

عنوان مقاله:

An Image Cryptosystem based on Elementary Cellular Automata with Integrity Checking

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خلاصه مقاله:

This paper presents a novel image cryptosystem using a specific feature of boundary elementary cellular automata with permutation-diffusion architecture. The characteristics of some periodic boundary elementary cellular automata (CAs) with the length of  $\lambda$  have been studied over the past years. The State-transition diagram shows that some elementary cellular automata (ECA) rule lead to some state attractors that are suitable to use to implement an encrypting function in order to transform the pixels' values while meeting the basic requirements of the encryption scheme. Minimizing computational overhead, the production of these attractors could be done by using an initial global state of the CA solely, and the implementation of which needs no extra hardware cost. Correspondingly, the proposed new image cryptosystem includes an encryption method based on both permutations of the image pixels and the replacement of the pixel values. The permutation method is optional and can be done by every permutation algorithm. Simulation results revealed this fact that the proposed CA-based image cryptosystem shows strong performance in terms of encryption and decryption. The outstanding characteristics of the proposed image encryption method are as follows: lossless and symmetric private key encryption, low data expansion, the possibility of encryption when there is more than one image with the use of just one key image, large key space, and checking data integrity.

کلمات کلیدی:

Attractors, Cellular Automata, Data Integrity, Image Encryption

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