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A SURVEY REPORT ON STEGANOGRAPHY IN IMAGES USING GENETIC ALGORITHM

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Abstract

Steganography is the art . It is method to hide some message in some carrier media file . Using this method some secret communication can be done . Audio, video,image, text this type media files can be used as a carrier file . Now a days digital images a gaining popular now a days . Lots of techniques are also been used to implement steganography . In this report overview of some research on steganography has been discussed. Advantages and disadvantages of those methods are also discussed .

Keywords: Cryptography, Genetic algorithm, Image steganography, LSB

1. INTRODUCTION

Today we are standing in a very modern age of technology . Every thing is digitalised here . Life is become very faster and simplier because of these new technology . Now a fays information sharing is also very important part of our lives . Ther are also lots of confidential data or message which we want to hide from other person . We just simply want to share with some particular person . Here the security comes into the picture . And steganography give the required security in this problem . Now we can send data by embedding it with an image , video , audio or any other file . Digital images also gaining popularity now a days . Here a carrier file is taken and message is incorporated into that file . And send it . Final file is called stego file .But here we concentrate only on image steganography . Here an image is taken as carrier file. The message is embedded into the pixels of carrier image . And finally a stego image is produced . A rgb image or grey scale image any kind of image can be used . Only concern is carrier image and the final stego image should be similar in looks .

A genetic algorithm is great for finding solutions to complex search problems. They're often used in fields such as engineering to create incredibly high quality products thanks to their ability to search a through a huge combination of parameters to find the best match. For example, they can search through different combinations of materials and designs to find the perfect combination of both which could result in a stronger, lighter and overall, better final product. They can also be used to design computer algorithms, to schedule tasks, and to solve other optimization problems. Genetic algorithms are based on the process of evolution by natural selection which has been observed in nature. They essentially replicate the way in which life uses evolution to find solutions to real world problems. Surprisingly although genetic algorithms can be used to find solutions to incredibly complicated problems, they are themselves pretty simple to use and understand.

step 1. [start]Generate random population of chromosome (suitable solution for the problem).

step 2. [Fitness] Evaluate the fitness f(x) of each chromosome x in the population.

step 3. [New population] Create new population by repeating following steps until new population is completed.
[Selection] Select two guardian chromosomes from a populace as per their wellness (the better fitness function, the greater opportunity to be chosen)
-[Crossover] With a hybrid likelihood traverse the folks to frame another posterity (children). In the event that no crossover was performed, posterity is a careful duplicate of parents.
[Mutation] With a mutation there is probability of transform new posterity at every locus (position in chromosome).
[Accepting] Place new posterity in another populace.

step 4. [Replace] Utilize new created populace for a further run of algorithm.

step 5. [Test] In the event that the end condition is fulfilled,stop, and return the best solution in current population.

step 6. [Loop]Go to step 2.

2.PAPER ANALYSIS

Elham Ghasemi et al. [1] worked on High Capacity Image Steganography using Wavelet Transform and Genetic Algorithm and it is applied on 512x512 8-bit grayscale images . The messages are created randomly with the same length as the maximum hiding capacity. Stego image quality is decided by PSNR . Human is unable to recognize the grayscale images with PSNR > 36 dB.

messages is embedded in a new concept that is k-lsb method , k varies from 3 to 6 . as a results we see if k= 4 or 5 , highest hiding capacity is achieved . They took k equal to 4. Capacity of image increase after embedding. GA helps here to increase the difference between stego and real image . Local image properties preserved by block mapping . they applied OPAP by which the hiding capacity of the algorithm is increase. Computational complexity is high for this method , positive sign is also more in this method.

M. Soleimanpour et al.[2] proposed a Scientific Technique for Steganography Method Based on Advanced Genetic Algorithm Optimization in the Spatial Domain field and a new LSB method came into the picture. Here different LSB match structures are evaluated. And then score matrix is generated. Total cover image is broken into different frequency divisions . A transform domain help us to hide the message in the most effective pixels . Advantage of this method is higher PSNR value of stego image is achieved here and it improves the visual quality of stego image . This method gives better output from other similar type of methods like Mielikainen and some different methods. The drawback of this method is it takes a long time to calculate score matrix . If this drawback can be somehow eliminated then it is a effective method .

Dr.USHA B.A et al.[3] researched on High Capacity Data Embedding Method in Image Steganography using Genetic Algorithm and the result is very impressive from this research . Private key is used here and an AES algorithm also . Both are applied in the case of encrypting the secret message . Here an evaluation matrix is calculated and then results are compared with it . Past execution will provide a huge effect on future calculation .To give a desirable result, lots of test have been done on this method to improve PSNR values . Here also they applied PIT and LSB insertion method. By using private key decryption ,message can be recovered .So here the advantage is that huge data can be embedded here . Pixels are almost similar in this method .Stego and real image resembles each other. There is some minor disadvantages also because lots of things are incorporated here . So lines of codes increases .Another thing is encode and decode time also very high in this method .

