Privacy Concerns of Sharing Multimedia in Social Networks

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ABSTRACT
This article summarizes the corresponding 3-hour tutorial at ACM Multimedia 2013.

Categories and Subject Descriptors
H.1.2 [**User/Machine Systems**]:Human factors;

General Terms
Security

Keywords
Privacy; Societal Concerns; Multimedia Content Analysis

1. MOTIVATION
The growth of multimedia as demonstrated by social networking sites such as Facebook and YouTube combined with advances in multimedia retrieval (geo-tagging, web search, face recognition, speaker verification, location estimation, etc.) provides novel opportunities for the unethical use of multimedia. In small scale or in isolation multimedia analytics have always been a powerful but reasonably contained privacy threat. However, when linked together and used on an Internet scale, the threat can be enormous and pervasive. It is already well discussed that the multimedia community therefore has an obligation to understand and attempt to mitigate these risks. The press covers "horror stories" almost on a day-to-day basis often crating panic reactions that can even draw companies out of business for very little grounded reason. Other stories, however, have more depth and require our attention as technologists (some of which can be found on the proposer's own blog: http://cybercasing.blogspot.com).

Electrical engineering and computer science curricula usually include an abundance of material on how to improve retrieval based on the underlying multimedia content analysis but only rarely talk about the negative impacts of these technologies. Privacy research is often limited to steganography, encryption, and other well-known techniques and/or even moved out of scope as "ethical concerns not part of engineering". Therefore, even when acknowledged as a problem, many multimedia researchers lack the knowledge of how to react to society's concerns and mitigate some of the risk while working on developing better retrieval options. The reason often given is: "We'll deal with privacy and social issues later -- right now we need to focus on

the development". The truth, however, is that, for example, if privacy and security had been a concern in the early stages of developing the Internet, many of todays' issues, such as spam and phishing email, would probably much less of a problem. At the same time, some of the solutions to security and privacy concerns are really simple and follow a limited set of basic principles, which, when already obeyed in the early stages of the development of a system can avoid large unresolvable issues later. Many of them are well known in the security and privacy communities but not so much in the multimedia community.

2. OBJECTIVES
The objective of the tutorial is to introduce interested multimedia students and researchers who are not specialized in security and privacy issues into the thinking of a security and privacy researcher. The tutorial will be a vivid class with many examples based on material developed for the CS10 course at the EECS department of UC Berkeley as well as from an NSF-sponsored project for teaching privacy to high-school students (http://teachingprivacy.icsi.berkeley.edu). The material has been selected from contemporary research from top-notch security and privacy conferences (see below). Using real-world examples and their consequences, the tutorial will focus on privacy and security threats induced by modern social networking practices in combination with multimedia retrieval. The tutorial's main thread of argument is that often small changes in interface and usability concepts can make a huge difference in how well privacy and security concerns are addressed. At the end of the tutorial, there will be a discussion.

3. OUTLINE
The following is a list of topics that the tutorial will cover:

Why privacy is a concern in multimedia research
- Privacy perception as a function of age, technical awareness, and cultural background
- Legal and ethical standpoint in the US
- Major privacy "invaders": Government, Industry, Research
- The state of the art in multimedia privacy
- Crimes potentially enabled by multimedia: cyberstalking, cybercasing, identity theft, and others

Examples
- Geotagging and it's implications for privacy
- Multimedia retrieval and it's implication for privacy
- Matching users across accounts with multimedia content analysis
- Facebook and LinkedIN vs Real World Social Networking

Mitigation Strategies
- Attacker model taxonomy
- Defense model taxonomy
- Quantifying the arms race
- 10 Principles for Social Media Privacy
- Concrete examples of using the strategies: Technical solutions that work

Conclusions
- Possible implications for research, education, industry
- Chances for startups, new research
- First steps everybody should do right now

Discussion

4. COURSE MATERIAL

The materials used for this tutorial will mostly be consisting of contemporary research articles from security and privacy conferences such as ACM MMSEC but also NSPW (New Security Paradigm Workshop), and Usenix Security dealing with Multimedia. The participants will also be handed the slides of the presentations. In addition, the attendees of the tutorial will have access to not yet published material at the teachingprivacy.com portal.

5. ABOUT THE PRESENTER

Dr. Gerald Friedland is the Director of Audio and Multimedia research at the International Computer Science Institute, a private lab affiliated with the University of California, Berkeley, where he is currently leading a group of multimedia researchers supported by NSF, IARPA, and industry grants. For the last two years, he has been heading an NSF-sponsored project on the privacy implications on multimedia content analysis, resulting in frequent press appearances, invited talks, and guest lectures about the topic.

More importantly, Gerald has presented and attended high class security and privacy conferences, working on building a bridge between the multimedia and privacy communities. Gerald has published more than 100 peer-reviewed articles in conferences, journals, and books and is currently authoring a new textbook on multimedia computing together with Dr. Ramesh Jain. Gerald co-founded the IEEE International Conference on Semantic Computing and is a proud founder and program director of the IEEE International Summer School on Semantic Computing at UC Berkeley. He is associate editor for ACM Transactions on Multimedia Computing, Communications, and Applications, is in the organization committee of ACM Multimedia 2011, 2012, and 2014. He is also serves as TPC Co-Chair of IEEE ICME 2012. He is the recipient of several research and industry recognitions, among them the European Academic Software Award and the Multimedia Entrepreneur Award by the German Federal Department of Economics. Most recently, he lead the team that won the ACM Multimedia Grand Challenge in 2009. Gerald received his doctorate (summa cum laude) and master's degree in computer science from Freie Universitaet Berlin, Germany, in 2002 and 2006, respectively.

Despite being mainly a researcher, Dr. Friedland is a passionate teacher. He held the ACM Workshop on Educational Multimedia and Multimedia Education at ACM Multimedia 2007, a subsequent panel on the same topic at ACM Multimedia 2008, gave a well-received tutorial at ACM Multimedia 2011 on acoustic processing for video analysis, and a previous version of this tutorial at ACM MM 2012. He is frequently participating in both undergraduate and graduate teaching activities at the EECS department of the University of California Berkeley. Part of the Tutorial will be based on material taught at UC Berkeley's CS10 class. Also, he has recently finished a new textbook "Introduction to Multimedia Computing" together with Dr. Ramesh Jain, to appear at Cambridge University Press by the end of 2013.