CSE302/ISE302:
Professional Ethics for Computer Science

Lecture 4: Intellectual Property

Scott Stoller

Computer Science Department

Stony Brook University

Objectives

What is intellectual property?

What are the strengths and limitations of using copyrights, patents, and trade secret laws to protect intellectual property?

What are open source, free, and public domain software?

What is the distinction between competitive intelligence and industrial espionage?

What is Intellectual Property?

Term used to describe works of the mind
- IP refers to creative works, regardless of their particular physical form
- Includes art, books, films, formulas, inventions, music, and processes
- Value comes from creativity, ideas, research, skills, labor, non-material efforts and attributes the creator provides

Copyright law
- Protects authored works (art, books, film, music)
- An idea cannot be copyrighted, but the expression of an idea can be.

Patent laws
- Protect inventions

Trade secret laws
- Help safeguard information critical to an organization's success

Copyrights

Copyright holders have exclusive rights (excluding fair use) for a fixed period (e.g., 70 years after death of author) to:
- make copies
- produce derivative works, such as translations into other languages or movies based on books
- distribute copies
- perform the work in public (e.g. music, plays)
- display the work in public (e.g. artwork, movies, computer games, video on a Web site)

Copyright holder may grant these rights to others

Challenges from new technology
- Digital technology (scanners, digital audio/video recorders, mass storage, etc.) and the Internet have made copyright infringement easier and cheaper
- New tools allow us to modify graphics, video and audio files to make derivative works

Fair Use

"Fair use" of copyrighted material does not require authorization from copyright holder

"Fair use" allows free use of copyrighted material that
- contributes to creation of new work, and
- is not likely to deprive original authors of income for their work.

Examples: criticism, comment, news reporting, teaching, research

Factors considered in determining whether a use is "fair":
- Purpose and nature of use – commercial (less likely) or non-profit
- Nature of copyrighted work – e.g., creative (less likely) or factual
- Amount or significance of portion used
- Effect on potential market for, or value of, the copyrighted work

Weight given to each factor varies case by case

Digital Millennium Copyright Act (DMCA), 1998

Prohibits making, distributing or using tools to circumvent technological copyright protection systems

Provides Web sites where users post material (e.g., YouTube, MySpace) a way to protect themselves from copyright-infringement lawsuits
- Copyright owner issues "take down" notices, requesting removal of specified material
- Web site is not in violation as long as it complies with take down notices
- This puts the burden on the copyright owner, not the Web site, to identify copyright-infringing material
- However, copyright owners sometimes issue take down notices for material that is (probably) protected as "fair use" (e.g., small excerpts of copyrighted video used in an educational video), but the Web site might comply rather than risk an expensive lawsuit

Copyright Cases: Sony v. Universal City Studios (1984)

Is taping/copying of broadcast TV for later viewing fair use?

Universal City Studio's arguments against fair use
- People copied the entire work
- Movies are creative, not factual

Sony's arguments for fair use
- The copy was for personal, noncommercial use and generally was not kept after viewing
- The movie studios could not demonstrate that they suffered any harm
- The studios had received a substantial fee for broadcasting movies on TV, and the fee depends on having a large audience who view for free

Supreme Court decided:
- copying movies for later viewing was fair use
- the makers of a device with legitimate uses should not be penalized because some people may use it to infringe on copyright

Copyright Cases: Reverse Engineering

Game software companies reverse engineered games sold by the makers of the video game console, so they could make games compatible with the video game console

Courts ruled that reverse engineering does not violate copyright if the intention is to make new creative works (video games), not copy the original work (the game systems).

- Sega Enterprises Ltd. v. Accolade Inc. (1992)

- Atari Games v. Nintendo (1992)

- Sony Computer Entertainment, Inc. v. Connectix Corp. (2000)

Copyright Cases: RIAA v. Napster (2000)

In 2000, the Recording Industry Association of America (RIAA) sued Napster for knowingly encouraging and assisting in copyright infringement.

