International Journal of Innovative
Computing, Information and Control
Volume **5**, Number **9**, September **2009**

 ISSN 1349-4198
pp. 2703–2710

A DCT-VQ BASED MULTIPURPOSE IMAGE HASHING SCHEME FOR COPYRIGHT PROTECTION AND CONTENT AUTHENTICATION

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Received February 2008; revised July 2008

Abstract. *A perceptual image hash function should have the property that two images that look the same map to the same hash value. It is an emerging solution for multimedia content authentication and retrieval. This paper proposes a multipurpose image hashing scheme based on DCT-VQ for both copyright protection and content authentication. The original image is first block-DCT transformed. In each DCT block, two groups of DCT coefficients are then respectively vector quantized to generate two indices, one for copyright protection and the other for content authentication. The obtained two index sequences are transformed into two binary strings using different mapping functions. Finally, the authentication mark and permuted copyright logo are respectively XOR-ed with the two binary strings to generate final authentication and protection fingerprints. Experimental results demonstrate the effectiveness of the proposed scheme.*
Keywords: Perceptual hashing, Copyright protection, Content authentication, Vector quantization, Discrete cosine transform

1. **Introduction.** With the development of computer and multimedia technologies, the digital products such as images, video, audio and 3D models are largely generated and distributed over the Internet and/or via CD-ROM. On the one hand, because of the easy-to-copy nature of digital media, digital data can be tampered with and hence, there exists a need to be able to verify the authenticity of the media content. On the other hand, valuable digital artworks can be reproduced and distributed arbitrarily without any control by the copyright holders, thus, issues related to intellectual property rights protection and management arise. In the literature, the methods used for media verification and protection can be classified into three categories: digital signature-based, watermark-based [1-5] and perceptual hash-based [6-12]. A digital signature is a set of features extracted from the media that sufficiently represents the content of the original media. Watermarking is a media authentication/protection technique that embeds invisible (or inaudible) information into the media. A perceptual image hash function maps an image into a short binary string based on an image's appearance to the human eye, where two images that look the same map to the same hash value.

In literatures, most of image hashing schemes are designed for only one purpose, such as the authentication or retrieval application. These approaches are typically statistics based [6], relations based [7], low-level features based [8], feature points based [9], clustering based [10] and non-negative matrix factorizations based [11], etc. In [6], the proposed algorithm uses randomized signal processing strategies for a non-reversible compression of images into random binary strings, and is shown to be robust against image changes due