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A Review of Copyright Protection Approaches in Electronic Commerce (Watermarking Method)

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A Review of Copyright Protection Approaches in Electronic Commerce (Watermarking Method)

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Abstract: Digital watermarking is the best way to protect intellectual property from illicit copying. Digital watermarks hide the identity of an image or audio file in its noise signal. A pattern of bits inserted into a digital image, audio or video file that identifies the files copyright information. The purpose of this paper is to provide copyright protection for intellectual property that's in digital format. In this career we review digital watermarks an application of steganography.

Keywords: Internet, Security & Privacy, Intellectual Property, Copyright, Electronic commerce, Watermarking

I.   Introduction

Before the advent of the Web, people made audiotape copies of music and videos to give to friends and family or used them for their own personal enjoyment activities were ignored by the producers, distributors, and artists who had the legal rights to the content MP3.com, Napster, and Intellectual Property Rights MP3.com enabled users to listen to music from any computer with an Internet connection without paying royalties Using peer-to-peer (P2P) technology, Napster supported the distribution of music and other digitized content among millions of users MP3.com, Napster, an Intellectual Property Rights MP3 and Napster claimed to be supporting what had been done for years and were not charging for their services Popularity of MP3.com and P2P services was too great for the content creators and owners to ignore   MP3.com, Napster, and Intellectual Property Rights.)

To the creators and owners, the Web was becoming a vast copying machine MP3.com's and Napster's services could result in the destruction of many thousands of jobs and millions of dollars in revenue MP3.com, Napster, and Intellectual Property Rights .

December 2000, E-Music (emusic.com) filed a copyright infringement lawsuit against MP3.com

In 2001, Napster faced similar legal claims, lost the legal battle, and was forced to pay royalties for each piece of music it supported—Napster collapsed—in October 2003 it reopened as "for fee only" MP3.com, Napster, and Intellectual Property Rights . Existing copyright laws were written for physical, not digital content. The Copyright Infringement Act states, "the defendant must have willfully infringed the copyright and gained financially".

The "no financial gain" loophole in the Act was later closed MP3.com, Napster, an Intellectual Property Rights (cont.)

The Results In 1997, the No Electronic Theft Act (NET) was passed, making it a crime for anyone to reproduce and distribute copyrighted works applied to reproduction or distribution accomplished by electronic means even if copyrighted products are distributed without charge, financial harm is experienced by the authors or creators of a copyrighted work MP3.com, Napster, and Intellectual Property Rights (cont.)MP3.com suspended operations in April 2000 and settled the lawsuit Napster suspended service and settled its lawsuits tried to resurrect itself as an online music subscription service with the backing of Bertelsmann AG filed. for bankruptcy in June 2002 purchased by Roxio with plans to revive Napster into a royalty-paying framework MP3.com, Napster, and Intellectual Property Rights .

What we can learn :All commerce involves a number of legal, ethical, and regulatory issues EC adds to the scope and scale of these issue What constitutes illegal behavior versus unethical, intrusive, or undesirable behavior?

Ethics is The branch of philosophy that deals with what is considered to be right and wrong ,What is unethical is not necessarily illegal.

Ethics are supported by common agreement in a society as to what is right and wrong, but they are not subject to legal sanctions Legal Issues Versus Ethical Issues .

Employees use e-mail and the Web for non-work-related purposes.

The time employees waste while surfing non-work-related Web sites during working hours is a concern Copyrighted trademarked material   cannot be used without permission

Post disclaimers of responsibility concerning content of online forums and chat sessions

Legal Issues Versus

There are ten topics   used for Checking IP issues in e-commerce(by WIPO)

1- Understanding how IP relates to e-commerce

2- Taking Stock of your IP assets relevant to e-commerce

3- IP issues when you design and build your website

4-IP issues related to internet domain names.