Question 1: Was the sharing of music via Napster fair use?

Napster's arguments for fair use:
- The Sony decision allowed for entertainment use to be considered fair use
- Did not hurt industry sales because users sampled the music on Napster and bought the CD if they liked it

RIAA's arguments against fair use:
- "Personal" meant very limited use, not trading with thousands of strangers
- Songs and music are creative works and users were copying whole songs
- Claimed, with supporting data, that Napster severely hurt sales

The court agreed with RIAA. Question 2: Who is liable?

Copyright Cases: RIAA v. Napster (2000)

Question 2: Who is liable? Napster or its users?

Napster's arguments that it is not liable:
- It was the same as a search engine, which is protected under the DMCA
- They did not store any of the MP3 files
- Their technology had substantial legitimate uses

RIAA's arguments that Napster is liable:
- Companies are required to make an effort to prevent copyright violations and Napster did not take sufficient steps
- Napster was not a device or new technology and the RIAA was not seeking to ban the technology

The court found that Napster "knowingly encourages and assists in infringement of copyright" and held Napster liable, because Napster had the right and ability to supervise the system, including copyright infringing activities.

Copyright Cases: MGM v. Grokster (2005)

In MGM v. Grokster, the court ruled that intellectual property owners could sue companies running P2P file sharing services, such as Grokster, Morpheus, and Kazaa, for encouraging copyright infringement, if those companies did not take steps to prevent copyright infringing activities.

New Business Models and Constructive Solutions

Organizations set up to collect and distribute royalty fees (e.g. the Copyright Clearance Center).
- Users don't have to search out individual copyright holders

Sites such as iTunes and the new Napster provide legal means for obtaining inexpensive music, and they generate revenue for the content owners

Content-sharing sites allow the posting of (copyrighted) content and share their ad revenues with content owners in compensation
- Content-sharing site might not charge users for the copyrighted content but profits from it through site traffic and hence ad revenue

Content owners embed advertising in files and then post them to content-sharing sites. The advertiser gets its message out, and the content owner gets paid.

In some countries, a levy is charged on digital media (e.g., DVDs) and recorders and given to the content industry.

Software Copyright Cases: Lotus v. Borland (1990)

1983: Lotus launched its spreadsheet program, Lotus 1-2-3.

1987: Borland launched Quattro, with two sets of command menus: one designed by Borland, and one identical to Lotus 1-2-3 menus.
- The latter made it easy for Lotus 1-2-3 users to switch to Quattro.
- Borland copied only the appearance of the menus, not the code

1990: Lotus sued Borland for copying Lotus 1-2-3's "look and feel"

1992: a U.S. District Court ruled that the menu command hierarchy was protectable by copyright, and Borland had infringed.

1995: a U.S. Court of Appeals reversed this decision, ruling that the menu command hierarchy was a "method of operation" (not an expression of an idea), hence not protected by copyright (possibly protectable by patent).

1996: U.S. Supreme Court affirmed the latter ruling.

Patents

Grant of property rights to inventors of devices and processes

Issued by the U.S. Patent and Trademark Office (USPTO)

Permits owner to exclude the public from making, using, or selling the protected invention for a fixed period (e.g., 20 years)

Allows legal action against violators

Patent (unlike copyright) applies even to people who independently created the same invention

Patents issued by USPTO apply only within the U.S.
- Inventor can patent same invention in multiple countries

Patents (continued)

An invention must pass four tests to be patentable:
- Must be in one of the five statutory classes of items: processes, machines, manufactures, compositions of matter (e.g., chemical compounds)
- Must be useful
- Must be novel, i.e., not exist in patents, published material, or general knowledge in the field
- Must not be obvious to a person having ordinary skill in the same field

Items cannot be patented if they are
- Abstract ideas (math formulas)
- Laws of nature
- Natural phenomena

Patent application is confidential. Patent is public.