H. Ramezani et al.[4] worked on a Novel Image Steganography in Contourletdomain Using Genetic Algorithm and the proposed method is applied on 512×512 8-bit grayscale images such as Barbara and Baboon. A measurement of quality of reconstruction is done with the help of PSNR in image compression etc. It gives the ratio between the peak power of a signal and the power of corrupting noise that affects the consistency of its representation. In k-LSB substitution, k = 1 or 2, means low hiding capacity with high visual quality of the stego-image and k = 7 or 8, provide low visual quality versus high hiding capacity. The experiment concludes that for k=4 or k=5, we have moderately high hiding capacity and reasonable visual quality . This process embeds the messages in the 4-LSBs and with a reasonable PSNR. It is robust against some statistic attacks. Steganography that is a branch of information hiding technology aims to hide a secret data securely in a cover media for transmission. Obtaining high hiding Capacity and stego-image quality are two most important criterias in evaluating a steganography method. This research proposes a novel algorithm for embedding and extracting data in contourlet domain. A genetic algorithm based mapping function is incorporated in order to embed data in Contourlet Transform coefficients in 4x4 blocks of pixels on the cover image. The optimal pixel adjustment process is used after message is hidden. We make use of a Genetic Algorithm and an Optimal Pixel Adjustment Process to obtain an optimal mapping function to decrease difference between the cover and the stego-image, therefore allowing well hiding capacity with low distortion. The outcome of the proposed method with two of the most powerful steganalysis algorithms show that we could easily embed data in cover-images with the average hiding capacity of 0.05 bits/ pixel.

DR. N RAHMAN et al.[5] put light on a New Data Hiding Approach in Versatile Color Images for Secret Communication with Steganography and the result proposed was very much confidential with contrast advancement in natural images shown in this section, simulation of our proposed method and result calculation. The proposed work was performed with the help the MATLAB R- 2013b (8.0.0.783) software and simulated our methodology in graphical user interface (GUI). The performance of the proposed algorithm is tested for different color natural face images that is MATLAB based simulation result shows good PSNR value for stego image and better quality as compare to other method that is shown in table. In the field of image data hiding, the capacity of the embedded secret information or data, and BR of the output is distributed in a communication channel. These criteria can be examined by PSNR in dB, Capacity in bits, BR in Bits/pixel (b/p) respectively. Performance of our proposed method are quantitatively measured in PSNR. The secure data hidding is a very challenging task in the field of data communication. In this research article a new steganography algorithm has been proposed by author with property of contrast modification. This new methodology describes how we can retain the image quality by histogram modification, and protect the image during transmission by using second order mathematical differential equation. So it has been concluded that we can hide our data in image, without compromising security as well as image quality. In this algorithm ,image quality has minimum distortion

after performing all the operations such as encryption, decryption, data hiding, data extraction etc. We has also concluded that high peak signal to noise ratio (PSNR) of the decrypted image is observed after performing all the operations. In the research article we also focused on some basic improvement of stego image because when data hiding operation perform maximum times image pixel disturb so that why in proposed method we also improve the quality of the image in terms of contrast and histogram enhancement of stego image. In future we will implement this method in a hardware through one of the famous technique in VLSI that is FPGA simulation and also improve the data capacity in stego image.

Medisetty Nagendra Kumar et al.[6] worked on Genetic Algorithm based Color Image Steganogaphy using Integer Wavelet Transform and Optimal Pixel Adjustment Process. In this paper we have proposed a technique based on Genetic Algorithm to embed the secret data in digital color image with extra security, imperceptibility, and good robustness. Using the effective optimization, a good balance between the security and image quality is maintained. The embedding process depends completely on the nature of the pixels which is inconsistent. This causes it much more adaptive and random because the nature of the pixels are uncontrollable; it is inherent of an image. Genetic Algorithm is employed to obtain an optimal mapping function to reduce the error occurrence between the cover and the stego image. Optimal Pixel Adjustment Process is employed to increase the hiding capacity of the algorithm in comparison to other process. One of the two drawbacks observed in this method is that the high execution time for selecting the best block and the other is that MSE is not uniformly distributed over all the three RGB channels.

3.Conclusion

Steganography is a method that provides secret communication between two parties. It is the science of hiding a data or message or information in such a secure way that only and only sender and recipient are aware about the presence of the message. The main advantage of this type of secures communication or we can say steganography is that it does not make any attention about the message to attackers or we can say does not attract the attackers. Strongest steganalysis method which known as RS analysis detects the secret hidden message by using the statistical analysis of pixel values. The main aim of this proposed work is to develop a steganography model which highly RS-resistant using Genetic algorithm and Integer Wavelet Transform. This proposed work introduced a novel steganography technique to increase the capacity and the imperceptibility of the image after embedding. This model enables to achieve full utilization of input cover image along with maximum security and maintain image quality. GA employed to obtain an optimal mapping function to lessen the error difference between the cover and the stego image and use the block mapping method to preserve the local image properties. In this proposed method, the pixel values of the stego image are modified by the genetic algorithm to retain their statistical characteristics. So, it is very difficult for attacker to detect the existence of the secret message by using the RS analysis technique. We applied the OPAP to increase the hiding capacity of the algorithm in comparison to other systems. However, the computational complexity of the new algorithm is high. Further, implementation of this technique improves the visual quality of the stego image same as input cover image. But, as we increase the length of the secret message, the chance of detection of secret hidden message by RS analysis also increases. The simulation results showed that capacity and imperceptibility of image had increased simultaneity. Also, we can select the best block size to reduce the computation cost and to increase the PSNR using optimization algorithms such as GA.The drawback of this method is it takes a long time to calculate score matrix . If this drawback can be somehow eliminated then it is a effective method . And other type of problem is encode and decode time also very high in this method . However, future works focus upon the improvement in embedding capacity and further improvement in the efficiency of this method.

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