A new image steganography method based on LSB replacement using Genetic Algorithm and chaos theory

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Abstract: In this article a new information hiding method based on LSB replacement in spatial domain has been presented. In this method, first message bites are shuffled by chaos whose parameters are adjusted by Genetic Algorithm. Then, the best order of the shuffled message bites are selected for embedding with consideration of image pixels. This makes minimal changes in the visual perception of the image while the first statistics of the image will also be preserved. The Experimental results, indicating that imperceptibility, security and high capacity of this method. Also to extract the message, the recipient does not require the original image.

Keywords: Steganography, LSB replacement, Genetic Algorithm, Chaos

1 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]. 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 LSB 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 algorithms and chaos theory has been presented. The use of chaos for shuffling the message bit and improved adaptive LSB has been suggested in [6]. In [7] the optimization system of evolutionary algorithms are used for increasing the resistance against the statistical attacks. In [8] by genetic algorithms a technique for watermarking the data inside the images has been proposed. In 2007, an innovative watermarking scheme based on progressive transmission with genetic algorithms has been proposed in [9]. In 2003, by using chaos theory another approach for data hiding in the frequency domain has been invented [10]. In 2010, a Steganography approached has been proposed based on LSB replacement and hybrid edge detector [11]. In [12] a water marking algorithm based on chaos for images in wavelet domain has been proposed. In [13] a water marking algorithm based on SVD and genetic algorithm has been presented.
In this paper the chaos are used for shuffling the message bits. The required parameters are adjusted by Genetic Algorithm in which the operators are selected intelligently. In the following, the proposed method

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