5-How your e-commerce is affected by patents

6-IP issues in the distribution of content on the internet

7- Using care in disclousures   on the internet

8- Important contracts on the internet

9- partnerships with government and educational system

10 – IP concerns about international transactions in e-commerce
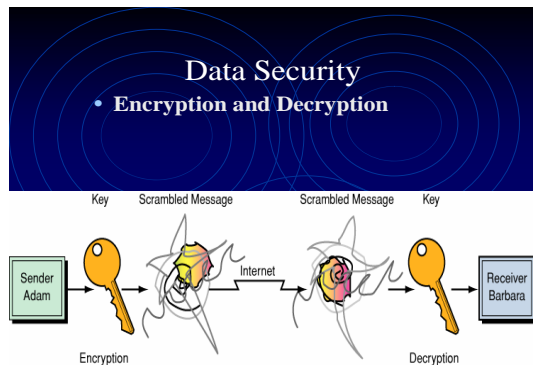
Copyright is an exclusive grant from the government that allows the owner to reproduce a work, in whole or in part, and to distribute, perform, or display it to the public in any form or manner, including the Internet

Copyrights.

Copyright protection approachesUsing software to produce digital content that cannot be copied Cryptography

Tracking copyright violations

Digital watermarks is   Unique identifiers imbedded in digital content that make it possible to identify pirated works. Cryptography is the art of protecting information by transforming it (encrypting it) into an unreadable format, called cipher text. Only those who possess a secret key can decipher (or decrypt) the message into plain text. Encrypted messages can sometimes be broken by cryptanalysis, also called code breaking, although modern cryptography techniques are virtually unbreakable

Cryptography.

As the Internet and other forms of electronic communication become more prevalent, electronic security is becoming increasingly important. Cryptography is used to protect e-mail messages, credit card information, and corporate data. One of the most popular cryptography systems used on the Internet is Pretty Good Privacy because it's effective and free.
Cryptography systems can be broadly classified into symmetric-key systems that use a single key that both the sender and recipient have, and public-key systems that use two keys, a public key known to everyone and a private key that only the recipient of messages uses.
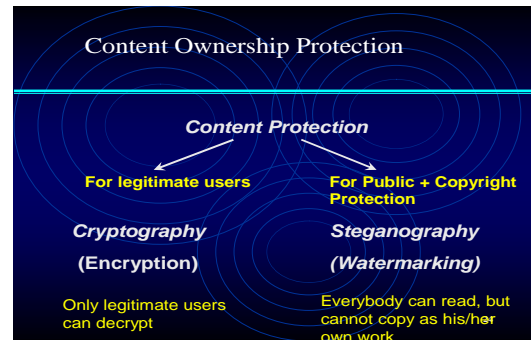
Range of Knowledge Management

II.   Digital Watermarking

Digital watermarking is the best way to protect intellectual property from illicit copying.
Digital watermarks hide the identity of an image or audio file in its noise signal.

Controlling spam

Spamming is the practice of indiscriminately broadcasting messages over the Internet (e.g., ., junk mail)

Spam comprises 25 to 50% of all e-mail

Free Speech Versus Censorship and Other Legal Issues .

Electronic Mailbox Protection Act requires those sending spam to indicate the name of the sender prominently and include valid routing information
Recipients may waive the right to receive such information

Free Speech Versus Censorship and Other Legal Issues .

ISPs are required to offer spam-blocking software

Recipients have the right to request termination of future spam from the same sender and to bring civil action if necessary

Free Speech Versus Censorship and Other Legal Issues

Electronic contracts

Uniform Electronic Transactions Act of 1999 establishes uniform and consistent definitions for electronic records, digital signatures, and other electronic communications

–Shrink-wrap agreements or box-top licenses

–Click-wrap contracts

Free Speech Versus Censorship and Other Legal Issues (cont.)

Intelligent agents and contracts

Contracts can be formed even when no human involvement is present

A contract can be made by interaction between an

individual and an electronic agent, or even between two electronic agents

Free Speech Versus Censorship and Other Legal Issues (cont.)

