Lecture Notes on Data Engineering and Communications Technologies

Volume 2

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.
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Kangbin Yim
Editors

Advances on Broad-Band Wireless Computing, Communication and Applications

Proceedings of the 11th International Conference on Broad-Band Wireless Computing, Communication and Applications (BWCCA-2016) November 5–7, 2016, Korea

Springer

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ISSN 2367-4512 ISSN 2367-4520 (electronic)
Lecture Notes on Data Engineering and Communications Technologies
ISBN 978-3-319-49105-9 ISBN 978-3-319-49106-6 (eBook)
DOI 10.1007/978-3-319-49106-6

Library of Congress Control Number: 2016956190

Printed on acid-free paper

This Springer imprint is published by Springer Nature
The registered company is Springer International Publishing AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Welcome Message of BWCCA-2016 International Conference Organizers

Welcome to the 11-th International Conference on Broadband and Wireless Computing, Communication and Applications (BWCCA-2016), which will be held in conjunction with the 11-th 3PGCIC-2016 International Conference from November 5 to November 7, 2016 at Soonchunhyang (SCH) University, Asan, Korea.

This International Conference is a forum for sharing ideas and research work in the emerging areas of broadband and wireless computing. Information networking are going through a rapid evolution. Different kinds of networks with different characteristics are emerging and they are integrating in heterogeneous networks. For these reasons, there are many interconnection problems which may occur at different levels of the hardware and software design of communicating entities and communication networks. These kinds of networks need to manage an increasing usage demand, provide support for a significant number of services, guarantee their QoS, and optimize the network resources.

The success of all-IP networking and wireless technology has changed the ways of living the people around the world. The progress of electronic integration and wireless communications is going to pave the way to offer people the access to the wireless networks on the fly, based on which all electronic devices will be able to exchange the information with each other in ubiquitous way whenever necessary.

The aim of this conference is to present the innovative research and technologies as well as developments related to broadband networking, and mobile and wireless communications. BWCCA-2016 received 195 paper submissions and based on review results, we accepted 53 papers (about 27% acceptance ratio) for presentation in the conference and publication in the Springer Lecture Notes on Data Engineering and Communication Technologies Proceedings.

The organization of an International Conference requires the support and help of many people. A lot of people have helped and worked hard to produce a successful BWCCA-2016 technical program and conference proceedings. First, we would like to thank all authors for submitting their papers, Program Committee Members and reviewers who carried out the most difficult work by carefully evaluating the submitted papers.

This year in conjunction with BWCCA-2016 we have 7 International Workshops that complemented BWCCA-2016 program with contributions for specific topics. We would like to thank the Workshop Co-Chairs and all workshops organizers for organizing these workshops.

We thank Shinji Sakamoto, Donald Elmazi and Yi Liu, Fukuoka Institute of Technology (FIT), Japan, as Web Administrator Co-Chairs and Dr. Makoto Ikeda, FIT, Japan, as Finance Chair for their excellent work.

We would like to express our gratitude to Prof. Makoto Takizawa, Hosei University, Japan and Prof. Kyoil Suh, Soonchunhyang University, Korea as Honorary Co-Chairs of BWCCA-2016 for their support and help.

We give special thanks to Prof. Nobuo Funabiki, Okayama University, Japan for kindly accepting to be Keynote Speaker of BWCCA-2016.

Finally, we would like to thank the Local Arrangement Team for making excellent local arrangement for the conference.

We hope you will enjoy the conference and have a great time in Asan, Korea.

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Welcome Message from BWCCA-2016 Workshops Co-Chairs

Welcome to the Workshops of the 11-th International Conference on Broadband and Wireless Computing, Communication and Applications (BWCCA-2016), which will be held in conjunction with the 11-th 3PGCIC-2016 International Conference from November 5 to November 7, 2016 at Soonchunhyang (SCH) University, Asan, Korea.