Obtaining a patent from the USPTO can be expensive and slow (typically 2+ years)

Alternatives to Patents

Treat the invention as a trade secret.
- Pro: Maintains secrecy.
- Con: Risk that a competitor will (re)invent it, patent it, and force you to pay licensing fees.

Defensive Publishing: publish a description of the invention, to prevent competitors from patenting it.
- Pro: Faster and cheaper than obtaining a patent.
- Con: Makes the invention immediately available to competitors.

Software Patents

Software patent: a patent that claims as all, or substantially all, of its invention some feature, function, or process embodied in instructions executed on a computer

20,000 software-related patents per year have been issued since the early 1980s

Before obtaining a software patent, do a patent search

Software Patent Institute is building a database to facilitate searches of existing software patents

Cross-licensing agreements
- Large software companies agree not to sue others over patent infringements
- Small businesses have no choice but to license patents

Software Patent Cases: Amazon's One-Click Shopping

Amazon patented its "one-click shopping" system.

In 1999, Amazon filed a lawsuit against Barnes & Noble for infringing the patent with its "express lane" feature.

Amazon and Barnes & Noble settled out of court in 2002.

Critics complain that software patents are too broad, covering unoriginal concepts.

Submarine Patents

Standard is a definition or format
- Approved by recognized standards organization
- Or accepted as a de facto standard by the industry
- Enables hardware and software from different manufacturers to work together
- Examples: TCP/IP protocol, JPEG image format.

Submarine patent: a patented technology, process, or principle embedded within a standard, without the standards organization's knowledge
- Patent holder then demands royalties from users of the standard

Trade Secrets

Uniform Trade Secrets Act (UTSA) established uniformity in trade secret law
- Most states have adopted it.

Trade secret
- Business information
- Represents something of economic value
- Requires effort or cost to develop
- Some degree of uniqueness or novelty
- Generally unknown to the public
- Company takes steps to keep it confidential

Computer hardware and software can qualify for trade secret protection

Trade Secrets (continued)

Greatest threat to loss of company trade secrets is employees

Nondisclosure clauses in employee's contract
- Enforcement can be difficult

Noncompete agreements
- Protect intellectual property from being used by competitors when key employees leave
- Require employees not to work for competitors for a period of time

Safeguards
- Limit outside access to corporate computers
- Guard use of remote computers by employees

Trade Secrets (continued)

Advantages of trade secret protection over patents and copyrights:
- No time limitations.
- Maintains secrecy. No need to file an application.
- No filing or application fees.
- Patents can be ruled invalid by courts.

Trade secret law does not prevent someone from using the same idea if it is developed independently

Intellectual Property in Other Countries

Some countries do not recognize or protect intellectual property

Some such countries export many pirated items to countries with strict copyright laws

Countries with high piracy rates often do not have a significant software industry
- lack of IP protection might be part of the reason

Economic sanctions often penalize legitimate businesses (that export to the country with the intellectual property owners), not necessarily the companies involved in the piracy

World Trade Organization (WTO)
- Trade-Related Aspects of Intellectual Property Rights (TRIPs) Agreement provides for a minimum level of protection for intellectual property

Summary of the WTO TRIPs Agreement

TABLE 6-1 Summary of the WTO TRIPs Agreement

Form of intellectual property	Key terms of agreement
Copyright	Computer programs are protected as literary works. Authors of computer programs and producers of sound recordings have the right to prohibit the commercial rental of their works to the public.
Patent	Patent protection must be available for inventions for at least 20 years and for both products and processes in almost all fields of technology. (Controversy has arisen over whether this protection applies to computer software.)
Trade secrets	Trade secrets and other types of undisclosed information that have commercial value must be protected against breach of confidence and other acts that are contrary to honest commercial practices. However, reasonable steps must have been taken to keep the information secret.

