

Lecture Notes on Data Engineering and Communications Technologies

Volume 6

Series editor

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The aim of the book series is to present cutting edge engineering approaches to data technologies and communications. It publishes latest advances on the engineering task of building and deploying distributed, scalable and reliable data infrastructures and communication systems.

The series has a prominent applied focus on data technologies and communications with aim to promote the bridging from fundamental research on data science and networking to data engineering and communications that lead to industry products, business knowledge and standardisation.

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Leonard Barolli · Mingwu Zhang
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Advances in Internetworking, Data & Web Technologies

The 5th International Conference on Emerging
Internetworking, Data & Web Technologies
(EIDWT-2017)

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Welcome Message of EIDWT-2017 International Conference Organizers

Welcome to the 5th International Conference on Emerging Internetworking, Data and Web Technologies (EIDWT-2017), which will be held from June 10 to June 11, 2017, in Wuhan, China.

The EIDWT is dedicated to the dissemination of original contributions that are related to the theories, practices, and concepts of emerging internetworking and data technologies yet most importantly of their applicability in business and academia toward a collective intelligence approach.

In EIDWT-2017 will be discussed topics related to information networking, data centers, data grids, clouds, crowds, mashups, social networks, security issues, and other Web 2.0 implementations toward a collaborative and collective intelligence approach leading to advancements of virtual organizations and their user communities. This is because current and future Web and Web 2.0 implementations will store and continuously produce a vast amount of data, which if combined and analyzed through a collective intelligence manner will make a difference in the organizational settings and their user communities. Thus, the scope of EIDWT-2017 includes methods and practices which bring various emerging internetworking and data technologies together to capture, integrate, analyze, mine, annotate, and visualize data in a meaningful and collaborative manner. Finally, EIDWT-2017 aims to provide a forum for original discussion and prompt future directions in the area.

For EIDWT-2017 International Conference, we received 254 papers, and out of them 76 were accepted for presentation (about 30% acceptance ratio) during the conference days.

An international conference requires the support and help of many people. A lot of people have helped and worked hard for a successful EIDWT-2017 technical program and conference proceedings. First, we would like to thank all authors for submitting their papers. We are indebted to Program Area Chairs, Program Committee members, and reviewers who carried out the most difficult work of carefully evaluating the submitted papers. We would like to give our special thanks to Honorary Chairs of EIDWT-2017, for their guidance and support. We would like

to express our appreciation to our keynote speakers: Prof. Kouichi Sakurai, Kyushu University, Japan, Prof. Jian Weng, Jinan University, China, Prof. Lein Harn, University of Missouri-Kansas City (UMKC), USA and Prof. Qian Wang, Wuhan University, China, for accepting our invitation and delivering very interesting keynote talks at the conference.

We would like as well to thank the Local Arrangements Chairs for making excellent local arrangements for the conference. We hope you will enjoy the conference and have a great time in Wuhan, China.

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EIDWT-2017 Keynote Talks

A Security Management with Cyber Insurance—Event Study Approach with Social Network Sentimental Analysis for Cyber Risk Evaluation

Kouichi Sakurai

Kyushu University, Fukuoka, Japan

Abstract. Since the recent security breach requires the intensification of security management, the documents, describing the best practice of security management, are published by experts. However, the implementations of all best practices are tough because of the cost and the difficulty of cost-effective security investment. In this talk, I will discuss the security management theory with cyber risk insurance, especially the effectiveness of cyber risk insurance by Monte Carlo simulation approach. Once organizations have the security incident and breaches, they have to pay tremendous costs. Although visible cost, such as the incident response cost, customer follow-up care, and legal cost are predictable and calculable, it is tough to evaluate and estimate the invisible damage, such as losing customer loyalty, reputation impact, and the damage of branding. In this talk, I also will present a new method, called Event Study Methodology with Twitter Sentimental Analysis, to evaluate the invisible cost. This method helps to assess the impact of the security breach and the impact on corporate valuation.

Look Back! Earlier Versions will Reveal Weaknesses in Android Apps

Jian Weng

Jinan University, Guangzhou, China

Abstract. Nowadays, Android platform gains explosively growing popularity. A considerable number of mobile consumers are attracted to varieties of Android Apps, which leads developers to invest resources to maintain the upward trajectory. In the early stage, the developers usually pay more attention to the functionality of Android Apps than the security matters. Unfortunately, it makes Android Apps a hot target for attackers. For the sake of resolving the attacks, developers attach great importance to improve the security of Apps and upgrade them to new versions, whereas leave their earlier versions diffuse through the network. In this paper, we indicate how to attack newly versions of popular Apps, including Facebook, Sina Weibo and Qihoo360 Cloud Driven, by using the weaknesses existing in their earlier versions. We design and implement an App weaknesses analysis tool named “DroidSkynet” to analyze the security weakness on widespread applications. Among 900 mainstream Apps collected from real world, our DroidSkynet indicates that 36.3% Apps are suffering from such weaknesses.

Secret Sharing and Its Applications

Lein Harn

University of Missouri-Kansas City (UMKC), Kansas City, USA

Abstract. Secret sharing is one of the most popular cryptographic tools in network applications used to protect data. For example, secret sharing has been used in cloud to strengthen data security. Shamir's threshold secret sharing scheme which was proposed originally in 1979 is the most popular scheme in the literature. In this talk, I will briefly introduce Shamir's scheme and point out some interesting properties. Then, I will introduce some related research problems to the secret sharing, including secure and fair secret reconstruction, verifiable secret sharing, multi-secret sharing, cheater detection and identification in the secret reconstruction. Applications using the secret sharing will also be discussed, such as group key establishment in group communications and group authentication. Finally, I will briefly introduce my recent research paper on the design and implementation of a general secret sharing.

New Short-Range Communication Technologies over Smartphones: Designs and Implementations

Qian Wang

Wuhan University, Wuhan, China

Abstract. With the ever-increasing popularity of smartphones in our daily lives, people more and more heavily rely on them to share and spread a wide variety of information. Because of the limitations of traditional short-range communication technologies (e.g., complex network configuration and troublesome authentication process), some new short-range communication technologies over smartphones have been proposed recently. In this talk, I will discuss barcode-based and acoustics-based short-range communication systems over off-the-shelf smartphones. First, we introduce Dolphin, a novel form of real-time acoustics-based dual-channel short-range communication, which uses a speaker and the microphones on smartphones to achieve concurrent audible and hidden communication. By leveraging masking effects of the human auditory system, Dolphin ensures real-time unobtrusive speaker-microphone communication without affecting the primary audio-hearing experience for human users, while, at the same time, it overcomes the main limitations of existing unobtrusive screen-camera links. Then, we introduce RainBar, a new and improved color barcode-based NFC system for achieving lightweight real-time streaming for smartphones, which features a carefully-designed high-capacity barcode layout design to allow flexible frame synchronization and accurate code extraction.

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