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COLOR PICTURE ENCRYPTION BY USING DNA ENCODING: A COMPREHENSIVE REVIEW

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Abstract

Due to the rapid advancement of the Internet and network, information security has become a major issue in encryption. Therefore, a growing and significant issue is the development of the encryption algorithm. A new color image encryption based on DNA complementary rules and pairing chaotic maps was implemented in this research. The plain color image was initially divided into three components (R, G, B) and converted using DNA encoding rules into three DNA matrices. Secondly, through the pair of chaotic maps, DNA addition for R, G and B components was introduced and the element position of three DNA sequences was scrambled. The restructuring of the R, G, and B components achieved three grey coded images and RGB encrypted images. The experimental outcome and safety analysis simulation showed that this algorithm had greater secret key space and high secret key sensitivity and had an excellent ability to resist statistical and differential attacks.

Keywords: *Color Image, DNA Encoding, Image Encryption, Multimedia Application.*

I. INTRODUCTION

To ensure the confidentiality of the image data during transmission over vulnerable networks around the globe, image encryption techniques are highly requested. Various research on proactive image encryption approaches have been investigated from the confidentiality perspective of images due to the growth of multimedia applications worldwide[1]. To ensure the confidentiality of image data during transmission over insecure networks around the globe, color image

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encryption methods are highly requested. Due to the growth of multimedia applications worldwide, various studies on pragmatic image encryption techniques have been investigated from the confidentiality perspective of color photos[2]. Color image encryption methods play a key role in maintaining the privacy of attackers' sensitive image data globally through the internet[3].
There are many techniques that are used during decryption to preserve the continuity of the images in order to retain the quality of the colored images. Privacy is one of the difficult components requiring more commitment to protected global image information[4]. The phase retrieval techniques are recognized as one of the most important methods to solve optical inverse problems. In this analysis, several phase retrieval algorithms are addressed. The existence of conditions that are ill-posed also makes the estimation complicated. In order to achieve more precise convergence result in iterative computation, the multiple-image phase recovery technology is invented as a synthesis.

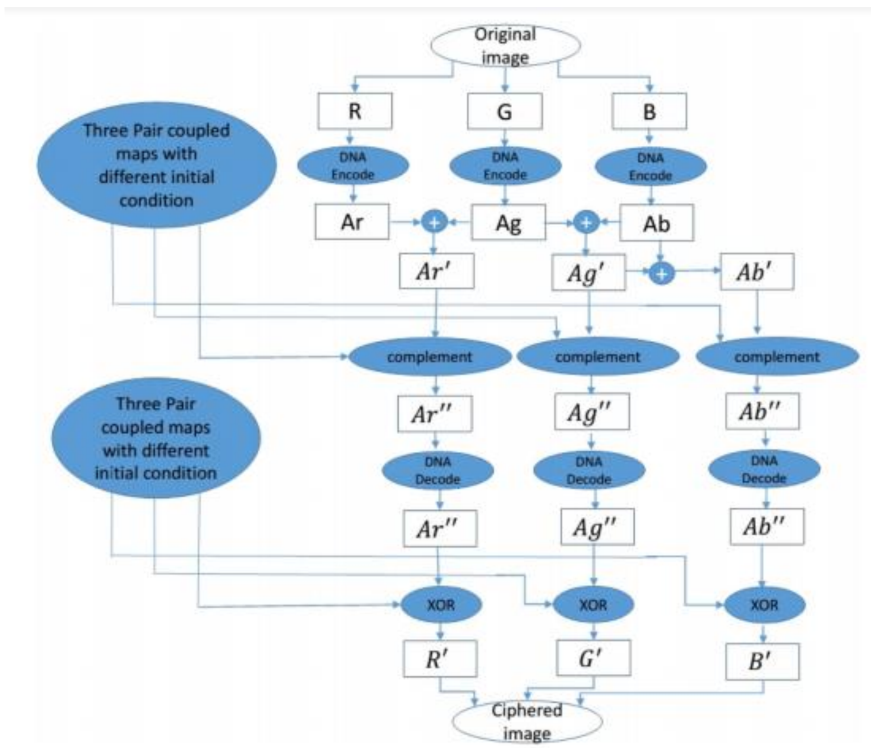

Fig. 1: Illustrates the block diagram of color picture encryption scheme by Using DNA Encoding.

Figure 1 illustrates the block diagram of color picture encryption scheme by Using DNA Encoding. Using the following formulas, the relationship analysis of the images is carried out. Correlation plays a key role in assessing the resemblance between the two neighboring pixels of the plain image as well as the cypher image. By applying the formulas below, the correlation coefficient of the images can be determined.

$$E(x) = \frac{1}{N}\sum_{i=1}^{N} x_i$$

$$D(x) = \frac{1}{N}\sum_{i=1}^{N}(x_i - E(x))^2$$

$$cov\,(x,y) = \frac{1}{N}\sum_{i=1}^{N}(x_i - E(x))\ (y_i - E(y))$$

$$r_{xy} = \frac{cov\,(x,y)}{\sqrt{D(x)}\sqrt{D(y)}}$$

$$\sqrt{D(x)}\ \neq 0, \sqrt{D(y)} \neq 0$$

In order to lose the image data during the transmission through the communication channel, there are some parameters that ensure the vulnerability of the different image formats against the strikers' various attacks. The Number of Pixel Change Rate (NPCR) and Unified Average Changed Intensity (UACI). The formulas for calculating the NPCR and UACI for an image is given below.

$$NPCR = \frac{1}{M \times N}\sum_{i=1}^{M}\sum_{j=1}^{N} D(i,j) \times 100\ \%$$

$$UACI = \left[\sum_{i=1}^{M}\sum_{j=1}^{N}\frac{|C1(i,j) - C2(i,j)|}{255}\right] \times \frac{100\%}{M \times N}$$

II. LITERATURE REVIEW

An analysis on a new DNA-based colour image encryption algorithm and spatial chaotic map was carried out by Liu et al. A colour image encryption algorithm based on DNA encoding is proposed in this paper, together with a logistic map and spatial map. Firstly, the algorithm performs logistic map scrambling for channels R, G, B. XOR is then run between the pixel channels and the spatial map-controlled sequence matrix. After that, the addition of R, G, B by DNA addition after DNA encoding is realized and the complement process is carried out using the spatial map-controlled

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DNA sequence matrix. What's more, after DNA decoding, R G B canal images are obtained. Finally, by reconstructing the components R, G, B, you get the encrypted R, G, B photos.

III. CONCLUSION

Using the pair of connected chaotic maps and DNA encoding to improve the security of image encryption, this research proposed a new color image encryption. The original color image is encoded using one form of DNA rules based on the above discussion and then scrambled by the chaotic sequences is achieved separately from pairs of paired chaotic maps for R, G and B image components. We used pairs of chaotic maps with different initial conditions and parameters, and different sequences were obtained. By using these various sequences, we modify the values of the R, G, and B matrices, respectively. The protection of pictures is greatly improved with the above encryption algorithm. The decryption process algorithm is a simple reversal of the encryption process. When used in the future DNA machine, the suggested system would be high-speed image encryption and decryption. The suggested image scheme can therefore be used in the future DNA machine as a candidate. Experimental simulation and security showed that most known attacks, such as exhaustive attacks and mathematical attacks and so on, can be resisted by the proposed algorithm. This makes it ideal for the transmission of data for safe communication through the Internet and the network.

IV. REFERENCES

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