Steganography Using Reversible Texture Synthesis

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Abstract-*Steganography means hiding the secret message within an ordinary message and extraction of it as its destination. In the texture synthesis process here re-samples smaller texture image which gives a new texture image with a similar local appearance. In the existing system work is done for the texture synthesis process but the embedding capacity of those systems is very low. In the project introduced the method SURTDS (Steganography using reversible texture synthesis) for enhancing the embedding capacity of the system by using the reversible texture synthesis. A texture synthesis procedure re-samples a smaller texture image, which incorporates a new texture image with a comparative local appearance and a discretionary size. We mesh the texture synthesis process into steganography to hide secret messages. Rather than utilizing an existing cover image to hide messages, our algorithm covers the source texture image and embeds secret messages through the procedure of texture synthesis. This permits us to extract the secret messages and source texture from a stego synthetic texture. Our methodology offers three distinct advantages. Initially, our plan offers the embedding capacity that is proportional to the size of the stegotexture image. Second, a steganalytic algorithm is not likely to defeat our steganographic approach. Third, the reversible capacity acquired from our plan gives functionality, which permits recovery of the source texture. Experimental results have confirmed that our proposed algorithm can give different numbers of embedding capacities, create a visually plausible texture images, and recover the source texture.*

Keywords-Steganography, texture synthesis, difference expansion, stego image.

I. INTRODUCTION

In this propose distinctive approach for steganography by using reversible texture synthesis [5]. Hiding of secret message among a standard message and extraction of it at its destination is understood as Steganography [1]. A texture synthesis technique resamples a smaller texture image that synthesizes a novel texture image with a native look and an autocratic size. Texture synthesis is that the method of algorithmically constructing an oversized digital image from a tiny digital sample image by a taking advantage of its structural content. Given an authentic source texture, our scheme will turn out an oversized stego synthetic texture concealing secret messages. The fundamental unit used for our steganographic texture synthesis is mentioned as a "patch". A patch represents a picture block of a source texture wherever its size is user-specified. System tend to propose a unique approach for steganography exploitation reversible texture synthesis.

A texture synthesis method re-samples a tiny texture image drawn by an artist or captured in a very photograph so as to synthesize a brand new texture image with the same native look and absolute size. An existing cover image bury messages, our algorithm conceals the source texture image and embeds secret messages through the method of texture synthesis. This permits us to extract hidden messages and also the source texture from a stego synthetic texture. To the most effective of our information, steganography taking advantage of the changeability in texture synthesis. Here it's tendency to weave the feel synthesis methodology into steganography to hide secret message. Our technique is novel and provides changeability to retrieve the initial source texture from the stego synthetic textures, creating likely a second round of texture synthesis if required. With the two techniques got introduced, our algorithm will create visually plausible stego synthetic textures although the secret messages consisting of bit "0" or "1" have an uneven look of chances.

In destination to victimization associate degree existing cowl image to hide message, our rule conceals the availability texture image and embeds secret message through the strategy of texture synthesis. It permits extracting the secret message and source texture from a stego synthesis texture. In our propose system provides three distinct advantages. Initially our theme offers the embedding capability that's proportional to the size of to the stego texture image[10][11]. Second a steganalytic rule isn't likely to defect our steganographic approach, and therefore the last is reversible capability inheritable from our theme provides practicality, which allows recovery of the available texture. Our scheme to support different kinds of texture synthesis approaches to enhance the image quality of the synthetic textures. Another potential study would be to mix different steganography approaches to extend the embedding capacities.

In this paper introduced the method for embedding capacity using difference expansion with texture synthesis. Initially evaluate the binary value of secret image. Then 14 bit groups of binary value convert into decimal value, if message is too large then difference expansion for embedding. In difference expansion compute average and difference in patch and embedded one by one in bit. By using the difference expansion method the improves the embedding capacity of the system.