This year 7 workshops will be held in conjunction with BWCCA-2016 International Conference. The workshops are very important part of the main conference and they cover specific topics related to next generation networks, network traffic analysis, sensor technologies, smart environments, complex systems, wireless communication, mobile networks and multimedia networking.

BWCCA-2016 workshops are listed in following:

1. The 18-th International Symposium on Multimedia Network Systems and Applications (MNSA-2016)
2. The 9-th International Workshop on Next Generation of Wireless and Mobile Networks (NGWMN-2016)
3. The 7-th International Workshop on Methods, Analysis and Protocols for Wireless Communication (MAPWC-2016)
4. The 7-th International Workshop on Cloud, Wireless and e-Commerce Security (CWECS-2016)
5. The 5-th International Workshop on Robot Interaction, Control, Communication and Cooperation (RI3C-2016)
6. The 3-rd International Workshop on Secure Cloud Computing (SCC-2016)
7. The 3-rd International Workshop on Large Scale Networks and Applications (LSNA-2016)

These workshops bring to the researchers conducting research in specific themes the opportunity to learn from this rich multi-disciplinary experience.

The Workshop Chairs would like to thank the workshop organizers for their great efforts and hard work in proposing the workshop, selecting the papers, the interesting programs and for the arrangements of the workshop during the conference days.

We hope you enjoy the workshops programs and proceedings.

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Welcome Message from MNSA-2016 International Symposium Co-Chairs

It is our great pleasure to welcome you to the 18-th International Symposium on Multimedia Network Systems and Applications (MNSA-2016), which will be held in conjunction with the 11-th International Conference on Broadband and Wireless Computing, Communication and Applications (BWCCA-2016) at Soonchunhyang (SCH) University, Asan, Korea from November 5 to November 7, 2016.

This international symposium is a forum for sharing ideas and research work in the emerging areas of multimedia networking and systems.

Networks of today are going through a rapid evolution and the growing popularity of wired and wireless networks, multimedia network systems and applications are changing our daily life. In the last few years, we have observed an explosive growth of multimedia computing, communication and applications. This revolution is transforming the way people lives, works and interacts with each other, and is impacting the way business, education, entertainment, and health care are operating. Presently, a lot of research on high-speed networks and multimedia communication is going on. The papers included in this symposium cover aspects of IoT, multimedia applications, DTNs, network protocols, distributed computing systems and wireless networks.

Many people contributed to the success of MNSA-2016. First, we would like to thank the organizing committee of BWCCA-2016 International Conference for giving us the opportunity to organize the symposium. We would like to thank all authors for submitting their research work and for their participation. We are looking forward to meet them again in the forthcoming editions of the workshop.

We would like to express our appreciation to MNSA-2016 reviewers who carefully evaluated the submitted papers. Finally, we would like to thank the Local Arrangement Chairs for the local arrangement of the workshop.

We hope you will enjoy the workshop and have a great time in Asan, Korea.

MNSA-2016 International Symposium Organizing Committee

MNSA-2016 Organizing Committee

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Muhammad Younas, Oxford Brookes University, UK
Fatos Xhafa, Technical University of Catalonia, Spain

Welcome Message from NGWMN-2016 International Workshop Co-Chairs

Welcome to the 9-th International Workshop on Next Generation of Wireless and Mobile Networks (NGWMN-2016), which will be held in conjunction with the 11-th International Conference on Broadband and Wireless Computing, Communication and Applications (BWCCA 2016) at at Soonchunhyang (SCH) University, Asan, Korea from November 5 to November 7, 2016.

The aim of this workshop is to present the innovative researches, methods and algorithms for wireless networks, sensor networks and ubiquitous computing. The next generation of wireless and mobile networks is expected to allow a single mobile user to access heterogeneous wireless and mobile networks. Therefore, this workshop will provide a timely technical forum for the dissemination of new results in this exciting research area and is devoted to the architectures, protocols, resource management, mobility management, and scheduling in integrated wireless and mobile networks.

