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Preface

Advanced Computer System 2018 (ACS 2018) conference was the 21st in the series of conferences organized by the Faculty of Computer Science and Information Technology of the West Pomeranian University of Technology in Szczecin, Poland. That event could not be possible without scientific cooperation with Warsaw University of Technology, Faculty of Mathematics and Information Science, Poland; Warsaw University of Life Sciences (SGGW), Poland; AGH University of Science and Technology, Faculty of Physics and Applied Computer Science, Poland; Polish Academy of Sciences (IPIPAN), Institute of Computer Science, Poland; Kuban State University of Technology, Institute of Information Technology and Safety, Russia; Bialystok University of Technology, Poland; and —last but not least—Ehime University in Matsuyama, Japan. As usual, the conference was held in Międzyzdroje, Poland, on 24–26 September 2018.

This volume contains a collection of carefully selected, peer-reviewed papers presented during the conference sessions. The main topics covered by the chapters in this book are artificial intelligence, software technologies, information technology security and multimedia systems.

It has been a tradition since the first conference that the organizers have always invited top specialists in the fields. Many top scientists and scholars, who have presented keynote talks over the years, have always provided an inspiration for future research and for young and experienced participants.

The book places a great emphasis both on theory and practice. The contributions not only reflect the invaluable experience of eminent researchers in relevant areas but also point new methods, approaches and interesting direction for the future researches.

In keeping with ACS mission over the last twenty years, this 21st conference, ACS 2018, was also an event providing a comprehensive state-of-the-art summary from keynote speakers as well as a look forward towards future research priorities. We believe that the keynote talks provided an inspiration for all attendees. This year authors of the keynote talks were professors: Nabendu Chaki from University of Calcutta (India), Akira Imada from Brest State Technical University (Belarus), Keiichi Endo and Shinya Kobayashi from Ehime University (Japan), Ryszard

Kozera from Warsaw University of Life Sciences SGGW (Poland), Jacek Pomykała from the University of Warsaw (Poland) and Marian Srebrny from Polish Academy of Sciences (Poland).

We would like to give a proof of appreciation to all members of the International Programme Committee for their time and effort in reviewing the papers, helping us to shape the scope and topics of the conference and providing us with much advice and support. Moreover, we want to express a gratitude to all of the organizers from the Faculty of Computer Science and Information Technology, West Pomeranian University of Technology in Szczecin for their enthusiasm and hard work, notably Ms. Hardej, Secretary of the Conference, and all other members of Organizing Committee including Luiza Fabisiak, Tomasz Hyla and Witold Maćków.

We expect this book to shed new light on unresolved issues and inspire the reader to greater challenges. We also hope that the book will provide tools or ideas for their creation that will be more effective in solving increasingly complex research problems and reaching common scientific goals.

September 2018

Imed El Fray
Tomasz Hyla
Janusz Kacprzyk
Jerzy Pejaś

Organization

Advanced Computer System 2018 (ACS 2018) was organized by the West Pomeranian University of Technology in Szczecin, Faculty of Computer Science and Information Technology (Poland), in cooperation with Warsaw University of Technology, Faculty of Mathematics and Information Science (Poland); AGH University of Science and Technology, Faculty of Physics and Applied Computer Science (Poland); Ehime University (Japan); Polish Academy of Sciences IPIPAN (Poland); Kuban State University of Technology, Institute of Information Technology and Safety (Russia); and Bialystok University of Technology (Poland).

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