Chapter 1.42
An Introduction in Digital Watermarking:
Applications, Principles, and Problems

Tino Jahnke
University of Cooperative Education Heidenheim, Germany

Juergen Seitz
University of Cooperative Education Heidenheim, Germany

ABSTRACT

In order to solve intellectual property problems of the digital age, two basic procedures are used: "Buy and drop," linked to the destruction of various peer-to-peer solutions and "subpoena and fear," as the creation of non-natural social fear by specific legislations. Although customers around the world are willing to buy digital products over networks, the industry is still using conventional procedures to push such a decisive customer impulse back into existing and conventional markets. Digital watermarking is described as a possibility to interface and close the gap between copyright and digital distribution. It is based on steganographic techniques and enables useful right protection mechanisms. Digital watermarks are mostly inserted as a plain bit sample or a transformed digital signal into the source data using a key based embedding algorithm and a pseudo-noise pattern. The embedded information is hidden in low-value bits or least significant bits of picture pixels, frequency or other value domains, and linked inseparably with the source of the data structure. For the optimal application of watermarking technology a trade-off has to be made between competing criteria like robustness, non-perceptibility, non-delectability, and security. Most watermarking algorithms are resistant against selected and application-specific attacks. Therefore, even friendly attacks in the form of usual file and data modifications can destroy easily the watermark or falsify it. This chapter gives an overview in watermarking technologies, classification, methodology, applications and problems.

LIMITATIONS, THREADS, AND IMPACTS ON THE DIGITAL AGE

At this decade, the Internet and especially the World Wide Web, a global working network with worldwide broadcasting potential, has been successfully integrated into public and business domains. Recent surveys and public opinion polls have accented the value of the Internet. Traditional television and the Internet converge (Merz, 1999, p. 209). In addition, the growth and integration of broadband access points, wireless and mobile technologies and the progress towards one-in-a-box device proves the significance of developing a legitimate marketplace for entertainment and business activities. Today, digital networks and libraries, Internet services and the disposition of non-branded digital products within a global accessible network support and lead to illegal copying, modification and redistribution. Particularly, the music and entertainment industry has struggled against the illegal distribution over peer-to-peer and other networks for years. The Recording Industry Association (RIAA), the leading music industry consortium, estimates the annual revenue for recorded music in the USA to $14 billion and worldwide $38 billion and claims $5 billion loss due to piracy in the year 2000 and millions $US to all forms of piracy per day (Tadjer, 2000). Although the industry positively evaluates the Internet and its distribution and economical quality, technologies, frameworks and support were blocked for a long time. On the other hand, the most significant barrier for online shopping – the trust of the customer – begins to fall. The increasing popularity of streaming media technologies and other types of distribution methods of digital content will support and eventually boost the acceptance of the Internet to become the most popular distribution channel in the future. Decisive business activities, like *Amazon.com, apple.com* and *yahoo.com,* who are selling entertainment products, like video and audio, clarify the progress of these progres-sive distribution channels. But, as audio, video, and any digital source can be straightforwardly copied and illegally distributed over various channels, the capital loss prevents decisive business activities and investments until a working juristic and technical protection mechanism would be available. These concerns are supported by the facts that digital mass recording devices for digital media have effectively entered the market (Hanjalic et al., 2000). The importance and the supposed economical thread for copyright holders are clarified by initiatives of the entertainment industry, like VIVA and SDMI - Secure Digital Music Initiative. Although distributors and artists have already recognized the advantages in making their material available online, they will not go further into the online business until their content can be protected by technical and by wide law regulations. As new intellectual property changes became new European law in 2003 and started to fit more towards the proposals of the World Intellectual Property Organization (WIPO) political signals, that proves the importance was set. Therefore, the features of the digital world lead to economical chances, but also to serious problems in simplifying unauthorized copying and distribution. In order to solve these problems, digital watermarking together with a working law framework can be used and eventually close the gap between usability of goods and the security level of protection.

STEGANOGRAPHY, DATA HIDING AND HISTORICAL WATERMARKING

The core principles of watermarking and data hiding can be traced back approximately 4,000 years to Egypt and Greece. At this time, hidden packets of information were transferred by special character adjustments or mutations (Hanjalic et al., 2000). Herodotus, the great Greek storyteller, often refers to the hidden information method-ology transferred on wax-tablets or smuggling

Related Content

Current Network Security Systems
Göran Pulkkis, Kaj Grahnand Peik Astrom (2008). *Information Security and Ethics: Concepts, Methodologies, Tools, and Applications (pp. 1339-1348).*
www.irma-international.org/chapter/current-network-security-systems/23161

An Efficient Accountable Oblivious Transfer With Access Control Scheme in the Public Cloud
Xin Liuand Bin Zhang (2022). *International Journal of Information Security and Privacy (pp. 1-24).*
www.irma-international.org/article/an-efficient-accountable-oblivious-transfer-with-access-control-scheme-in-the-public-cloud/297030

Wearable Devices and Privacy Concerns: Data Collection, Analysis, and Interpretation
Ersin Dincelli, Xin Zhou, Alper Yaylaand Haadi Jafarian (2021). *Research Anthology on Privatizing and Securing Data (pp. 208-230).*
www.irma-international.org/chapter/wearable-devices-and-privacy-concerns/280175

The Role and Place of Cyber Warfare and Cyber Security in the World: Past, Present, Future
Nika Chitadze (2023). *Cyber Security Policies and Strategies of the World's Leading States (pp. 1-17).*
www.irma-international.org/chapter/the-role-and-place-of-cyber-warfare-and-cyber-security-in-the-world/332278

Paradise to Peril: Humanistic Uncertainty during Hurricanes Isaac and Katrina
Scheljert Denas (2013). *International Journal of Risk and Contingency Management (pp. 67-70).*
www.irma-international.org/article/paradise-peril-humanistic-uncertainty-during/76658