

# Lecture Notes in Networks and Systems

Volume 469

## Series Editor

Janusz Kacprzyk, Systems Research Institute, Polish Academy of Sciences,  
Warsaw, Poland

## Advisory Editors

Fernando Gomide, Department of Computer Engineering and Automation—DCA,  
School of Electrical and Computer Engineering—FEEC, University of Campinas—  
UNICAMP, São Paulo, Brazil

Okyay Kaynak, Department of Electrical and Electronic Engineering,  
Bogazici University, Istanbul, Turkey

Derong Liu, Department of Electrical and Computer Engineering, University  
of Illinois at Chicago, Chicago, USA

Institute of Automation, Chinese Academy of Sciences, Beijing, China

Witold Pedrycz, Department of Electrical and Computer Engineering, University of  
Alberta, Alberta, Canada

Systems Research Institute, Polish Academy of Sciences, Warsaw, Poland

Marios M. Polycarpou, Department of Electrical and Computer Engineering,  
KIOS Research Center for Intelligent Systems and Networks, University of Cyprus,  
Nicosia, Cyprus

Imre J. Rudas, Óbuda University, Budapest, Hungary

Jun Wang, Department of Computer Science, City University of Hong Kong,  
Kowloon, Hong Kong

The series “Lecture Notes in Networks and Systems” publishes the latest developments in Networks and Systems—quickly, informally and with high quality. Original research reported in proceedings and post-proceedings represents the core of LNNS.

Volumes published in LNNS embrace all aspects and subfields of, as well as new challenges in, Networks and Systems.

The series contains proceedings and edited volumes in systems and networks, spanning the areas of Cyber-Physical Systems, Autonomous Systems, Sensor Networks, Control Systems, Energy Systems, Automotive Systems, Biological Systems, Vehicular Networking and Connected Vehicles, Aerospace Systems, Automation, Manufacturing, Smart Grids, Nonlinear Systems, Power Systems, Robotics, Social Systems, Economic Systems and other. Of particular value to both the contributors and the readership are the short publication timeframe and the world-wide distribution and exposure which enable both a wide and rapid dissemination of research output.

The series covers the theory, applications, and perspectives on the state of the art and future developments relevant to systems and networks, decision making, control, complex processes and related areas, as embedded in the fields of interdisciplinary and applied sciences, engineering, computer science, physics, economics, social, and life sciences, as well as the paradigms and methodologies behind them.

Indexed by SCOPUS, INSPEC, WTI Frankfurt eG, zbMATH, SCImago.

All books published in the series are submitted for consideration in Web of Science.

For proposals from Asia please contact Aninda Bose ([aninda.bose@springer.com](mailto:aninda.bose@springer.com)).

More information about this series at <https://link.springer.com/bookseries/15179>

Alvaro Rocha · Hojjat Adeli ·  
Gintautas Dzemyda · Fernando Moreira  
Editors

# Information Systems and Technologies

WorldCIST 2022, Volume 2

*Editors*

Alvaro Rocha  
ISEG  
Universidade de Lisboa  
Lisbon, Portugal

Gintautas Dzemyda  
Institute of Data Science  
and Digital Technologies  
Vilnius University  
Vilnius, Lithuania

Hojjat Adeli  
College of Engineering  
The Ohio State University  
Columbus, OH, USA

Fernando Moreira  
DCT  
Universidade Portucalense  
Porto, Portugal

ISSN 2367-3370

ISSN 2367-3389 (electronic)

Lecture Notes in Networks and Systems

ISBN 978-3-031-04818-0

ISBN 978-3-031-04819-7 (eBook)

<https://doi.org/10.1007/978-3-031-04819-7>

© The Editor(s) (if applicable) and The Author(s), under exclusive license  
to Springer Nature Switzerland AG 2022

This work is subject to copyright. All rights are solely and exclusively licensed by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG  
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

# Preface

This book contains a selection of papers accepted for presentation and discussion at The 2022 World Conference on Information Systems and Technologies (WorldCIST'22). This conference had the scientific support of the Information and Technology Management Association (ITMA), IEEE Systems, Man, and Cybernetics Society (IEEE SMC), and Global Institute for IT Management (GIIM). It took place online at Budva city, Montenegro, during 12–14 April 2022.