Many people have kindly helped us to prepare and organize the NGWMN-2016 workshop. First, we would like to thank the authors who submitted high quality papers and reviewers who carefully evaluated the submitted papers. We would like to give our special thanks to General Co-Chairs of BWCCA-2016 for their strong encouragement and guidance to organize this workshop. We would like to thank all of the PC members for their serious review works in order to make successful organization of NGWMN-2016.

Finally, we would like to thanks the Local Organizing Committee of BWCCA-2016 for excellent arrangement.

We hope you will enjoy the conference and have a great time in Asan, Korea

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Message from MAPWC-2016 International Workshop Organizers

Welcome to the 7-th International Workshop on Methods, Analysis and Protocols for Wireless Communication (MAPWC-2016), which will be in conjunction with the 11-th International Conference on Broadband and Wireless Computing, Communication and Applications (BWCCA-2016) at Soonchunhyang (SCH) University, Asan, Korea from November 5 to November 7, 2016.

Wireless communications are characterized by high bit-error rates and burst errors, which arise due to interference fading, shadowing, terminal mobility, and so on. Since the traditional design of the algorithms, methods and protocols of the wired Internet did not take wireless networks into account, the performance over wireless networks is largely degraded. Especially, the multi-hop communication aggravates the problem of wireless communication even further. To solve these problems, there has been increased interest to propose and design new algorithms and methodologies for wireless communication.

The aim of this workshop is to present the innovative researches, methods and numerical analysis for wireless communications and wireless networks. The workshop contains high quality research papers, which were selected carefully by Program Committee Members.

It is impossible to organize such a successful program without the help of many individuals. We would like to express our appreciation to the authors of the submitted papers, and to the program committee members, who provided timely and significant review.

We hope all of you will enjoy MAPWC-2016 and find this a productive opportunity to exchange ideas with many researchers.

MAPWC-2016 International Workshop Organizers

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Shinji Sakamoto, Fukuoka Institute of Technology, Japan

Message from CWECS-2016 International Workshop Organizers

Welcome to Asan, Korea and the 7-th International Workshop on Cloud, Wireless and e-Commerce Security (CWECS-2016), which is held in conjunction with the 11-th International Conference on Broadband and Wireless Computing, Communication and Applications (BWCCA-2016) at Soonchunhyang (SCH) University, Asan, Korea from November 5 to November 7, 2016.

Computer network and communication have been a part of our everyday life. People use them to contact others almost anytime anywhere. However, hackers due to business benefits, enjoying their skill/professional achievement or some other reasons very often attack, intrude or penetrate our systems. This is the key reason why computer/network security has been one of the important issues in computer research. Many researchers have tried to do their best to develop system security techniques and the methods to protect a system. But system attacks still occur worldwide every day. In fact, current system security technology is far away from prefect and should be continuously improved.

This workshop aims to present the innovative researches, methods and applications for cloud, wireless and e-commerce security. Other network related papers are also welcomed. The workshop contains high quality research papers, which were selected carefully by Program Committee Members.

It is impossible to organize such a successful program without the help of many individuals. We would like to express our appreciation to the authors of the submitted papers, and to the program committee members, who provided timely and significant reviews.

We hope all of you will enjoy CWECS-2016 and find this a productive opportunity to exchange ideas with many researchers.

CWECS-2016 International Workshop Organizers

CWECS-2016 Workshop Co-Chairs

Fang-Yie Leu , Tunghai University, Taiwan
Aniello Castiglione, University of Salerno, Italy
Chu-Hsing Lin, Tunghai University, Taiwan

CWECS-2016 Workshop PC Co-Chairs

Ilsun You, Korean Bible University, Korea
Fuu-Cheng Jiang, Tunghai University, Taiwan
Yi-Li Huang, Tunghai University, Taiwan

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Aniello Castiglione, University of Salerno, Italy
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Ilsun You, Korean Bible University, Korea
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Yi-Li Huang, Tunghai University, Taiwan

