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A Pixel-Based Digital Medical Images Protection Using Genetic Algorithm

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Abstract

In this Paper, we present a new approach to protect digital images using the genetic algorithm using the image encryption technique. In genetic algorithms, the crossing operation assembles the existing genes and the mutation operation produces new genes. Here, for each pair of pixels of digital image, the binary value of a cross-image is applied and the mutation is used to encrypt the digital image. Several test analyzes are performed, such as correlation analysis, entropy, and histogram, to verify the performance of the digital protection of the medical images or the encryption algorithm.

Keywords: Genetic algorithms, Medical image protection, Encryption Secret key, Gray scale image security.

INTRODUCTION

The image is the most used mode of communication in the different fields, such as the medical area, the research area, the commercial zone, the military zone, etc. The important transfer of images will be through an unsecured Internet network. Therefore, adequate security is required so that the image prevents the unauthorized person from accessing important information. The advantage of the image is that it covers more multimedia data and requires protection. Cryptography is a type of image security method. It offers a secure transmission and storage method for images over the Internet. Security is the main concern of any system to preserve the integrity, confidentiality and authenticity of the image. Cryptography is the efficient method, but if the number of gray levels is greater than the security problem.

Data encryption is a product of the field of mathematical information theory, a field that addresses various ways of managing and manipulating information. Cryptography includes two basic processes: a process involves transforming recognizable data,

called simple data, into an unrecognizable form, called encryption data. Data transformation in this way is called to encrypt data or encryption. The second process occurs when the encryption data is transformed back into original data, called decryption or decryption of data. To determine if a user has permission to access the information, a key is often used. Once a key has been used to encrypt information, only a person who knows the correct key can decrypt the encrypted data. The key is the basis of most of the current data encryption algorithms. A good encryption algorithm should be safe even if the algorithm is known.

Encryption is the process of transforming information to ensure its security. With the strong growth of computer networks and the latest advances in digital technologies, a large amount of digital data is being exchanged between different types of networks. It is often true that much of this information is confidential or private. As a result, different security techniques have been used to provide the required protection [6].

The privacy of the data has become unacceptable for access to data and the increasing demand for digital signal transmission. The data monitoring program has become a critical problem. Different cryptographic schemes are needed to protect the information against unauthorized access or illegal copying and modification. Cryptography is used using an illegible format to modify the original data. The greater complexity of the central generation process makes it difficult to attack through glass.

PROPOSED MEDICAL IMAGE PROTECTION TECHNOQUE

Image encryption is a technique used to hide data or protect image information. This is one of the most used methods for protecting image data. In this method, the image is encrypted and the encrypted image differs from the original image. In the encrypted image, no part of the original image is displayed. To obtain the original image of the encrypted image, we decipher it.

In the world of technology, information security is a major concern. Encryption algorithms have become practical tools for authorizing and protecting copyright. Digital images play an important role in our daily lives as a great source of information, and many algorithms have been proposed to encode digital images [1]. The safety of digital medical imaging has attracted great attention recently, especially when these images are sent over communications networks. Image encryption tries to convert an image into another image that is difficult to understand. In this article, we propose a method of coding medical images in gray scale based on the characteristics of genetic algorithms. The performance analysis shows that the proposed scheme is statistical and highly sensitive and can withstand brute force attacks, differential attacks, script attacks and Croatian attacks.

The main advantage of genetic algorithms is their flexibility and robustness as a global search method. These are "weak methods" that do not use gradient information and make relatively few assumptions about the problem to be solved. They can handle highly non-linear problems and non-differentiable functions, as well as functions with several local optima and easily applicable to the implementation, making them usable

in real time.

In recent technology, the safety of digital images in the medical field has attracted a lot of attention, especially when communication networks are used to send these images. Image encryption is one of the best technical ways to convert an image into an image that is difficult to understand. In this type of communication, we propose an encryption technique in which medical images in gray scale are based on the characteristics of genetic algorithms. The analysis of the performance of the proposed scheme shows that it has a good statistical character, key sensitivity and can effectively resist brute force attacks, flat text attacks, differential attacks and entropy attacks. The basic scheme to protect the digital medical image or the encryption using the genetic algorithm is shown in the figure 1.