Uniform Electronic Transactions Act (UETA) includes the following two provisions:

–Electronic records do satisfy the requirement for a contract

–Electronic signature is enforceable equal to a written signature on a paper contract

Free Speech Versus Censorship and Other Legal Issues .

Internet Gambling Prohibition Act of 1999Online wagering illegal except for minimal amounts Provides criminal and civil remedies against individuals making online bets or wagers and those in the business of offering online betting or wagering venues Free Speech Versus Censorship and Other Legal Issues .

Taxing business on the Internet

Internet Tax Freedom Act passed the U.S. Senate on October 8, 1998 Barred any new state or local sales taxes on Internet transactions until October 2001 (extended by US Congress to 2006) Created a special commission to study Internet taxation issues and recommend new policies Free Speech Versus Censorship and Other Legal Issues .

The global nature of business today suggests that Cyberspace be considered :A distinct tax zone unto itself

Unique rules and considerations befitting the stature of the online environment Free Speech Versus Censorship and Other Legal Issues .

Tax-free policies may give online businesses an unfair advantage—Internet businesses should pay their air share of the tax bill for the nation's social and physical infrastructure.

8- Important contracts on the internet

9-partnerships with government and educational system

10 – IP concerns about international transactions in e-commerce

• Cryptography

• Tracking copyright violations

• Digital watermarks: Unique identifiers imbedded in digital content that make it possible to identify pirated works

Content Ownership Protection

Cryptography

• The art of protecting information by transforming it (encrypting it) into an unreadable format, called cipher text. Only those who possess a secret key can decipher (or decrypt) the message into plain text. Encrypted messages can sometimes be broken by cryptanalysis, also called

codebreaking, although modern cryptography techniques are virtually unbreakable

Data Security

Data Security

Cryptography(cont.)

As the Internet and other forms of electronic communication become more prevalent, electronic security is becoming increasingly important. Cryptography is used to protect e-mail messages, credit card information, and corporate data. One of the most popular cryptography systems used on the Internet is Pretty Good Privacy because it's effective and free.

Cryptoghraohy

Cryptography systems can be broadly classified into symmetric-key systems that use a single key that both the sender and recipient have, and public-key systems that use two keys, a public key known to everyone and a private key that only the recipient of messages uses.
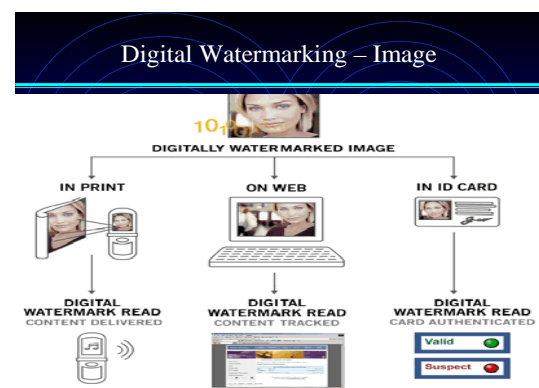
 "Digital Watermark"

Watermarking: An application of Steganography.

Digital Watermarking

• Digital watermarking is the best way to protect intellectual property from illicit copying.

• Digital watermarks hide the identity of an image or audio file in its noise signal.

Digital Watermarking – What is it?

Digital Watermarking is a form of steganography which embeds usually imperceptible or invisible markings or labels in digital data in the form of bits.

Digital Watermark

Interest in digital watermarks has grown out of an increasing interest in intellectual property and copyright protection.

Digital Watermark .

Digital watermarks provide means of placing additional information within digital media so if copies are made, the rightful ownership may be determined.

III. Digital Watermark

Digital watermark ,a security software, are added to still images in a way that can be seen by a computer but is imperceptible to the human eye. A Digital watermark carries a message containing information about the creator or distributor of the image, or even about the image itself.

