Chapter I

Digital Watermarking for Protection of Intellectual Property

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ABSTRACT

Digital watermarking techniques have been developed to protect the copyright of media signals. This chapter aims to provide a universal review and background about the watermarking definition, concept and the main contributions in this field. The chapter starts with a general view of digital data, the Internet and the products of these two, namely, the multimedia and the e-commerce. Then, it provides the reader with some initial background and history of digital watermarking. The chapter presents an extensive and deep literature review of the field of digital watermarking and watermarking algorithms. It also highlights the future prospective of the digital watermarking.

INTRODUCTION

Digital watermarking techniques have been developed to protect the copyright of media signals. Different watermarking schemes have been suggested for multimedia content (images, video and audio signal). This chapter aims to provide an extensive literature review of the multimedia copyright protection. It presents a universal review and background about the watermarking definition, concept and the main contributions in this field. The chapter consists of four main sections.
The first section provides a general view of digital data, the Internet and the products of these two, namely multimedia and e-commerce. It starts this chapter by providing the reader with some initial background and history of digital watermarking. The second section gives an extensive and deep literature review of the field of digital watermarking. The third section reviews digital-watermarking algorithms, which are classified into three main groups according to the embedding domain. These groups are spatial domain techniques, transform domain techniques and feature domain techniques. The algorithms of the frequency domain are further subdivided into wavelet, DCT and fractal transform techniques. The contributions of the algorithms presented in this section are analyzed briefly. The fourth section discusses the future prospective of digital watermarking.

**DIGITAL INTELLECTUAL PROPERTY**

Information is becoming widely available via global networks. These connected networks allow cross-references between databases. The advent of multimedia is allowing different applications to mix sound, images, and video and to interact with large amounts of information (e.g., in e-business, distance education, and human-machine interface). The industry is investing to deliver audio, image and video data in electronic form to customers, and broadcast television companies, major corporations and photo archivers are converting their content from analogue to digital form. This movement from traditional content, such as paper documents, analogue recordings, to digital media is due to several advantages of digital media over the traditional media. Some of these advantages are:

1. The quality of digital signals is higher than that of their corresponding analogue signals. Traditional assets degrade in quality as time passes. Analogue data require expensive systems to obtain high quality copies, whereas digital data can be easily copied without loss of fidelity.
2. Digital data (audio, image and video signals) can be easily transmitted over networks, for example the Internet. A large amount of multimedia data is now available to users all over the world. This expansion will continue at an even greater rate with the widening availability of advanced multimedia services like electronic commerce, advertising, interactive TV, digital libraries, and a lot more.
3. Exact copies of digital data can be easily made. This is very useful but it also creates problems for the owner of valuable digital data like precious digital images. Replicas of a given piece of digital data cannot be distinguished and their origin cannot be confirmed. It is impossible to determine which piece is the original and which is the copy.
4. It is possible to hide some information within digital data in such a way that data modifications are undetectable for the human senses.
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