The World Conference on Information Systems and Technologies (WorldCIST) is a global forum for researchers and practitioners to present and discuss recent results and innovations, current trends, professional experiences and challenges of modern Information Systems and Technologies research, technological development, and applications. One of its main aims is to strengthen the drive towards a holistic symbiosis between academy, society, and industry. WorldCIST'21 is built on the successes of: WorldCIST'13 held at Olhão, Algarve, Portugal; WorldCIST'14 held at Funchal, Madeira, Portugal; WorldCIST'15 held at São Miguel, Azores, Portugal; WorldCIST'16 held at Recife, Pernambuco, Brazil; WorldCIST'17 held at Porto Santo, Madeira, Portugal; WorldCIST'18 held at Naples, Italy; WorldCIST'19 held at La Toja, Spain; WorldCIST'21 held online at Terceira Island, Azores, Portugal, and WorldCIST'22, which took place online at Budva, Montenegro.

The programme committee of WorldCIST'22 was composed of a multidisciplinary group of 287 experts and those who are intimately concerned with Information Systems and Technologies. They have had the responsibility for evaluating, in a 'blind review' process, the papers received for each of the main themes proposed for the conference: A) information and knowledge management; B) organizational models and information systems; C) software and systems modelling; D) software systems, architectures, applications, and tools; E) multimedia systems and applications; F) computer networks, mobility, and pervasive systems; G) intelligent and decision support systems; H) big data analytics and applications; I) human–computer interaction; J) ethics, computers, and security; K) health informatics; L) information technologies in education; M) information technologies in radiocommunications; and N) technologies for biomedical applications.

The conference also included workshop sessions taking place in parallel with the conference ones. WorldCIST'22 featured a set of Workshops on specific subjects, including second Workshop on Open Learning and Inclusive Education Through Information and Communication Technology (OLIE-ICT 2022); first Workshop on Digital Transformation and Artificial Intelligence (WDTAI 2022); first Workshop on Recent Advances in Deep Learning Methods and Evolutionary Computing for Health Care (RADLMECHC 2022); first Workshop on Novel approaches to Natural Language Processing and Dialogue Systems (NANLPDS 2022); first Workshop on Information Systems Cybersecurity and Resilience (ISCR 2022); first Workshop on Data processing in the Cloud Environment (DPCE 2022); and first Workshop on Digital Marketing and Communication, Technologies, and Applications (DMCTA 2022).

WorldCIST'22 received about 400 contributions from 49 countries around the world. The papers accepted for oral presentation and discussion at the conference are published by Springer (this book) in three volumes and will be submitted for indexing by WoS, EI-Compendex, Scopus, and/or Google Scholar, among others. Extended versions of selected best papers will be published in special or regular issues of relevant journals, mainly JCR/SCI/SSCI and Scopus/EI-Compendex indexed journals.

We acknowledge all of those that contributed to the staging of WorldCIST'22 (authors, committees, workshop organizers, and sponsors). We deeply appreciate their involvement and support that was crucial for the success of WorldCIST'22.