Digital Watermark (cont.)
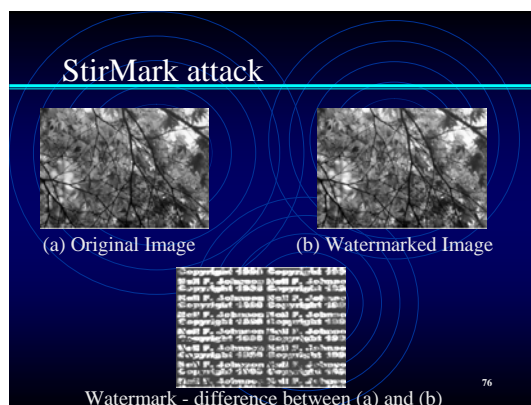
Embeds imperceptible messages for tracking down the sites to check for abuses

• Encrypts data that only prospects users can read by using "Digital Key"

• Places icon or logo of copyrights' owner in the corner of the screen or page

Embedded information

The embedded information is known as a watermark can provide, for example, information about the media, the author, copyright, or license information.

Digital Watermarking

• Embed visible / invisible watermark data into objects without changing the original document format and contents.

• C = E(wm, P)

• Embedding watermark wm into object P, producing watermarked object C.

• Watermark can contain object ID, author's name, terms of use, copyright date and so forth.
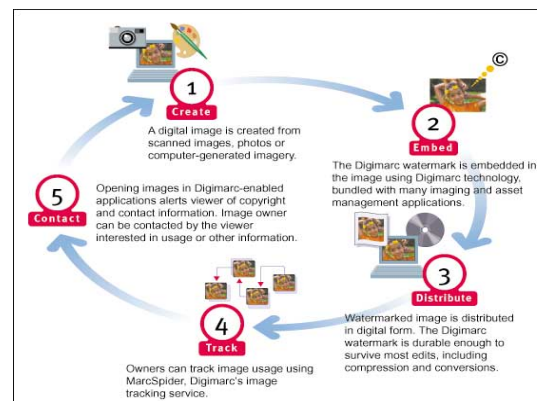
• Watermark can be either visible or invisible.

• Watermark recovery

• D(C) = wm

• Applying watermark extraction to recover watermark, proving ownership.

• Good evidence in a copyright court.

• For a good watermark scheme it should be difficult to removed the watermark without knowing the embedding algorithm (and key).

Digital Watermarking - Examples

• Text – varying spaces after punctuation, spaces in between lines of text, spaces at the end of sentences, etc.

• Audio – low bit coding, random imperceptible noise, fragile & robust, etc.

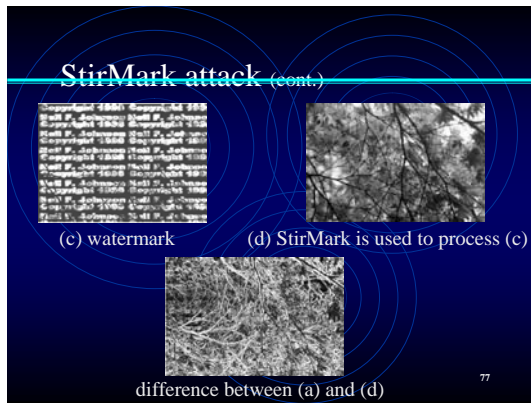• Images – least-significant bit, random noise, masking and filtering, etc.

Digital Watermarking Example

Digital Watermarking – Purposes

Digital Watermarking – Qualities/Types

Digital Watermarking – Case Studies

• Text

StirMark attack (cont.)

(c) watermark   (d) StirMark is used to process (c)

difference between (a) and (d)

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•Image

•Audio

•Video

Digital Watermarking – Image

Digital Watermarking - Images

•Digimarc Image Bridge

•Inserts imperceptible digital watermarks onto images

•Digimarc MarcSpider

•Tracks all images with Digimarc's watermark on the Internet

•Searches over 50 million images on the Internet a month

MarcSpider report

Who is using ImageBridge and MarcSpider?

