Chapter XXV
A Survey on Video Watermarking

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ABSTRACT

Video watermarking technique embeds some information into videos by modifying video content slightly. The embedded information, named watermark, may be ownership information, customer information, integrity information, redundancy information, and so forth. Thus, this technique can be used for copyright protection, piracy tracing, content authentication, advertisement surveillance, error resilience, and so forth. In this chapter, we give an overview on video watermarking technology, including its architecture, performance requirement, typical algorithms, hot topics, and open issues.

INTRODUCTION

Watermarking is a technology with the aim of embedding information into carrier (image, video, audio, text, program, web, database, etc.), and related early work can be traced back as far as 1954. The last 10 years has seen considerable interest in digital video watermarking, due in large part to ever growing of digital video content everywhere and concerns on spreading of pirate programs.

A general video watermarking system, shown in Fig. 1, is composed of three parts: watermarking embedding, attack channel and watermark detection. According to the structure, the message (watermarking) is embedded into the original signal under the control of the embedding key, which produces the watermarked signal. In transmission channel, the watermarked signal may be attacked or distorted. The attacks include cutting, rotation, scaling or translation, and so on. The distortion includes such signal processing operations as compression, filtering, adding noise, A/D, D/A,
Figure 1. General watermarking system

Around 480 B.C., Histiaeus sent secret message to Greek city through an ingenious method (Moulin & Koetter, 2005): shave the head of a slave, tattoo the message on his skull, allow the hair to grow back, and finally dispatch the slave. And the slave was shaved again to reveal the secret message.

In 1954, Emil Hembrooke of the Muzac Corporation filed a patent entitled “Identification of sound and like signals” (Hembrooke, 1961) in which is described a method for imperceptibly embedding an identification code into music for the purpose of proving ownership. This might be the first application of watermarking in digital form.

Digital watermarking (Cox, & Miller, 2001) was firstly introduced by Tanaka in 1990 and Caronni & Tirkel in 1993. In these schemes, the technology of embedding mark information in digital work is presented. The word “Water Mark” is firstly used in their papers. Electronic watermarking had been invented. From 1990s on, digital watermarking has received substantial interest as a research topic (Swanson, et al., 1998a).

Video watermarking was first introduced in 1996 when the video compression standard MPEG2 (Woolley, 2007) is published and widely applied. From then on, the related theoretical and technical work attracts more and more researchers. Besides academic perspective, its commercial implementations are also emphasized together with economic and engineering constraints.
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