Chapter 4
Robust Multimedia Watermarking:
Characteristics, Applications, and Attacks

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ABSTRACT

The data transmission on network channel has increased tremendously in the past few decades. Watermarking is a process to add watermark as a digital signal, label, or tag into a cover media. The primary requirements of multimedia watermarking are robustness and embedding capability. The robustness is defined as the strength of an algorithm to repel the noise. However, it is challenging to achieve both at the same time. The numerous characteristics of watermarking are very imperative in the multimedia watermarking system. The researchers are using watermarking schemes in various applications such as military, digital forensics, medical, and so on. Attacks of these watermarking harm or uncover the secret information carried in the watermark. Potential researchers have been presented various techniques for balancing or improving these concerns. This chapter reviews the recent multimedia watermarking techniques on the basis of robustness and embedding capability. The characteristics, applications, and attacks on multimedia watermarking techniques are introduced.

INTRODUCTION

During past, data transmission has increased among various channels and networks. As with the developing technologies, there is increase in growth and usage of transmission media. To avoid misuse and establish authenticity, watermarking techniques should be used to secure the multimedia data. The malevolent copying

and illegal dissemination of digital images is averted by digital watermarking by hiding the data ownership in host image (Ganic & Eskicioglu, 2004; Patel, Mehta, & Pradhan, 2011). Watermarking is designed as process of embedding dual/single watermark in terms of label, tag or digital signal. The process of watermark is defined on the basis of different groups and domains (Aslantas, 2008). The methods of watermarking are categorized into transform and spatial domain (Loukhaoukha, Nabti, & Zebbiche, 2014). The initially used methods are the spatial domain a technique in which watermarking embedding is performed by directly making a change in pixel. It exhibits the feature of accessibility for implementation and low computational cost. The important in this area is correlation based, spread spectrum and Least Significant bit (LSB). The potential example of transform domain is discrete Fourier transform (DFT), discrete wavelet transforms (DWT), singular value decomposition (SVD), discrete cosine transforms (DCT). The two different categories of digital watermark in context of visibility is invisible and visible. The classes of invisible watermark are fragile and robust (Aslantas, 2008). The detailed watermark classification is presented further in (Aslantas, 2008; Singh, 2017; Tsai, Huang, Kuo, Horng, 2012).

Watermark Embedding and Extraction Process

The complete process of watermark embedding and extraction is represented in Figure 1. In watermark embedding process, a secret key is generated. The method of watermark recovery is the function of watermarked original data/ watermarked image, test data and key. Similar kind of key is used in further processes as in Figure 2 and in Figure 3.

Figure 1. Detailed watermark extraction process
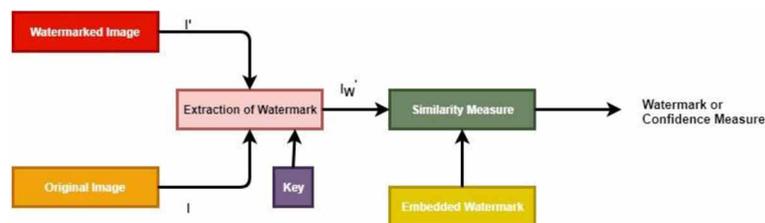
Classification of Watermark Systems

Watermark systems are classified into three different categories (Mathon, Cayre, Bas, & Mac, 2014; Singh, Dave, & Mohan, 2014; Singh, Kumar, Singh, & Mohan, 2017; Tsai, Jhuang, & Lai, 2012)as described below in Figure 3.

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