•Corbis

•Workbookstock.com

•The British Library

Success Story

•Cobris

•identifies up to 50 cases of unauthorized commercial use of its images per month

•Settled 28 cases in and out of court in 8 months

•Movie Market paid 1 million for the settlement

Digital Rights to Entertainment Media

•Internet makes it easy to transfer video content

~350k movies/day illegally downloaded via Internet.

Broadband access enables transfer of full length movies in < 40 minutes

Next generation technology may reduce the time 45 seconds

500k to 1mm simultaneous users find, reproduce and redistribute entertainment content via file sharing services

•Sales of audio and video packaged media dropping rapidly

Record and CD sales down 10% last year

Top ten album sales dropped from 60mm in 2000 to 40mm in 2001

Digital Watermarking - Video

Watermarking for Copy Protection

Consumer Detector

Professional Embedder

STB / PVR

DVD Player

Embed CCI
• Copy Once
• Copy Never
• Copy Freely
• Copy No More
• No Redistribution
CCI = Copy Control Information

Enforce CCI
• Copy Once
• Copy Never
• Copy Freely
• Copy No More
• No Redistribution
CCI = Copy Control Information

Watermark is insert into video by production studio, broadcast station, or cinemas

•Watermark contains copyright information and copying restriction information that indicates the video can be copy once, copy unlimited times, or never copy

•Video recording equipments manufactures have to agree with the code, and make the equipments accordingly

Digital Watermarking - Video

•Universal Pictures

•Insert digital watermarks in its movies including theatrical release, home video, video on demand, and broadcast movies

•Work with video recording makers in the next few years to ensure that new devices will complied the new standards

Video Watermarking Applications

Watermarking for Copy Protection

Copyright Protection Ecosystem

Philips Digital Network Water Cast

Who is using Water Cast?

•BBC

•Reuters

•EBU

Digital Watermarking - Audio

•Cannot effectively prevented illegal use of music on the Internet

•Identify the source of the music, and determine if the music is legal or not

•In 1999, a few companies including Liquid Audio, MP3, CDnow, formed a coalition to have digital watermark on distributed music on the Internet

Digital Watermark – National Security

•Insert watermark into ID card

•Carry secure information, which is used to authenticate and verify cardholder

•Harder for counterfeiter to replicate the ID card

Image Watermarking

Digital Watermark

Digital Watermark

Digital Watermark

Benefit from Implementing Digital Watermark Technology

•Communicate owner, image and/or transaction specific information, providing additional detail valuable for directing potential customers directly to appropriate licensing information.

Benefit from Implementing Digital Watermark Technology

•Facilitate image specific licensing and commerce opportunities by enabling each image to direct customers to image specific information on your Web site.

Digital Watermarking – Attacks

Attackers can seek to destroy watermark for the purposes of use without having to pay royalties to the originator of the content.

Types of Attacks

•Attackers have a visible target and can remove the watermark by cropping the image.

•Attacks on watermark may not necessarily remove the watermark, but disable its readability.

•Multiple watermarks can be placed in an image and one cannot determine which one is valid.

Types of Attacks (cont.)

•Robustness attacks – seek to degrade watermark beyond its utility value without altering the quality of the content so that the watermark cannot be detected

•Presentation – seek to manipulate content so that a detector cannot find the watermark in the file (i.e slicing an image into pieces and then reassembling it on a web site)
Interpretation – create duplicate watermarks in order to create an ownership conflict

•Legal – challenging legal aspects of watermarking

StirMark attack

StirMark attack (cont.)

Question?

VWM: Protecting Movies from Piracy

•VWM Group formed March 2001

Macrovision, Philips, Sony, NEC,

Hitachi, Pioneer, Digimarc

•Copy prevention and play control

•Tens of Millions of dollars invested in watermarking technology

•Global standards initiatives

US: DVD CCA bids submitted 11/01; decision before mid-year

Europe: DVB-CP (coordinated through EBU)

Japan: ARIB (broadcast standards organization in Japan)

•Market need becoming critical

Production of DVD recordable devices ramping

US debating mandatory copyright protection in all digital devices

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