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Shiuh-Jeng Wang, Central Police University, Taiwan
Ugo Fiore, University of Naples, Italy
Heru Susanto, University of Brunei, Brunei

Message from RI3C-2016 International Workshop Organizers

Welcome to the 5-th International Workshop on Robot Interaction, Control, Communication and Cooperation (RI3C-2016), which will be held in conjunction with the 11-th International Conference on Broadband and Wireless Computing, Communication and Applications (BWCCA 2016) at Soonchunhyang (SCH) University, Asan, Korea from November 5 to November 7, 2016.

Robots are being steadily introduced into modern everyday life and are expected to play a key role in the near future. Typically, the robots are deployed in situations where it is too dangerous, expensive, tedious, and complex for humans to operate. Although many of the real-life applications may only need a single robot, a large number of them require the cooperation, coordination and communication of a team of robots to accomplish a certain task. The use of multiple robots of overlapping capabilities offers a cost-effective and more robust solution. This redundancy in the robots' capabilities makes the overall system more flexible and fault-tolerant.

This workshop focuses on the emerging field of robot interaction, communication and cooperation bringing together research and application of methodology from robotics, human factors, human-computer interaction, interaction design, cognitive psychology, education and other fields to enable robots to have more natural and more rewarding interactions, communication and cooperation with humans throughout their spheres of functioning.

The design of an efficient collaborative multi-robot framework that ensures the autonomy and the individual requirements of the involved robots is a very challenging task. Developing operational multi-robot teams involves research on a number of topics such as fault tolerant cooperative control, adaptive action selection, distributed control, robot awareness of team member actions, improving efficiency through learning, inter-robot communication, action recognition, local versus global control, and metrics for measuring the success.

The aim of this workshop is to present the innovative researches, technologies and new concepts, services and application software of robotic systems.

The organization of an International Workshop needs the help of many people. We would like to express our appreciation to the authors of the submitted papers, and to the program committee members.

We hope all of you will enjoy RI3C-2016 program and your stay in Asan, Korea.

RI3C-2016 Workshop Organizers

RI3C-2016 Workshop Chair

Leonard Barolli, Fukuoka Institute of Technology, Japan

RI3C-2016 Workshop PC-Chairs

Keita Matsuo, Fukuoka Institute of Technology, Japan
Hiroyuki Fujioka, Fukuoka Institute of Technology, Japan

RI3C-2016 Organizing Committee

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Tetsuya Oda, Fukuoka Institute of Technology, Japan
Shinji Sakamoto, Fukuoka Institute of Technology, Japan

Message from SCC-2016 International Workshop Organizers

Welcome to the 3-rd International Workshop on Secure Cloud Computing (SCC-2016) which will be in conjunction with the 11-th International Conference on Broadband and Wireless Computing, Communication and Applications (BWCCA-2016) at Soonchunhyang (SCH) University, Asan, Korea from November 5 to November 7, 2016.

As cloud computing becomes prevalent, more and more organizations outsource the expensive computing and storage into the cloud servers. It brings appealing benefits including relief of the burden for storage management, universal data access with independent geographical locations, and avoidance of capital expenditure on hardware, software, and personnel maintenances, etc. Despite the tremendous benefits, outsource storage inevitably suffers from some new security challenges, such as security and privacy of outsourced data. To address these issues, there has been increased interest to propose and design new algorithms and methodologies for secure cloud computing.

This workshop covers the latest advances in securing cloud storage and cloud computing that lead to gain competitive advantages in business and academia scenarios. Industry and academic researchers, professionals and practitioners are invited to exchange their experiences and present their ideas in this field. The workshop contains high quality research papers, which were selected carefully by Program Committee Members. The main topics of interest of SCC-2016 include but are not limited to the following:

- Security infrastructure and framework of cloud computing
- Coding and cryptography for secure cloud
- Remote data integrity and possession
- Distributed computation and access control on encrypted data
- Privacy preserving technologies in cloud computing
- Security and privacy in outsourcing data and computation
- Dependability, availability and forensics in cloud
- Secure data sharing, secure data replication
- Security in Cloud and Grid Systems

It is impossible to organize such a successful program without the help of many individuals. We would like to express our appreciation to the authors of the submitted papers, and to the program committee members, who provided timely and significant review.

