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Information and Communication Technologies in Education, Research, and Industrial Applications

11th International Conference, ICTERI 2015
Lviv, Ukraine, May 14–16, 2015
Revised Selected Papers

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Preface

This volume contains a number of selected and extended contributions to ICTERI 2015, the 11th International Conference on Information and Communication Technologies (ICT) in Education, Research, and Industrial Applications: Integration, Harmonization, and Knowledge Transfer.

The conference was held in Lviv, Ukraine, during May 14–16, 2015. It was a real pleasure for all ICTERI players, that in contrast to 2014, the 11th edition could bring scholars and experts physically together again for exchanging and discussing new ideas and findings, and for networking across political borders. This was all the more pleasing as, despite all the current challenges, the Ukrainian ICT community proved its vigor and global integration.

ICTERI as a conference series is concerned with interrelated topics of ICT development, deployment, and use; topics that are vibrant for both the academic and industrial communities, namely: education, research, industrial applications, and cooperation in ICT-related aspects. ICTERI 2015 continued the tradition of hosting co-located events, this year by offering four workshops.

As in previous years, the ICTERI 2015 proceedings have been published as a CEUR-WS volume (http://ceur-ws.org/Vol-1356/), containing 45 papers selected from a total of 119 submissions from 12 countries. Thus the acceptance rate for ICTERI 2015 was 38 %. Of these papers, the best 19 were identified and selected by the program and workshop chairs to be submitted in substantially extended and revised versions for a proceedings volume. All authors resubmitted. Again, these papers were reviewed by at least two experts regarding scientific and technical quality, anticipated reader interest, and coverage of the conference scope. Finally, the proceedings committee selected the nine most mature and interesting papers for publication after further revision. The acceptance rate thus is 7.5 % regarding the overall number of ICTERI 2015 submissions and 47 % of the proceedings submissions.

The selected papers are grouped into two parts in this volume: (I) ICT in Education and Industrial Applications, and (II) Formal Frameworks.

In the first paper of Part I, Aleksandr Spivakovsky, Maksim Vinnik, and Yulia Tarasich present an approach of developing dissertation committees and ICT infrastructure for graduate schools. As a continuation of their research, the authors are actively working on the creation of an open course on the use of ICT for undergraduates and postgraduate students.

Mykola Tkachuk, Konstiantyn Nagornyi, and Rustam Gamzayev discuss a framework for effectiveness estimation of post-object-oriented technologies in software maintenance. They define complex estimation measures based on fuzzy logic, and embed these into a CASE tool, which has been successfully tested on real-life software applications.

Oleksandr Gordieiev, Vyacheslav Kharchenko, and Mario Fusani give a survey of software quality models and related metrics, and analyze their evolution with respect to

covering aspects of "greenness" and reliability. Using the elsewhere published "cumulative matching characteristics metric" they also calculate a forecast on quality model evolution for the year 2020.

Bohdan Volochiy, Bohdan Mandziy, and Leonid Ozirkovskyy in their paper deal with safety models of complex technical systems for critical applications. They propose to extend and improve the state space method such that a model also reflects independencies between accidental situations in contrast to the traditional methods FTA and FMEA/FMECA.

Part II presents formal and algorithmic frameworks for advancing ICT foundations.

Andrei Alexandru and Gabriel Ciobanu describe an extension of the theory of invariant sets to a theory of invariant algebraic structures that allows one to work with (infinite) structures in terms of finitely supported objects. The advantage of such "finitely supported mathematics" is shown by means of some applications in experimental sciences.

Bogdan Aman and Gabriel Ciobanu first introduce a polynomial solution of the SAT problem (satisfiability problem) by using polarizationless P systems with active membranes, without division, but with a pre-computed alphabet. Secondly, they present how to efficiently simulate polynomial space Turing machines by using a logarithmic space P system with active membranes and encoding the positions on the Turing machine tape by use of a binary representation.

Nadezhda Baklanova, Wilmer Ricciotti, Jan-Georg Smaus, and Martin Strecker discuss a new kind of small-step semantics for imperative programming languages, based on the zipper data structure. They show that this semantics has decisive advantages for abstracting programming language semantics to automata.

Grygoriy Zholtkevych formalizes the implementation of black boxes by Moore machines for synchronous black boxes and by pre-machines for asynchronous black boxes, i.e., black boxes with an asynchronous interdependence between input and output. Using this approach, event processing in distributed systems can be modelled and analyzed.

Finally, Elena Zaitseva, Vitaly Levashenko, Jozef Kostolny, and Miroslav Kvassay address the problem of reliability analysis of multi-state systems, and propose an approach to the analysis of the boundary states of such systems based on direct partial logic derivatives.

This volume would not have materialized without the support of many people. First, we are very grateful to all the authors for their continuous commitment and intensive work. Second, we would like to thank the Program Committee members and additional reviewers for providing timely and thorough assessments, and also for being very cooperative in doing additional review work at short notice. Furthermore, we would like to thank all the people who contributed to the organization of ICTERI 2015. Without their efforts there would have been no substance for this volume.

November 2015

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