Robust Image Watermarking against Geometric Deformation

Dr. V.Kavitha, B.E., M.E., Ph.D, M. Akila, R. KavenKumar, J. Lavanya
Computer Science and Engineering
Velalar College of Engineering and Technology Engineering and Technology

***Abstract*—a novel approach to steganography employing a reversible texture synthesis is proposed in this project. After resamplinga smaller texture image, a texture synthesis process creates a new texture image of any size with a similar local appearance. To conceal secret messages, this paper incorporates texture synthesis into stegano graphy . Our algorithm uses texture synthesis to hidethe source texture image and embed secret messages, as opposed to using an existing cover image to hide messages .We can thus obtain the source texture and secret messages from a stags synthetic texture. There are three distinct benefits to this method. To start with, our plan offers the installing limit that is relative to the size of the stag's surface picture. Second, a steganalytic calculation isn't probably going to overcome our steganography approach. Thirdly, the source texture can be recovered thanks to the functionality provided by our scheme's reversible capability. Our proposed algorithm's ability to recover the source texture, produce texture images that are visually convincing, and provide a variety of embedding capacities has been confirmed by the results of our experiments.**

***Index Terms*—Steganography, reversible synthesis, source texture, stages synthetic texture, embedding capacities**

I. INTRODUCTION

Steganography for digital media has sparked a lot of concern over the past ten years, despite numerous advancements in the field ofdigital media. Steganography is a unique technique for hiding information. It inserts messages into a host medium to conceal secret messages and avert eaves dropper suspicion. The success of a typical steganography application is contingent on discovering covertcommunications between two parties whose existence is unknown to a potential attacker. Steganography typically employs meaningful digital media like 3D models, digital images, text, audio, and video as the host medium. With the increasing use of digital images, numerous image steganography algorithms have been investigated. Them a jurist of image steganography algorithms coveran existing image. The stego image's image distortion is the cost of embedding secret messages in to this cover image. Two drawbacks result from this. First, the more secret messages that are embedded, the more room there is for image distortion due to the fixed sizeof the cover image.

As a consequence of this, a compromise needs to be made between the embedding capacity and the quality of the image, which is why any given cover image only has a limited amount of capacity. Keeping mind that image stego analysis is a method for finding hidden messages in stego images.This bring to these cond disadvantage, which is that it is still possible for an image stego analytic algorithmto defeat image steganography and thus reveal that a hidden message is being conveyed in a stego image. This would allow for these cond disadvantage to be eliminated. To create a new texture image with a similar locale appearance and arbitrary size, a texture synthesis process re-samples a small texture image drawn by an artist or captured in a photograph. Steganography uses the technique of texture synthesis to hide secret messages and these our texture. Specifically, rather than utilizing a current cover picture to conceal messages, our calculationhides the source surface picture and inserts secret messages through the course of surface blend. We can thus obtain the source texture and secret messages from a stego synthetic texture. Steganography that takes advantage of reversibility has never been discussed in the literature on textures thesis, according to our knowledge.

II. LITERATURE REVIEW

A. New Robust Lossless Data Hiding Scheme And Its Application To Color Medical Images

The proposed algorithm depends on transforming non-overlapping blocks of the host image using Slantlet transform (SLT) matrix and embedding data bits by modifying the difference between the mean values of the SLT coefficients in the high frequency subbands.

B. Non-integer expansion embedding techniques for reversible image watermarking

This work aims at reducing the embedding distortion of prediction-error expansion (PE)-based reversible watermarking. The rounding operation makes a constraint on a predictor's performance. we propose a non-integer PE (NIPE) embedding approach, which can proceed non-integer prediction errors for embedding data into an audioor image file by only expanding integer element of a prediction error while keeping its fractional element unchanged.

C. Independent Embedding Domain Based Two-Stage Robust Reversible Watermarking

The cover image is first transformed into two independent EDs, and then the robust and reversible watermarksare embedded into each domain separately. By the proposed method, the embedding performance of the original two-stage RRW is significantly enhanced. Moreover, the proposed method is experimentally verified better than some other state-of-the-art RRW methods.

D. Multiple Histograms Shifting-Based Video Data Hiding Using Compression Sensing

To increase embedding capacity, multiple pairs of peak bin and zero bin are selected, and pre-processed, in which prediction errors (PEs) are investigated with new prediction errors, is to prevent the possible overflow and underflow of pixel values .

III. PROPOSED METHODOLOGY

A novel approach to steganography employing reversible texture synthesis is proposed in this paper. To create a new texture image with a similar local appearance and arbitrary size, a texture synthesis process re-samples a small texture image drawn by an artist or captured in a photograph.

