

Multimedia Encryption, Transmission and Authentication

Edited by

Othman Omran Khalifa, B.Sc., M.Sc., Ph.D.
International Islamic University Malaysia

Aisha-Hassan Abdulla, B.Sc., M.Sc., Ph.D.,
International Islamic University Malaysia

Teddy Surya Gunawan, B.Sc., M.Sc., Ph.D.,
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Chapter 16

Digital Watermarking Techniques and Methodologies

Othman O. Khalifa and Yusnita binti Yusof

Electrical and Computer Engineering

International Islamic University Malaysia

yusnita@ucti.edu.my, khalifa@iium.edu.my

16.1 Introduction

Digital watermarking is a huge research area which is progressively growing. It covers theoretical studies, novel techniques, attacks and performance analysis. Over the years, the digital watermarking community has focused on developing new techniques for watermark embedding and detection. Analysis of these techniques leads to methods for attacks and countermeasures which are used to discover faults and limitations in applications, encouraging the development of better ones. Digital watermarking is distinctive depending on its techniques and applications. The location of watermark embedding determines two kinds of methods:- The spatial domain methods embed watermark information directly into images pixels. On the other hand, the frequency domain methods embed watermark information in the transform domain. The general approach used in these methods is to divide the image into blocks. Each block is mapped into the transform domain using either the Discrete Cosine Transform (DCT) [9], the Discrete Fourier Transform (DFT), or the Wavelet Transform. Embedding the watermark in the frequency domain can provide more robustness than in the spatial domain. It is strong against attacks like compression where spatial domain is not. Image watermarking techniques can be distinguished according to the way the watermark is revealed from the watermarked image. One way is by comparing this image to the original one, while the other doesn't resort to this comparison. The second are usually referred to as *blind* watermarking techniques and are preferable.

16.2 Digital Watermarking Techniques in Spatial Domain

Spatial domain techniques are normally simple and straightforward. These techniques modify pixel luminance and chrominance values to embed the watermark. Most of earlier watermarking schemes work directly in spatial domain. Using some image analysis