II. LITERATURE SURVEY

This paper [1], presented a novel approach for steganography by using a reversible texture synthesis. This process resamples a minor texture picture, which synthesizes a new texture image along with a similar local appearance and an arbitrary size. To hide the secret messages compose the texture synthesis process into steganography. On the other hand, using an existing cover image to hide messages, this algorithm cover up the source texture image and enclose secret messages through the process of texture synthesis. This permit us to derive the secret messages as well as source texture from a stage synthetic texture. This method provide three different advantages. In first, this schema provides the embedding capacity that is relative to the size of the stego texture image. Second, a stage analytic algorithm is not likely to overcome steganographic approach. In third, the reversible capability inherited from scheme offers functionality, which grant the recovery of the source texture. The experimental outcomes have validated that proposed algorithm can provide different numbers of embedding capacities, generates a visually plausible texture images, and recover the source texture.

Reversible data hiding refers to embedding secret message into a cover and the cover image can be recovered exactly. It helps in hiding the secret data in the image. Patch based texture synthesis pattern conserve the image quality. In this paper [2], firstly generate a lookup table and denoting the location of source patches. then depend on the lookup-table secret messages are located on a blank workbench. The secret messages are embedded according to proposed embedding algorithm which is robust to any stage analysis attack. The reversible capacity inherited from this approach permit the receiver to perform second round of stage analysis by using the same source texture which the sender has sent.

This paper[3], implemented a novel, reversible data hiding scheme that gives improved performances. In this First, the algorithm is proposed named as a distortion-oriented, minimized, (DOM) embedding algorithm. A cascading trellis coding algorithm can be used to minimize the overall modifications to the host coefficients, and some specified host coefficients are kept intact. The proposed DOM algorithm is used in the distinct wavelet transform (DWT) domain. To increase the payload, both the scaling coefficients as well as the wavelet coefficients are involved in computation. However, by using the DOM algorithm, the scaling coefficients are kept unchanged. By these approaches, the proposed scheme offers high quality to the stego image and reversibility to the host image without the difficulties of overflow and underflow. Moreover, by using a multi-round embedding operation, a high payload is acomplished. The experimental results displays that the proposed scheme outperforms the state-of-the-art reversible hiding schemes.

In this paper[4], a new pattern-based fragile, semi-blind, spatial domain data hiding scheme is developed. In order to transparently as well as securely insert secret data into an image the Local Binary Pattern texture classification approach is used. Pixel values are updated in such a way that the texture satisfies the message requirements. The method is studied in detail and compared to other techniques in spatial domain in terms of capacity and image quality. The scheme performs well in images with smooth areas and can be used for authentication, tamper proofing, and secret communications.

This paper [5] implemented a reversible steganographic algorithm by using texture synthesis depend on edge adaptive along with tree based parity check. First of all generate a huge stego synthetic texture covering the secret messages. To synthesized the textures use a conventional patch-based method. This project will also offer reversibility to extract the original source texture from the stego synthetic textures, making possible a second round of texture synthesis if needed. This paper also introduce another image steganography method that merged the edge adaptive and TBPC algorithms to increase the payload and imperceptibility of the stego image, and thus reducing the possible distortion during the embedding process to minimize the probability of discovering the secret message data from unauthorized users and also resulting in high embedding capacity.

This paper [6], work presents stegnography in texture images utilizing reversible texture synthesis depend on error histogram shift. This procedure is fabricated into steganography hiding secret messages and in addition the source texture. The algorithm conceals the source texture image as well as embeds the secret messages through the procedure of texture synthesis and error histogram shift. This process permit us to retrive the secret messages along with the source texture from a stego synthetic texture.

In this paper [7], the Steganographic Texture synthesis algorithm can use a small size texture image to synthesize a massive result texture image by reclaiming, matching and recombining. Hence suggest a reversible technique for texture synthesis with multilayer embedding. It can extract the source texture from result texture. The proposed technique is the one that actually allow the users to execute multiple layers embedding to accomplish the purposes of very high embedding capacity as well as very good optical quality of stego images.