March 2022

Alvaro Rocha  
Hojjat Adeli  
Gintautas Dzemyda  
Fernando Moreira

# Contents

<b>Information and Knowledge Management</b>	
<b>Dynamics of Monitoring and Talent Management . . . . .</b>	<b>3</b>
Ricardo Perpétuo and Gabriel Pestana	
<b>A Systematic Review of Data Management Platforms . . . . .</b>	<b>15</b>
Michael Boch, Stefan Gindl, Alan Barnett, George Margetis, Victor Mireles, Emmanouil Adamakis, and Petr Knoth	
<b>Aspect Based Sentiment Analysis Annotation Methodology for Group Decision Making Problems: An Insight on the Baseball Domain . . . . .</b>	<b>25</b>
Tiago Cardoso, Vasco Rodrigues, Luís Conceição, João Carneiro, Goreti Marreiros, and Paulo Novais	
<b>Determinants of Mobile Wallet Adoption: A Longitudinal Approach Applying an Extension of the Technology Acceptance Model in Cameroon . . . . .</b>	<b>37</b>
Samuel Fosso Wamba	
<b>A Must Have: Customized Ways to Go for Data Literacy to Further Valuable Deliverables . . . . .</b>	<b>47</b>
Jacqueline David-Planas and Solange N. Alves-Souza	
<b>Avionic Software and Agile Development: A Systematic Mapping Study . . . . .</b>	<b>55</b>
Imane Rhouas and Khalid Nafil	
<b>Lean Marketing: Application of the Lean Six Sigma to Marketing – Case Study . . . . .</b>	<b>66</b>
José Carlos Sá, Manuel Sousa Pereira, and Sérgio Almeida	
<b>Multi-Core Implementation of Geometric Multidimensional Scaling for Large-Scale Data . . . . .</b>	<b>74</b>
Gintautas Dzemyda, Viktor Medvedev, and Martynas Sabaliauskas	

<b>Innovators and Anti-innovators in the Digital Era – The Persecution of the Innovative by the Less Innovative . . . . .</b>	<b>83</b>
Manuel Au-Yong-Oliveira and Cicero Eduardo Walter	
<b>Supporting Situational Awareness on Aviation Pilots: Key Insights Affecting the Use of Electronic Flight Bags Devices . . . . .</b>	<b>93</b>
Nuno Moura Lopes, Manuela Aparicio, and Fátima Trindade Neves	
<b>How to Identify Fake News on Social Media: A Systematic Literature Review . . . . .</b>	<b>102</b>
Russel Jowore and Marita Turpin	
<b>Telco Customer Churn Analysis: Measuring the Effect of Different Contracts . . . . .</b>	<b>112</b>
Paulo Pinheiro and Luís Cavique	
<b>More Data Analysis with Citizen Data Scientists? . . . . .</b>	<b>122</b>
Paul Alpar and Michael Schulz	
<b>Improving Document Evolvability Based on Normalized Systems Theory . . . . .</b>	<b>131</b>
Vojtěch Knaisl and Robert Pergl	
<b>Modeling Generalization in Domain Taxonomies Using a Maximum Likelihood Criterion . . . . .</b>	<b>141</b>
Zhirayr Hayrapetyan, Susana Nascimento, Trevor Fenner, Dmitry Frolov, and Boris Mirkin	
<b>Machine Learning Detection for Financial Statement Fraud . . . . .</b>	<b>148</b>
Ting-Kai Hwang, Wei-Chun Chen, Wan-Chi Chiang, and Yung-Ming Li	
<b>Is it Trustworthy?: Trusting Clients in a Cloud Based Multi Agent System . . . . .</b>	<b>155</b>
Bouabdallah Imen and Mellah Hakima	
<b>Semantic-Based Image Retrieval Using <math>R^S</math>-Tree and Neighbor Graph . . . . .</b>	<b>165</b>
Le Thi Vinh Thanh, Le Manh Thanh, and Van The Thanh	
<b>An Improvement Method of Kd-Tree Using k-Means and k-NN for Semantic-Based Image Retrieval System . . . . .</b>	<b>177</b>
Nguyen Thi Dinh, Thanh Manh Le, and Thanh The Van	
<b>Step-by-Step Implementation to Position Small Business Services on Google Search Engine . . . . .</b>	<b>188</b>
Jorge Lira Camargo, Ivan Crispin Sanchez, Zoila Rosa Lira Camargo, Giancarlo Sanchez Atuncar, Luis Gerónimo Lira Camargo, and Celso Concha del Castillo	