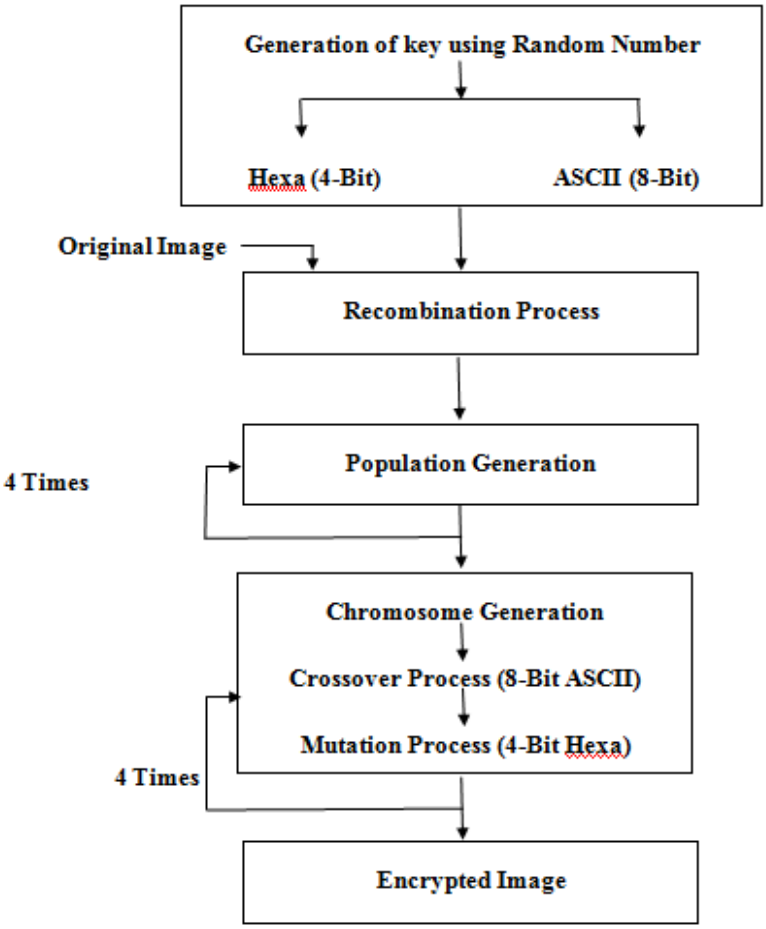

Figure 1: Flow Chart of Genetic Algorithm Process

All the process which is shown in the figure 1 is used to protect a digital medical image by using the genetic algorithm. These all the process is used to secure a digital image or encrypted a digital medical image. It is one of the best methods to encrypt the medical image to secure or protect the digital medical image.

SIMULAATION AND RESULT DISCUSS OF THE PROPOSED METHOD

The Image is transfer after the encryption of the medical image, at the time of communicating or transfer the medical image we transfer the encrypted image for the protection of the original medical image because from this process only that person will be get the original in which we want to transfer it. Only that person gets the original image after decryption process of the encrypted medical image.

The figure 2 Shown an original medical image and the figure 3 shown its encrypted image. From the encrypted image no one can get the original image before decrypted it properly. The figure 4 has shown the Histograms of medical images. Similarly figure 5 and 6 is shown the original image and its encrypted image. In which the encryption of image is done using the genetic image.

