reversibility of algo-rithm is able to retrieve the original source texture from the stego synthetic textures. With the two techniques we have introduced, algorithm can produce visually plausible stego synthetic textures even if the secret messages consisting of bit 0 or 1 have an uneven appearance of probabilities. The algorithm presented in this project is secure and robust against an RS steganalysis attack.

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