We hope all of you will enjoy SCC-2016 and find this a productive opportunity to exchange ideas with many researchers.

SCC-2016 International Workshop Organizers

SCC-2016 Workshop Chair
Xiaofeng Chen, Xidian University, China

SCC-2016 Workshop PC Chair
Jin Li, Guangzhou University, China

SCC-2016 Organizing Committee

Workshop Chair

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Workshop PC Chair

Jin Li, Guangzhou University, China

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Joseph K. Liu, Institute for Infocomm Research, Singapore
Yong Yu, University of Wollongong, Australia

Web Administrator Co-Chairs

Tetsuya Oda, Fukuoka Institute of Technology, Japan
Shinji Sakamoto, Fukuoka Institute of Technology, Japan

Message from LSNA-2016 International Workshop Organizers

Welcome to the 3-rd International Workshop on Large Scale Networks and Applications (LSNA-2016), which will be held in conjunction with the 11-th International Conference on Broadband and Wireless Computing, Communication and Applications (BWCCA 2016) at Soonchunhyang (SCH) University, Asan, Korea from November 5 to November 7, 2016.

There are many network applications in various areas of Human life, thus there are many security threats by various attacks such as viruses and information interception. The network applications have attracted continuous attentions from both academia and industry. Especially, the large scale networks (e. g. social networks and wireless sensor network) aggravate even futher the problem of cyber attack. To address these issues of large scale networks, there has been increased interest to propose and design new algorithms and methodologies for network security and applications.

The aim of this workshop is to serve as a forum to present current and future work as well as to exchange research ideas in this field. The workshop invites authors to submit their original and unpublished work that demonstrate current research in all areas of large scale networks and applications.

It is impossible to organize such a successful program without the help of many individuals. We would like to express our appreciation to the authors of the submitted papers, and to the program committee members, who provided timely and significant review.

We hope all of you will enjoy LSNA-2016 and find this a productive opportunity to exchange ideas with many researchers.

LSNA-2016 International Workshop Organizers

LSNA-2016 Workshop Chair
Xiaofeng Chen, Xidian University, China

LSNA-2016 Workshop PC Chair
Debiao He, Wuhan University, China

LSNA-2016 Organizing Committee

Workshop Chair

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Zheli Liu, Nankai University, China
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Tetsuya Oda, Fukuoka Institute of Technology, Japan
Shinji Sakamoto, Fukuoka Institute of Technology, Japan

BWCCA-2016 Keynote Talk

Prof. Nobuo Funabiki, Okayama University, Japan

Java Programming Learning Assistant System: JPLAS

Abstract

As a useful and practical object-oriented programming language, Java has been used in many practical systems including enterprise servers, smart phones, and embedded systems, due to its high safety and portability. Then, a lot of educational institutes have offered Java programming courses to foster Java engineers. We have proposed and implemented a Web-based Java Programming Learning Assistant System called JPLAS, to assist such Java programming educations. JPLAS supports three types of problems that have different difficulties to cover a variety of students: 1) element fill-in-blank problem, 2) statement fill-in-blank problem, and 3) code writing problem. For 1), we have proposed a graph-theory based algorithm to automatically generate element fill-in-blank problems that have unique correct answers. For 2) and 3), we have adopted the test-driven development (TDD) method so that the answer codes from students can be automatically verified using test codes for their self-studies. In this talk, we introduce outlines of JPLAS and its application results to the Java programming course in our department. Besides, we introduce some new features of JPLAS including the offline answering function and the coding rule learning function.

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