Open Source, Free, and Public Domain Software

Open Source Software: source code publicly available for use and modification
- Software can be adapted (by users) to meet new needs
- Bugs can be rapidly identified and fixed by a large community

Free Software: open source software with a license requiring that all software that uses the original code, or code derived from it, will always be available for free and unrestricted use
- Copylefted software: the developer copyrights the program and releases it under a license agreement that allows people to use, modify, and distribute it, or any program developed from it, but only if they apply the same license agreement to the new work.
- Free software is usually copylefted with the GNU General Public License (GPL), which provides free and unrestricted use

Public Domain Software: software that is not copyrighted
- In most countries, author gets copyright automatically and must explicitly disclaim it to put the software in the public domain.
- The software can be used in a proprietary commercial product.

More info: Open Source Initiative (www.opensource.org), Free Software Foundation (www.fsf.org)

Competitive Intelligence

Gathering of legally obtainable information about competitors

Part of a company's strategic planning and decision making

Uses only published information:
- Annual reports, shareholder filings, quarterly reports, press releases, promotional materials, websites, stock report, credit reports, interviews, customer service, articles in the trade press, patents, environmental impact statements.

Without proper management safeguards, it can cross over to industrial espionage, which uses non-published information
- In 2000, Procter & Gamble hired a competitive intelligence contractor that hired subcontractors that went through Unilever's dumpsters, on public property near Unilever's headquarters. When P&G discovered this, it fired the contractor and the three managers that hired it, returned the stolen documents to Unilever, promised not to use any information from the documents, and, after negotiation, paid Unilever an undisclosed sum (believed to be tens of millions of dollars).

In-Class Exercise: Instructions

Work in groups of 3 students.

Produce one written statement with the group's answers to the questions on the next slide.

Everyone in the group must print their name and write their signature next to it, at the top of the paper.
- The names are used for attendance.
- Your signature attests that (1) you are present and (2) everyone else whose name appears on the paper is present. False claims will be penalized. I will count the number of people in the room.

Groups will read their statements aloud.
- As many as time permits.

Submit the written statement at the end of class.

In-Class Exercise: Similar Software

Altai hired Claude Arney from CA to work on a job scheduler that competed with CA's job scheduler. Altai's product ran on only one Operating System (OS). To make it portable to multiple OSs, Arney's team at Altai re-structured the product copying CA's approach, in which the scheduler uses generic commands that are translated into OS-specific commands by an adapter module. In addition, they copied some of CA's code. About 30% of the code for Altai's adapter module, OSCAR 3.4, was copied from CA's adapter, CA-ADAPTER.

In 1998, CA discovered this and sued Altai for copyright infringement. Altai ordered a rewrite of the copied portions by programmers with no direct knowledge of CA's code. The new code was used in OSCAR 3.5. CA claimed that both OSCAR 3.5 also violated its copyright.

Do you agree with CA? In general, what criteria should be used to determine whether similar software is copyright-infringing? What factors might make some parts of a program more or less significant, in terms of copyright infringement, than other parts? To illustrate your ideas, try to invent a scenario in which the similarity between two programs is not quite copyright-infringing, and a scenario in which the similarity is barely infringing. Are there situations in which some similarity or imitation is not copyright-infringing but is an unethical/unfair business practice?

http://en.wikipedia.org/wiki/Computer_Associates_Int._Inc._v._Altai_Inc.

In-Class Exercise: Similar Software (continued)

Outcome of Computer Associates v. Altai (1992):

The court specified a process for deciding whether a similar program infringes a copyright.

1. Determine the allegedly infringed program's constituent parts.

2. Identify elements that are not protectable by copyright, namely, design elements that are
   - the only efficient way of accomplishing some task,
   - dictated by external factors, or
   - taken from the public domain.

3. Compare the remaining elements with the other program to determine whether there is substantial similarity. This is done by experts on a case-by-case basis.

The court ruled that OSCAR 3.4 infringed CA's copyright but OSCAR 3.5 did not.