Figure 2: Original Medical Image

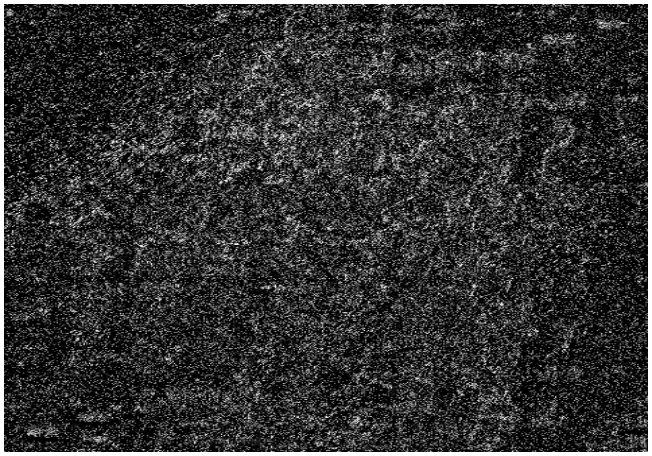

Figure 3: Encrypted Medical Image

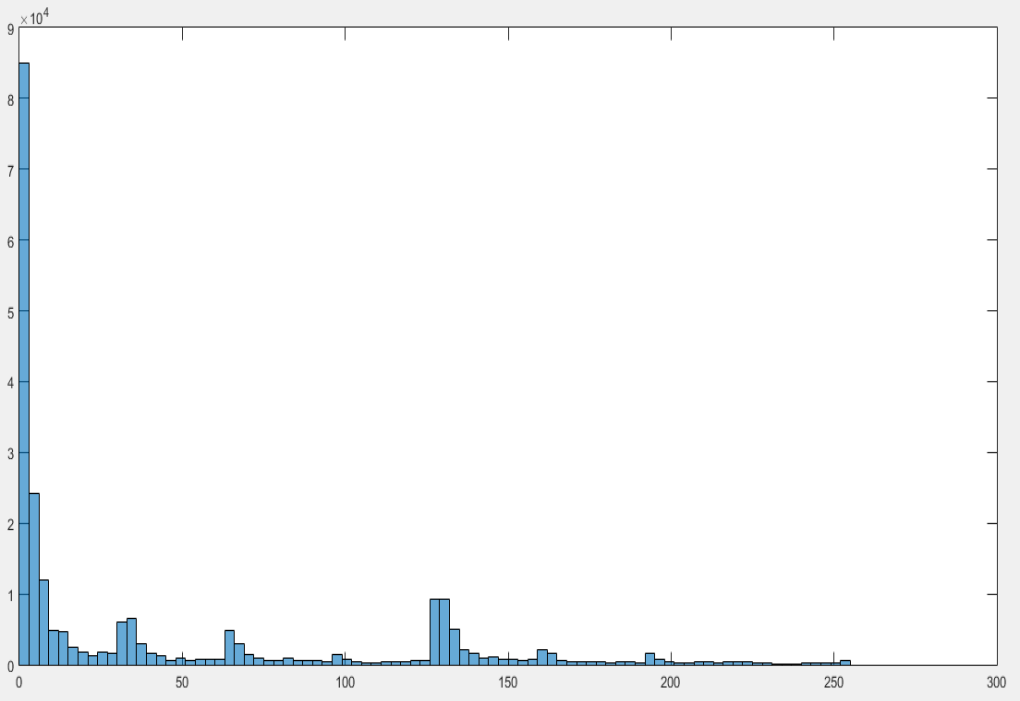

Figure 4: Histograms of Medical Images

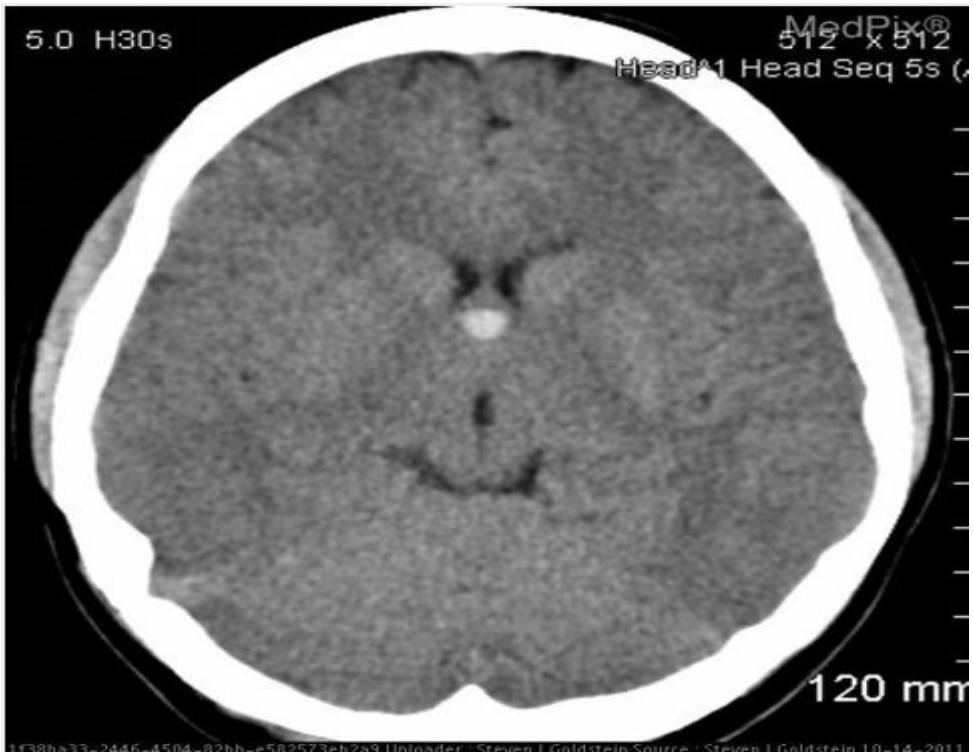

Figure 5: Original Image

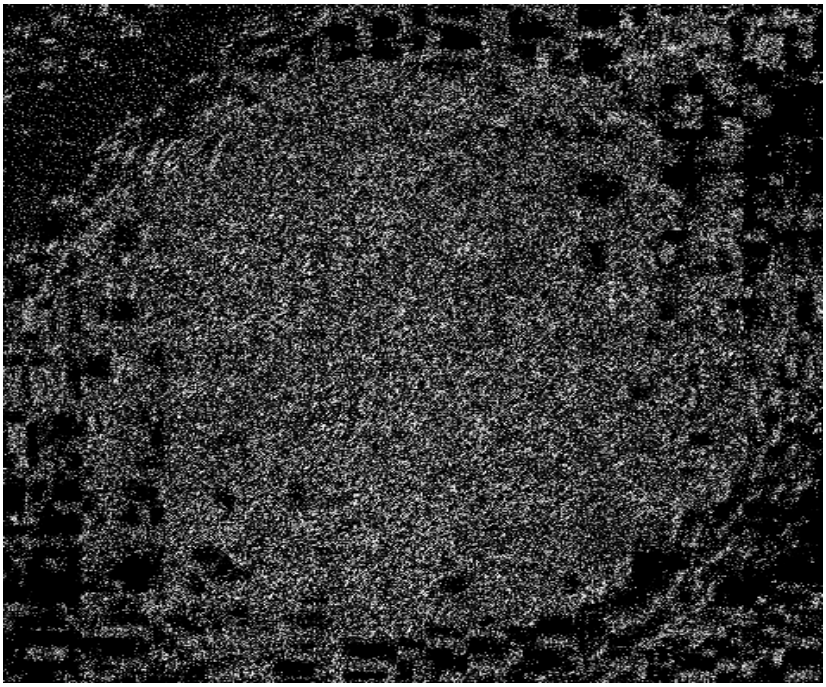

Figure 6: Encrypted Image

CONCULSION

The main advantage of genetic algorithms is their flexibility and robustness as a global search method. These are "weak methods" that do not use gradient information and make relatively few assumptions about the problem to be solved. They can handle highly non-linear problems and non-differentiable functions, as well as functions with several local optima and easily applicable to the implementation, making them usable in real time. This approach is based primarily on using MATLAB in implementing the genetic operators. Genetic algorithms also be extremely useful if applied in conjunction with neural networks. One of the best algorithm is the Genetic algorithm. In this paper presented the digital medical image protection technique or encryption technique using the genetic algorithm in detailed.

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