This paper[8], implemented a robust steganography depend on texture synthesis. Distinct from the traditional steganography by modifying an previous image, cover up the secret messages during the process of synthesizing a texture image. The generated stego texture is related to the sample image, preserving a good local appearance. This algorithm also ensures that the hidden message can be exactly derived from the stego image. More essentially, the implemented steganography approach gives a capability of countering JPEG compression.

A. Existing System

On the other hand, using an existing hide image to hide messages, This algorithm conceals the source texture image as well as embeds secret messages through the process of texture synthesis. A usual steganographic application consisting covert communications among two parties whose existence is unknown to a possible attacker and whose success based on identifying the existence of this communication. Most image steganographic algorithms accept an existing image as a cover medium. In the stego image, the expense of embedding secret messages into this cover image is the image distortion encountered. No significant visual difference occur among the two stego synthetic textures as well as the pure synthetic texture.

III. PROPOSED SYSTEM

System is split up into two parts which are embedding secret message and extracting the secret message. The detailed description of both procedures is as follows:

Embedding Secret Message

In this process initially input image is provided to the system, image is split up into the kernel blocks. By providing the source texture size and kernel block size the kernel block is generated. Equation 3 shows the formula for kernel block generation. Using kernel block, creating source patch by 3 Process which are: Mirroring boundary region, expanded boundary region and kernel block. Candidate patch from source texture image is produced by size of Cf + Pw * Ph. Each Cf is unique, Check any duplicate candidate patch. After that first creating indexing table using random function. Using IT generating composition image calculate decimal value of secret key. Finally the stego synthesis structure is generated.

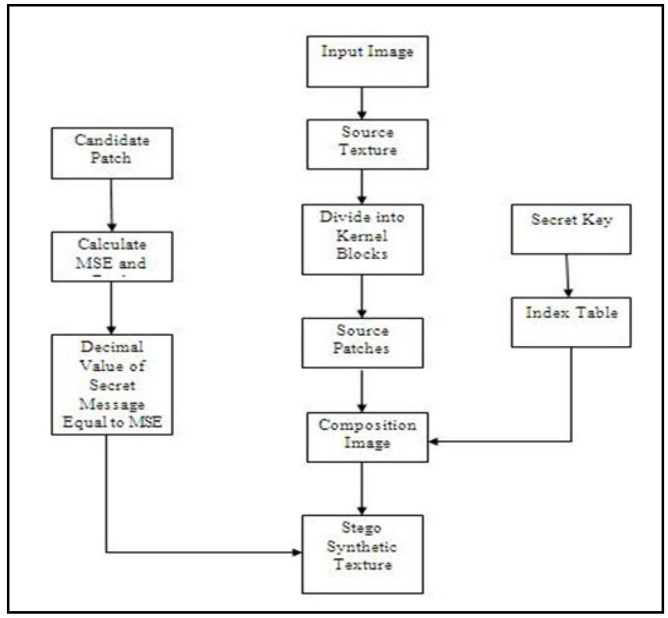

Fig 1: Embedding Secret Message

Extracting Secret Message

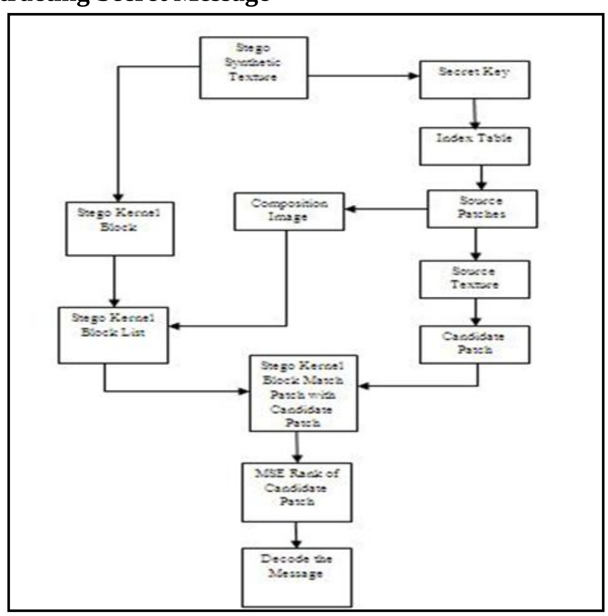

Fig 2: Extracting Secret Message

In this phase the process of extracting the secret message is done. By using the secret key index table is generated texture image is recovered. As the above procedure candidate patch is generated. Calculate Stego patch and matching with candidate patch. Calculate the rank of stego patch. Secret message is decoded and final result is obtained.

