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(Eds.)



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This edited collection represents Volume II of the proceedings of ICTERI 2021: the 17th International Conference on ICT in Education, Research, and Industrial Applications, held in Kherson, Ukraine, September-October 2021. The volume presents the contributions to the workshops affiliated with the conference. It comprises 59 contributed regular and short papers that were carefully peer-reviewed and selected from 194 submissions. The volume is organized in seven parts. Part I presents the contributions for the 3L-Person workshop. Part II contains the papers of the CoSinE workshop. Part III collects the papers of the ITER workshop. Part IV presents the contributions for the MROL workshop. Part V contains the papers of the RMSEBT workshop.

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Preface

It is our great pleasure to present you Volume II of the proceedings of ICTERI 2021, the seventeenth edition of the International Conference on Information and Communication Technologies in Education, Research, and Industrial Applications, held in Kherson (Ukraine) on September 28 – October 2, 2021. ICTERI focuses on ICT research advances, industry/academic applications of Information and Communication Technologies, design and deployment of ICT Infrastructures. It puts the emphasis on real-world applications of ICT solutions. The current edition has a special focus on (i) ICT research advances, (ii) information systems technologies and applications, (iii) academic and industry cooperation in respect to Information and Communication Technologies, and (iv) ICT in Education.

The contributions for the Main Conference of ICTERI 2021, its PhD Symposium, and Posters Track were published separately in Volume I of the Proceedings.

The second volume of the proceedings of ICTERI 2021 collects the contributions for the seven workshops co-located with the conference. The volume is structured in seven topical parts that correspond to the proceedings of these workshops.

Part I of the volume presents the proceedings of the 3L-Person workshop. 3L-Person was the sixth workshop on Professional Retraining and Life-Long Learning using ICT. It was organized by Svitlana Lytvynova, Oleksandr Burov, Nataliia Demeshkant, and Viacheslav Osadchyi. 3L-Person Workshop focused on providing and evaluating new and emerging technologies in education, learning environments and methods that have to satisfy life-long learning of a person (from school age to retirement), professional training and retraining in view of the person-oriented approach.

Part II of the volume presents the proceedings of the CoSinE workshop. CoSinE was the ninth Illia O. Teplytskyi Workshop on Computer Simulation in Education. It was organized by Arnold Kiv, Serhiy Semerikov, Vladimir Soloviev, and Andrii Striuk. The topical scope of the CoSinE Workshop included computer simulation in STEM education; Artificial Intelligence in education; educational data mining and learning analytics; learning environments models; learning virtualization; modelling systems in education.

Part III of the volume presents the proceedings of the ITER workshop. ITER was the ninth workshop on Information Technology in Economic Research. It was organized by Vitaliy Kobets, Tetiana Paientko, and Tommaso Federici. The workshop focused on the interplay of two important themes: (i) the application of IT in business, economics, finance, and research; and (ii) the economics of research and development in IT industries. Based on these foci, the goals of the workshop were to help economists use IT in economic research and practice, in particular for simulation and forecasting; improve and refine the use of IT in the context of digital economics.

Part IV of the volume presents the proceedings of the MROL workshop. MROL was the fifth workshop on Methods, Resources, and Technologies for Open Learning and Research. It was organized by Hennadiy Kravtsov, Mariya Shyshkina, and Paul Plaskura. The workshop aimed at paving a way to benchmark the State-of-the-Art and define future prospects for open systems of higher education design and development, with the focus on the most valuable trends, methods, tools, and technologies driving the innovative development of educational environments. Required learner competencies in the context of open educational and research systems development were explored and discussed.

Part V of the volume presents the proceedings of the RMSEBT workshop. RMSEBT was the workshop on Rigorous Methods in Software Engineering and Blockchain Technologies. It was organized by Vladimir Peschanenko, Grygoriy Zholtkevych, Mykola Nikitchenko and Yuliia Tarasich. The workshop focused on the problems of rigorous methods, which are used in different fields of software engineering. These include the methods for specification, verification and optimization of software; methods for different kinds of software analysis (modelling, business rule extraction etc.); software testing based on model based testing, white box testing etc.; re-engineering problems including model extraction from source code, language migration etc.; DLT architecture development; modelling and verification of token economies; detection of smart contracts vulnerability.

Part VI of the volume presents the proceedings of the TheRMIT workshop. TheRMIT was the seventh workshop on Theory of Reliability and Markov Modelling for Information Technologies. It was organized by Vyacheslav Kharchenko, Elena Zaitseva, Nikos Bardis, and Bogdan Volochiy. The

workshop addressed the perceived gap between the researchers of mathematical methods for reliability, safety, security, and dependability, on the one side, and engineers who develop critical systems, auditors who assess and assure dependability during life cycle stages, on the other side. To narrow this gap, TheRMIT offered a venue for researchers, engineers and experts to discuss the problems of the application of modern theories of reliability and safety, based on Markov models and other mathematical methods for more accurate assessment and creation of dependable and resilient IT systems.

Finally, Part VII of the volume presents the proceedings of the UNLP workshop. UNLP was the inaugural instance of the workshop on Ukrainian Natural Language Processing. It was organised by Andrii Hlybovets, Oleksii Ignatenko, and Oleksii Molchanovskyi. The workshop provided a platform for sharing ideas and initiating collaboration between different groups in the field of Natural Language Processing, with an emphasis on Ukrainian and other low-resourced languages. It was anticipated that the platform might enhance coherence across the field, leading to greater visibility of the research community, new opportunities for exchanging ideas, creation of shared standards and processing pipelines, as well new industrial applications, joint research projects, and publications across different teams working on Ukrainian and other low-resourced languages.

Overall, the workshops, co-located with ICTERI 2021 had attracted 194 submissions by the authors from eighteen countries in Europe, Asia, Americas, and Africa. Out of these submissions, we accepted 59 high quality, most relevant, and most interesting contributions. The average acceptance rate for the workshops of ICTERI 2021 was 30.4 percent.

The workshops at ICTERI 2021 would not have been possible without the support of many people. We would like to thank all the authors who submitted papers to our workshops and thus demonstrated their interest in the research problems within our scope. We are also very grateful to the members of our Program Committees for providing timely and thorough reviews and being cooperative in doing additional review work. We would like to thank the local organizers of the conference, the steering committee, and the technical support team for their valuable service and help. Special thanks go to the sponsors of ICTERI 2021 whose financial and technical contributions enabled the materialization of this instance of the conference and its sub-events. All these people, their devotion, energy, and efficiency, made our constellation of seven workshops a very interesting and effective scientific forum.

September – October 2021

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