

ARMTFR: A new permutation-based image encryption scheme

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Abstract:

In this paper, a new image encryption scheme named (ArMTFR) is proposed. An image is encrypted using a combination of keyed permutations and substitution, where a fractal is XORed with the scrambled image. Fractal images are employed in order to improve the performance of the encryption scheme from the viewpoint of randomisation and to increase the encryption key space, thus boosting its security. The employed permutations are the Arnold map and Mersenne-Twister's permutation algorithm. Before the encryption process starts, histogram equalisation is used to enhance the contrast of the image by transforming the intensity values in it, so that the histogram of the output image approximately matches a uniform histogram. First, greyscale images are considered and then the basic algorithm is extended to handle coloured images. Three representations for coloured images are considered: RGB, YCbCr and HSI colour spaces. The security of the algorithm is enhanced in this case by applying RGB colour channels multiplexing. The experimental results show that the encrypted image has low correlation coefficients among adjacent pixels and a good histogram distribution, as well as resistance to various attacks. Copyright © 2019 Inderscience Enterprises Ltd.

Reference:

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