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Slobodan Kalajdziski · Nevena Ackovska (Eds.)


ICT Innovations 2018

Engineering and Life Sciences

10th International Conference, ICT Innovations 2018
Ohrid, Macedonia, September 17–19, 2018
Proceedings

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Preface

The ICT Innovations 2018 conference created and managed a vibrant environment, where participants shared the latest discoveries and best practices, and learned about the symbiosis between engineering and life sciences. The conference promoted the development of models, methods, and instruments of data science, as well as other aspects of computer sciences, and provided a unique environment for the presentation and discussion of new approaches and prototypes in the joint fields of engineering and life sciences.

ICT Innovations conferences are organized by the Association for Information and Communication Technologies (ICT-ACT), whose mission is the advancement of ICT technologies. The main co-organizer and supporter of the 10th International ICT Innovations conference was the Faculty of Computer Science and Engineering and Ss. Cyril and Methodius University in Skopje, Republic of Macedonia.

The ICT Innovations 2018 conference was held in Metropol Lake Resort - Ohrid, during September 17–19, 2018. The special conference topic was “Engineering and Life Sciences,” and it celebrated a decade of successful ICT Conferences. Technological innovations have become an essential drive for modern life sciences development. With the advent of high-throughput techniques, life scientists are starting to grapple with massive data sets, encountering challenges with handling, processing and moving information that was once the domain of computer scientists and engineers. Today, cancer diagnostics introduces novel micro/nano-based technologies that can facilitate the detection of cancer biomarkers in early cancer phases, which are more amenable to treatment. Engineering has played a central role in the development of diagnostic and therapeutic instruments, such as prosthetic valves, pacemakers, implantable cardioverters/defibrillators (ICDs), and automated external defibrillators (AEDs). The non-invasive brain imaging techniques produce massive brain-related data that are a great basis for engineers and computer scientists to gather foundational knowledge of the brain and the nervous system, providing the basis for diagnosing and treating several neurological and mental illnesses. Robots have become part of life sciences as tools, models, and challenges. Robots are engaged in 3D printing, manipulating laboratory materials as well as surgery tools. They are emotional support of a class of patients and elderly. They are engaged in direct brain–robot communication using EEG signals. Genetic agents, on the other hand, can be modeled as nanorobots. The interleaving of engineering and the life sciences is becoming more imminent and present. Currently there is a great synergy between these two seemingly different areas. It is transforming the traditional ways of creation and of product assembly, the educational process, health care and other societal phenomena. However, in spite of the great synergy that exists, there are still many open issues and obstacles that need to be addressed and overcome in order to bridge the gap between life sciences and engineering.

ICT Innovations 2018 received 81 submissions from 169 authors coming from 20 different countries. All these submissions were peer reviewed by the ICT Innovations 2018 Program Committee consisting of 190 top researchers based in 47 different countries. In order to assure a high-quality and thorough review process, we assigned each paper to more than three reviewers, resulting in 3.91 reviewers per paper on average; at the end of the review process, there were an average of 3.68 reviews per paper. Based on the results of the reviews, 21 full papers were accepted, yielding a 25.9% acceptance rate.

We would like to express our sincere gratitude to the invited speakers for their inspirational talks, to the authors for submitting their work to this conference, and the reviewers for sharing their experience during the selection process. Special thanks to Ilinka Ivanoska, Bojana Koteska, Monika Simjanovska, Aleksandar Stojmenski, and Kostadin Mishev for their technical support during the conference and their help during the preparation of the conference proceedings.

September 2018

Slobodan Kalajdziski
Nevena Ackovska

Organization

ICT Innovations 2018 was organized by the Macedonian Society of Information and Communication Technologies (ICT-ACT).

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Abstract of Keynotes

The Future of Brain Imaging

Vesna Prchkovska

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Abstract. Neuroimaging has advanced rapidly in the last two decades. The MRI scanners are getting more powerful offering rich data that can provide detailed insights on the brain structure and function. New computational tools are being developed at a fast pace, and machine learning and big data are the new trends in brain imaging. In this talk I will address some of the most notable advancements in the brain imaging in the recent years from reconstruction to visualization and interaction techniques. Furthermore, I will talk about the future of brain imaging and patient care.

Keywords: Neuroimaging · Machine learning · Big data · Visualization

How Far Humans Are from the Time When Robots Will Become Superior?

Aleksandar Rodić

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Abstract. Human civilization in its long history passed through many delicate phases of its development, fighting for their biological survival, surviving brutal interethnic conflicts, natural disasters and large-scale epidemiological murders, experiencing their ups and downs through several techno-economic industrial revolutions globally stratifying divided into technologically developed and undeveloped communities (societies). Industrial revolutions in the 19th and 20th century contributed to the progress of humankind leaps and bounds, the rise of science and increasing the comfort and overall quality of life. Nowadays, on the scene is the so called 4th industrial revolution, whose main features are mass digitization, global communication and high automation and robotization of industry and society. On this wave of rapid development of mankind, Robotics as a highly interdisciplinary science, has built sophisticated machines for the first time in the history of human civilization that reached the level of skills, physical and intellectual, which can be comparable to the human skills. Are the robots created in the race for greater economic profit of rich industrialists or are they designed to help people in the times of major natural challenges (industrial pollution, climate change, risks from the Cosmos, etc.) to survive and prolong their biological type in the following centuries? Also a substantial analysis meaning will be exposed, can we expect (and when) the robots, as imitations of people (technology clones), to become superior to their biological models – human beings?

Keywords: Human beings · Humanoids · Degree of anthropomorphism
Hyper realistic robots · Technology clones

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