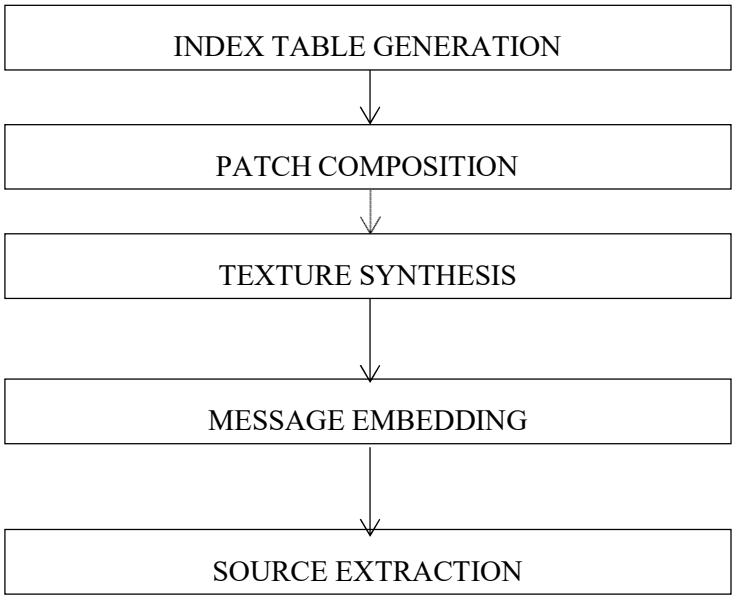

Fig.1.Flowchart

During the synthesizing process, a secret message is embedded using the patch-based method. In a message extracting process, this makes it possible to recover the source texture and provides reversibility. The data embedding procedure has three steps:

- Index Table Generation
- Composition Image generation
    - Message–Oriented Texture SynthesisThe data extraction procedure has four steps:

- Index Table Generation
- Source Texture Recovery
- Composition Image generation
- Message Extraction and Authentication

A. Index Table Generation

This module generates the index table. The index table allows us to access the synthetic texture and retrieve the source texture completely. The index table has the initial values of −1 for each entry, which shows that the table is blank.

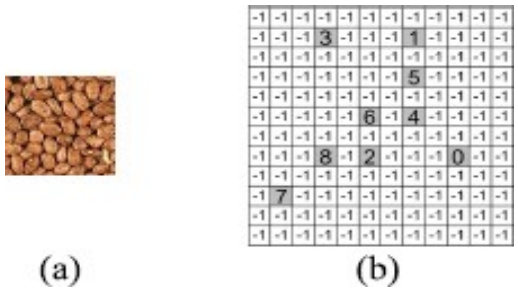

Fig A. Index Table Generation

B. Composition Image Generation

Establish a blank image as our workbench 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 paste the source patches into the workbench.

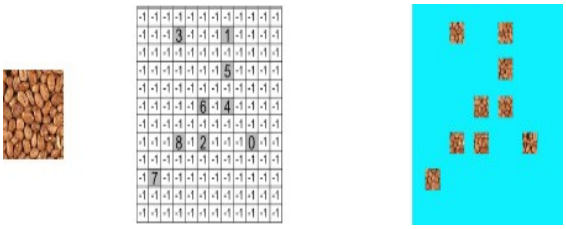

Fig B. Composition Image Generation

C. *Texture Synthesis*

Texture Synthesis is the process of algorithmically constructing a large digital image from a small digital sample image by taking advantage of its structural content. It is an object of research in computer graphics and is used in many fields, amongst steganography.

V. EXPERIMENTAL SETUP

Experimental setup shows that comparative analysis proves that which system is better in accuracy.

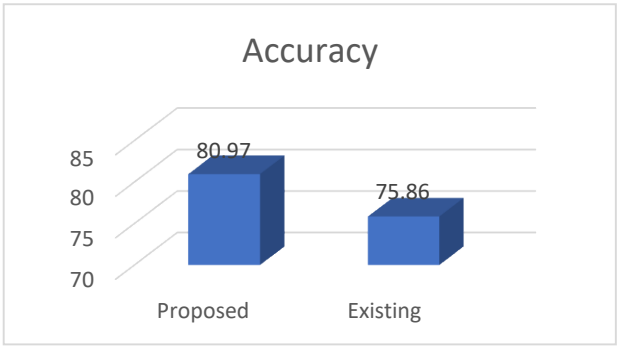

Fig 2. Bar Chart

In proposed system addition to the existing robust watermarking algorithm RRW 256 & Hash algorithmis used to improve accuracy. The existing algorithm reduces the PSNR level, Performance, Robustness and Security. The applied algorithm increases the Performance, Robustness and Security, PSNR. In existing system is 75.86% and proposed system is 80.97%.

VI. RESULTS

The goal of this method is to keep the image's visual quality while embedding the secret information in a way that is invisible to the naked eye. The peak signal-to-noise ratio (PSNR), structural similarity index (SSIM), and meansquare error (MSE) are three metrics that can be used to assess an image's visual quality. By attempting to decode the image and comparing it to the original message, one can also test the algorithm's capacity to extract the hiddendata. This can be accomplished with a variety of decoding methods, including statistical analysis, frequency domain analysis, and machine learning-based methods.