IV. PROPOSED ALGORITHM

Step 1: Initially generating kernel block
Step 2: Using Kernel Block, generating source patch of given size.
Step 3: Generating candidate patch of same size of source patch from source textual image.
Step 4: Encoding secret message and produce composition image.
Step 5: Using index table generating Stegnography image.
Step 6: Extracting process, regenerating index table using secret key.
Step 7: Generating source texture image, produce candidate patch.
Step 8: Generating composition image creating stego patch.
Step 9: Matching stego patch with rank of cp and decoding the message.

V. MATHEMATICAL MODEL

- User Interest Estimation Calculation

1. Kernel Block Generation

Kernel block is generated is as follows:
Size of source texture = S_w x S_h (1)
Given kernel Block Size = K_w x K_h (2)
Then the number of kernel block = $\frac{S_w \times S_h}{K_w \times K_h}$ (3)

Where S_w – Source texture width
S_h – Source texture height
K_w – Kernel block width
K_h – Kernel block height

2. Candidate patch generation

Calculate the number of C_p
$CP_n = (S_w - P_w+1) \times (S_h - P_h+1)$ (4)
Where, P_w -Candidate patch width
P_h – Candidate pitch height
$Cp = \{CP_i \,/\, i = 0, 1, \ldots\ldots\ldots\ldots\ldots\ldots, CP_n-1\}$

3. Index table generation

Given synthesis image size by user = T_w x T_h (5)
Number of rows and columns in table is find as:

Row = $\frac{T_W}{P_W}$ (6)

Column = $\frac{T_h}{P_h}$ (7)

Assign initial value ``-1” for each entry.

4. Message encoding and decoding

Keep secret message as input.
Convert message into byte bitarray[];
for(i=0 to bitarray length)
{
group of 12 bit convert to decimal value and save to arraylist.
}

VI. APPLICATIONS

- Military Application
- Business Application
- Government can uses for different application to send secret message.
- High security, difficult to extract secret message.

VII. RESULT AND DISSCUSSION

1. Experimental setup

The system is built using Java framework on Windows platform. The Net Beans IDE are used as a development tool. The system doesn’t require any specific hardware to run; any standard machine is capable of running the application

2. Results

In this section analyze the test outcomes of the proposed framework.

Figure 3 given bellow demonstrated the time comparison graph of the proposed framework with the existing framework.

From figure 3 we can see that the proposed system uses less time for processing compared with the existing system.

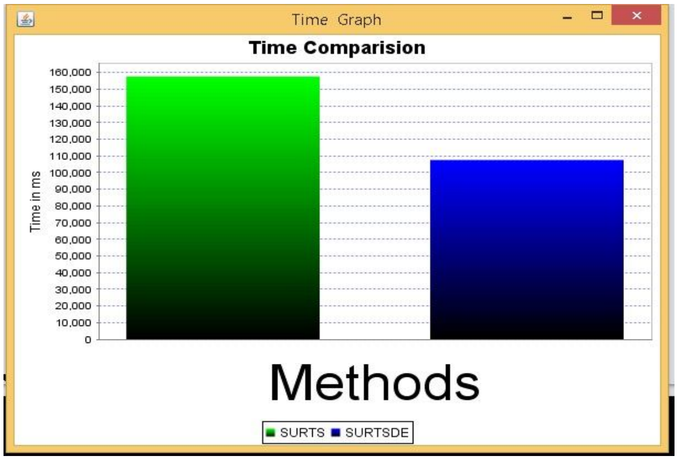

Fig 3: Time comparison graph

Following figure 4 demonstrates the memory comparison graph of the proposed framework with the existing framework. Memory needed for proposed framework is more as compare to existing system.

