

## Editors' Introduction to the Special Issue on “Applications in Information Technology”

### Towards Better Human-Centric Solutions in Information Technology Applications

This special issue includes five revised and extended papers presented at the *2nd Conference on Applications in Information Technology (ICAIT-2016)* held in Aizu-Wakamatsu (Japan) between October 6th to 8th, 2016. This conference was organized by the University of Aizu in collaboration with international academic partners from Peter the Great Saint-Petersburg Polytechnic University, Saint-Petersburg State University, and Novosibirsk State University. The primary objective of the conference was to foster rich creativity of students and young scientists and to encourage them to participate actively in open discussions with their colleagues, advancing the design, development, use, and evaluation of information technology applications from many respected research institutions all around the world.

ICAIT-2016 accumulated good traditions established in the past conferences organized by the University of Aizu including *The Conference on Humans and Computers* in 1998-2010, its successor, *The 2012 Joint International Conference on Human-Centered Computer Environments* and *The 2015 International Workshop on Applications in Information Technology*. After event completion we are assured that the conference meetings and discussions facilitated significantly numerous partnership research activities. As guest editors, we particularly thank *Informatica* journal for giving us an excellent opportunity to publish the extended versions of the distinguished conference papers in the Special Issue on Applications in Information Technology.

For this issue we selected a number of works which pay particular attention to advancing human-centric solutions in the huge domain of information technology applications. Our authors address such important areas as developing approaches for computer-assisted learning in mathematics, data acquisition and visualization for the purpose of human emotion analysis, improving models and algorithms used in urban computing, enhancing quality of current recommendation systems, as well as modeling, design and verification of power efficient hardware systems. All the presented works are in strong connection to the current trends in developing better social and technology environments used in a wide range of present day human-centric systems.

The authors of the article “Mathematical Equation Structural Syntactical Similarity Patterns: A Tree Overlapping Algorithm and Its Evaluation” (Evgeny Pyshkin and Mikhail Ponomarev) investigate possible improvements of tree overlapping algorithms for the case of mathematical equations structural syntactical similarity. The work addresses the case of using such algorithms for educational purposes, particularly, for finding appropriate test and exam preparation exercises. The article “Analysis of Emotions in Real-time Twitter Streams” (Yuki Kobayashi, Myriam Munezero, and

Maxim Mozgovoy) presents a system for visualizing discussions and emotions of Twitter users in real time over a specific geographical location. The authors describe the existing implementation by using a couple of examples illustrating the process of exploring and comparing ongoing discussions. The article “OD-Matrix Estimation based on a Dual Formulation of Traffic Assignment Problem” (Alexander Yu. Krylatov, Anastasiia P. Shirokolobova, and Victor V. Zakharov) is devoted to problems of improving traffic assignment algorithms used in modern urban computing systems. Particular attention is paid to the process of decision making while processing big volumes of transportation data describing travel demands between travel origins and destinations. The focus of the article “Design of an Asynchronous Processor with Bundled-Data Implementation on a Commercial Field Programmable Gate Array” is on improving design and modeling tools for developing hardware systems using asynchronous control circuits. The authors specifically address the aspects of increasing computational performance with making significant efforts in reducing energy consumption which is one of urgent needs in advancing smart and environment friendly systems. Finally, the authors of the paper “Performance Comparison of Featured Neural Network Trained with Backpropagation and Delta Rule Techniques for Movie Rating Prediction in Multi-Criteria Recommender Systems” (Mohammed Hassan and Mohamed Hamada) examine current trends in the area of recommendation systems and describe a multi-criteria recommendation technique using feedforward neural network for model user preference modeling.

We are pleased to acknowledge the great efforts of ICAIT-2016 organizers. We would like specially mention the conference honorary chairs Prof. Ryuichi Oka, President of the University of Aizu, Prof. Leon Petrosjan, Dean of the Faculty of Applied mathematics – Control Processes of Saint-Petersburg State University, Prof. Vladimir Zaborovsky, Director of the Institute of Computer Science and Technology of Saint-Petersburg Polytechnic University, and Prof. Mikhail M. Lavrentiev, Dean of the Faculty of Information Technologies of Novosibirsk State University.

We would like to express our great appreciation to the program committee members who reviewed the conference submissions and ensured high quality of published papers. Among them we thank Thomas Baar (Hochschule für Technik und Wirtschaft Berlin, Germany), Natalia Bogach (Peter the Great Saint-Petersburg Polytechnic University, Russia), Paolo Bottoni (University of Rome, Italy), John Brine (University of Aizu, Japan), Alfredo Capozucca (University of Luxembourg, Luxembourg), Hapugahage

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This year, we are organizing a special session on Information Management in Human-Centric Systems (IMHCS'17) as an event of the *3rd IEEE International Conference on Cybernetics* (IEEE CYBCONF 2017) to be held in Exeter, UK on June 21 – 23, 2017. We expect to continue our efforts in organizing high quality discussions of current trends in information acquisition, representation and processing in human-centric systems and applications.

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