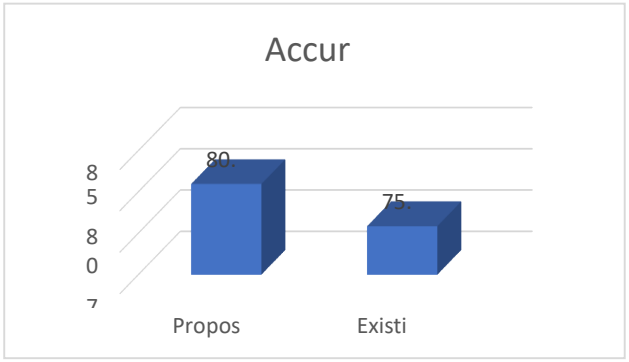

Fig.3.Comparison Graph For Existing and Proposed System

CONCLUSION AND FUTURE SCOPE

Our method is capable of producing a substantial synthetic stego texture that conceals secret messages when givenan original source texture. As far as we could possibly know, we are the main that can flawlessly mesh the steganography into a traditional fix based surface combination. Our novel approach makes it possible to reverse the process and retrieve the original source texture from the stego synthetic textures, allowing for a second texture synthesis attempt in the event that one is required. Even if the secret messages containing bits "0" or "1" have an uneven appearance of probabilities, our algorithm can produce visually plausible stego synthetic textures using the two methods we've presented. . To improve the image quality of the synthetic textures, we might expand our plan to include support for other kinds of texture synthesis methods in future research. Increasing the embeddingcapacities by combining different steganography approaches is another possible study.

REFERENCES

[1] S. Xiang and Y. Wang, "Non-integer expansion embedding techniques for reversible image watermarking," EURASIP J. Adv. Signal Process., vol. 2015, no. 1, p. 56, Dec. 2015.

[2] J. Qin and F. Huang, "Reversible data hiding based on multiple two-dimensional histograms modification," IEEE Signal Process. Lett., vol. 26, no. 6, pp. 843–847, Jun. 2019

[3] D. Hu, D. Zhao, and S. Zheng, "A new robust approach for reversible database watermarking with distortion control," IEEE Trans. Knowl.Data Eng., vol. 31, no. 6, pp. 1024–1037, Jun. 2019.

[4] X. Liang and S. Xiang, "Robust reversible audio watermarking based on high-order difference statistics," Signal Process., vol. 173, Aug. 2020.

[5] X. Wang, X. Li, and Q. Pei, "Independent embedding domain based two-stage robust reversible watermarking," IEEE Trans. Circuits Syst. Video Technol., vol. 30, no. 8, pp. 2406–2417, Aug. 2020.

[6] J. S. Seo and C. D. Yoo, "Image watermarking based on invariant regionsof scale-space representation," *IEEETrans. Signal Process.*, vol. 54, no. 4, pp. 1537–1549, Apr. 2006.

[7] C.-S. Lu, S.-W. Sun, C.-Y. Hsu, and P.-C. Chang, "Media hash- dependent image watermarking resilient against both geometric attacks and estimation attacks based on false positive-oriented detection," *IEEE Trans. Multimedia*, vol. 8, no. 4, pp. 668–685, Aug. 2006.

[8] C.Nagarajan and M.Madheswaran - 'Experimental verification and stability state space analysis of CLL-T Series Parallel Resonant Converter' - Journal of ELECTRICAL ENGINEERING, Vol.63 (6), pp.365-372, Dec.2012.

[9] C.Nagarajan and M.Madheswaran - 'Stability Analysis of Series Parallel Resonant Converter with Fuzzy Logic Controller Using State Space Techniques'- Taylor & Francis, Electric Power Components and Systems, Vol.39 (8), pp.780-793, May 2011.

[10] Nagarajan and M.Madheswaran - 'Experimental Study and steady state stability analysis of CLL-T Series Parallel Resonant Converter with Fuzzy controller using State Space Analysis'- Iranian Journal of Electrical & Electronic Engineering, Vol.8 (3), pp.259-267, September 2012.

[11] C.Nagarajan and M.Madheswaran - 'Performance Analysis of LCL-T Resonant Converter with Fuzzy/PID Using State Space Analysis'- Springer, Electrical Engineering, Vol.93 (3), pp.167-178, September 2011.

[12] G.Neelakrishnan, P.Iraianbu, T.Abishek, G.Rajesh, S.Vignesh, "IOT Based Monitoring in Agricultural" International Journal of Innovative Research in Science, Engineering and Technology, March 2020, Volume 9, Issue 3, pp:814-819

[13] G.Neelakrishnan, R.S.Jeevitha, P.Srinisha, S.Kowsalya, S.Dhivya, "Smart Gas Level Monitoring, Booking and Gas Leakage Detector over IOT" International Journal of Innovative Research in Science, Engineering and Technology, March 2020, Volume 9, Issue 3, pp: 825-836