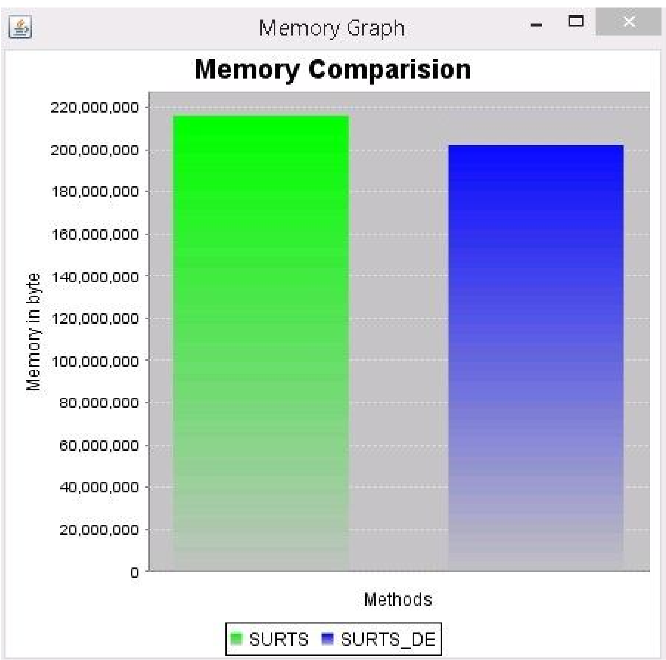

Fig 4: Memory comparison graph

Following figure 5 demonstrates the Embedding capacity graph of the proposed framework with the existing framework.

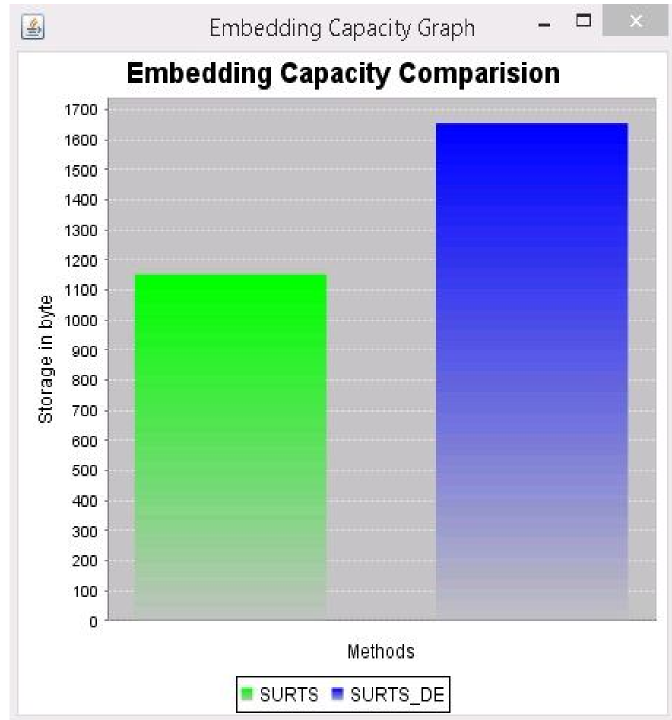

Fig 5: Embedding capacity graph

VIII. CONCLUSION AND FUTURE SCOPE

This system proposes a reversible steganographic algorithmic program using texture synthesis. Introduce the difference expansion method for enhancing the embedding capacity of the stego image. Our technique is novel and provides changeableness to retrieve the initial supply texture from the stego artificial textures, creating attainable a second spherical of texture synthesis if required. Finally the experimental results show that the embedding capacity of the SURTDS is higher than the SURTS system. Also compare the PSNR value of system and results shows that the SURTDS is better than the SURTS system. In future system focuses on security of the embedded data.

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