A new image steganography method using genetic algorithm and corner detection

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***Abstract*— In this article a new LSB steganography method based on LSB replacement, genetic algorithms and chaotic sequences has been presented. In this scheme, genetic algorithm is used to find the best chaotic sequence for data embedding. This sequence is chosen in a way to minimize the MSE error between cover image and stego image, before and after data embedding. to reach the best order of messages bits, those are being shuffled several times employing chaotic sequence. Then, the best order of the shuffled message bites are selected for embedding. Using this approach the image will makes less touched and the first statistics of the image also will be preserved. Consequently, obtained stego images will profit a better quality. Then message bits will variably be embedded in smooth and corner pixels of cover image by means of LSB replacement. Proving that human visual system is less sensitive to changes of corners, there for Stego image will have a good quality. Finally, as experimental results indicate this method provide higher security by imposing less changes to the image and eliminating the necessity of the presence of the original image to extract the message at receiving end.**

Keywords- Steganography; LSB replacement; Genetic Algorithm; Chaos; Corner Detection

I. INTRODUCTION

Steganography refers to the science of invisible communication. Unlike cryptography, where the goal is secure communications from an eavesdropper, steganographic techniques strive to hide the presence of the message from an observer [1]. Steganography embed the data in the least significant components of a cover media, such that unauthorized users are not aware of the existence of hidden data [2]. The cover object can be a still digital image, a video or an audio file. The hidden message also can be a row text, an image, an audio file or a video file [3,4]. A steganography algorithm embeds the hidden message in a cover media. The combination of cover and the hidden message is called "Stego".

The Steganography techniques can be divided into two main categories: embedding in frequency domain and embedding in spatial domain. In the frequency domain most of the methods are based on discrete cosines transform (DCT), after performing DCT on 8*8 blocks and quantizing the DCT coefficients, the hidden messages are embedded in quantized DCT coefficients. LSB replacement is the most commonly used method in spatial domain which directly replaces the LSBs of the cover images with the hidden message bits [5].

Due to the increasing knowledge of hackers, the need for inventing approaches with high security and acceptable capacity has increased sharply. In the recent years lot of approaches for embedding the data in images based on evolutionary algorithms, Genetic Algorithm (GA) and edge detection has been presented.

In 2010, a Steganography approached has been proposed based on LSB replacement and hybrid edge detector [6]. In 2011, four pixel differencing and modified LSB replacement are used for detect edge blocks [7]. In 2010, The use of chaos for shuffling the message bit and improved adaptive LSB has been suggested [8] .in 2012, a secure image steganography method based on LSB replacement using GA and chaos theory has been presented [9]. In [10] the optimization system of evolutionary algorithms are used for increasing the resistance against the statistical attacks. In [11] by GA a technique for watermarking the data inside the images has been proposed. In 2007, an innovative watermarking scheme based on progressive transmission with GA has been proposed in [12]. In [13], by using chaos theory another approach for data hiding in the frequency domain has been invented. In [14] a water marking algorithm based on chaos for images in wavelet domain has been proposed. In [16] a water marking algorithm based on SVD and GA has been presented.

In this paper a new method based on GA and corner detection is proposed that increased capacity and imperceptibility simultaneously. Capacity is increased by embedding more bits in corner areas than smooth areas. The chaos are used for shuffling the message bits. The required parameters are adjusted by GA operators intelligently. In the following, the proposed method will be described in Section II. In Section III, experimental results will be illustrated and finally Section IV concludes the paper.