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Geometrically resilient color image zero-watermarking algorithm based on quaternion Exponent moments

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Abstract: Although research on zero-watermarking has made great progress in recent years, most of it has been focused on grayscale images rather than color ones, and cannot resist geometric attacks efficiently. In this paper, we discuss properties of quaternion Exponent moments (QEMs) in detail and propose a robust color image zero-watermarking algorithm which is robust to geometric attacks. We first compute and select robust QEMs of the original color image, and then a binary feature image is constructed using the magnitude of the selected moments. Eventually, a bitwise exclusive-or is applied on the binary feature image and a scrambled binary logo to generate the zero-watermark image. Experimental results show that the proposed zero-watermarking algorithm is robust to both geometric attacks and common image processing attacks effectively. Compared to similar zero-watermarking algorithms and traditional watermarking algorithms based on QEMs, the proposed zero-watermarking algorithm has better performance.

Keywords: Color image, Geometric attacks, Quaternion Exponent moments, Zero-watermarking.

1. Introduction

With the increase in digitalization and informatization of modern times, the protection of image copyright has become a prominent problem. As a crucial technology for image copyright protection, image watermarking technology has been extensively researched and used. Traditional watermarking algorithms [1, 2] embed the information of ownership identification in the original image so that the information can be extracted in order to enforce copyright protection. However, this kind of algorithms degrades the quality of the original image and has to trade off between robustness and imperceptibility. To overcome the limitations of traditional watermarking algorithms, zero-watermarking was proposed by Wen et al. [3]. In zero-watermarking algorithms, copyright protection is achieved by extracting important features of an image and storing them in an intellectual property rights (IPR) database. These algorithms

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