

Image Encryption Based on Complicated Chaotic^{*}

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Abstract

In order to improve the security of secret image transmission, using the property of the chaotic sequence in the encryption algorithm, a block image encryption scheme based on Logistic and Henon composite chaotic system is presented. The image encryption algorithm from two aspects that the pixel grayscale value and pixel position through two different chaotic sequences transform of the Logistic and Henon. At first, Logistic chaotic sequence is applied to the scrambling operation on the pixel position matrix. Then the pixel values of blocked images are scrambled based on Henon chaotic sequence. The experiments show that the algorithm has good encryption effect, and has better robustness to crop or noise attack. The cross correlation of encrypted image are decreased and the transport security is improved, the result shows that the project is effective.

Keywords: Chaotic System; Logistic Map; Henon Map; Image Encryption

1 Introduction

With the rapid progress of information technology, the digital image storage and transmission security problem has become an important research direction in the field of information security. The image data encryption technology takes one kind of commonly used digital image processing technology, which widely applies to domain of the military, aviation, medicine, communication. Image data is characterized by its large data volume and higher information correlation. Secret

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key sensitivity and real-time data should be taken into consideration when design an encryption scheme. Research shows that a good password system should meet the following conditions:

- (1) The plaintext should be transform for random cipher text;
- (2) Highly sensitive to the encryption algorithm;
- (3) Chaotic systems are sensitive to the chaotic key.

The characteristics of the chaotic system, such as well pseudorandom, long inscrutability, high sensibility to the initial value, the regularity and universality, make it be applied in the code field [1–5]. Chaotic encryption method is flexible. We take advantage of all the good qualities of chaotic signal.

2 Based on the Logistic and Henon Compound Chaotic Sequence Encryption Algorithm

Chaotic sequence has the characteristics of high ergodicity and sensitivity to initial value, this feature is suitable for the encryption of digital information. In view of the small key space, the simple encryption structure, the low chaotic sequence complexity and the low safety, the block image encryption algorithm based on the Logistic and Henon compound chaotic sequence is presented in this paper. In the new image encryption system, image encryption is implemented by changing the position and value of every pixel. Image encryption with the improved complicated chaotic sequence is studied such as encryption structure, key space and every possible attack. In this paper, the digital image encryption algorithm encryption algorithm flow chart is shown in Fig. 1. This encryption algorithm is divided into two key steps:

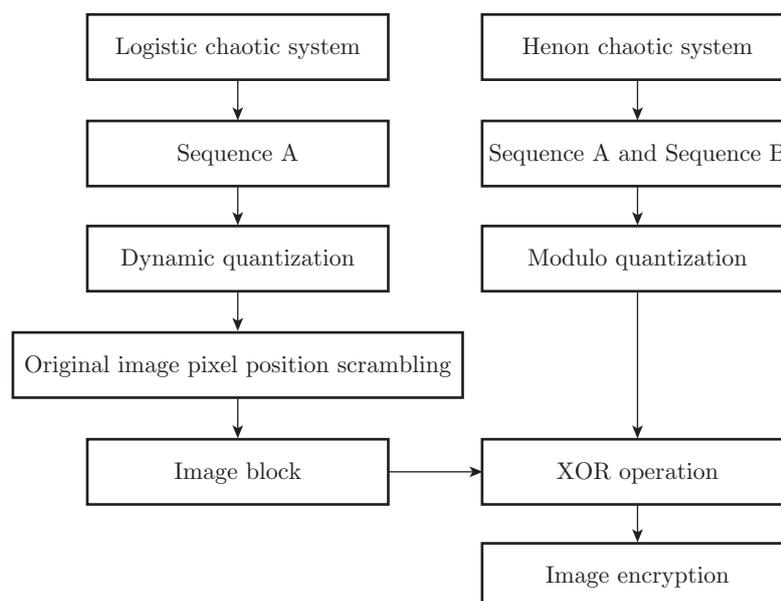


Fig. 1: Steps of the encryption algorithm