<b>Keeping the Eyes Busy: A Case Study of Disney+ . . . . .</b>	<b>195</b>
Daniel Soares, Hugo Freitas, Joana Oliveira, Luís Vieira, and Manuel Au-Yong-Oliveira	
<b>An Exploratory Cross-national Analysis of the Plastic Recycling Industry . . . . .</b>	<b>207</b>
Giacomo Errighi, Luís Dinis, Luís Almeida, Pedro Dias, Cicero Eduardo Walter, and Manuel Au-Yong-Oliveira	
<b>Sports Streaming: Transition from TV to Digital . . . . .</b>	<b>220</b>
Jéssica Meneses, Leandro Souto, Simão Sil, Tatiana Silva, and Manuel Au-Yong-Oliveira	
<b>Information Security Threat Assessment Using Social Engineering in the Organizational Context – Literature Review . . . . .</b>	<b>233</b>
António Lopes, Leonilde Reis, Henrique São Mamede, and Arnaldo Santos	
<b>Factors Influencing Crossborder Medical Tourism from Bangladesh: An Empirical Study . . . . .</b>	<b>243</b>
Sandip Nandi, Dhanonjoy Kumar, and Paula Serdeira Azevedo	
<b>Dependency Mining in IoT - From Research to Practice in Intelligent Transportation Systems . . . . .</b>	<b>258</b>
David Graf, Lisa Spitzl, Michael Steiner, Wieland Schwinger, Werner Retschitzegger, Elisabeth Kapsammer, Birgit Pröll, and Norbert Baumgartner	
<b>Step-by-Step Implementation of a Non-face-to-face Audit Using the Tools of the Cloud . . . . .</b>	<b>272</b>
Jorge Lira Camargo, Luis Soto Soto, Zoila Rosa Lira Camargo, Oscar Mujica Ruiz, Luis Gerónimo Lira Camargo, and María Elena Campos Miranda	
<b>Is There Meaning in the Emoji Sequences Used on Social Media? . . . .</b>	<b>279</b>
Alexandre Pereira and Gabriel Pestana	
<b>Mobile Application to Bring Face-to-Face Attendance to Students of Peruvian Universities Within the New Normality . . . . .</b>	<b>293</b>
José Antonio Ogosi-Auqui, Jimmy Aurelio Rosales-Huamani, Ivan Petrlik-Azabache, and Roberto Esparza-Silva	
<b>Digital Chain of Custody for CBRNE Events: Custody Transfer Governance . . . . .</b>	<b>304</b>
Gabriel F. Pestana, Luís M. Carvalho, Júlio Gouveia-Carvalho, and Wilson Antunes	

<b>Cloud Computing System Application in the Mining Industry . . . . .</b>	<b>315</b>
Naim Baftiu, Vehebi Sofiu, and Betim Maloku	
<b>Development of Deep Learning Systems: A Data Science Project Approach . . . . .</b>	<b>325</b>
Domingos F. Oliveira and Miguel A. Brito	
<b>NER in Archival Finding Aids: Next Level . . . . .</b>	<b>333</b>
Luís Filipe da Costa Cunha and José Carlos Ramalho	
<b>Dialogo: A Controlled Portuguese for Developing Agroecological Information Systems . . . . .</b>	<b>343</b>
Maxim Simões de Abreu Jaffe, Domingos Manuel Mendes Lopes, and Arsénio Monteiro Reis	
<b>Context-Aware Completion Time Prediction for Business Process Monitoring . . . . .</b>	<b>355</b>
Renato Marinho Alves, Luciana Barbieri, Kleber Stroeh, Sarajane Marques Peres, and Edmundo Roberto Mauro Madeira	
<b>An Exploratory Study on the Spotify Recommender System . . . . .</b>	<b>366</b>
Greta Björklund, Magdalena Bohlin, Edvard Olander, Josef Jansson, Cicero Eduardo Walter, and Manuel Au-Yong-Oliveira	
<b>Performance Evaluation of ECOC Considering Estimated Probability of Binary Classifiers . . . . .</b>	<b>379</b>
Gendo Kumoi, Hideki Yagi, Manabu Kobayashi, Masayuki Goto, and Shigeichi Hirasawa	
<b>Applying Time-Constraints Using Ontologies to Sensor Data for Predictive Maintenance . . . . .</b>	<b>390</b>
Alda Canito, Armando Nobre, José Neves, Juan Corchado, and Goreti Marreiros	
<b>Student's Behaviors Analysis in Classroom Context Using IoT: A Systematic Mapping Study . . . . .</b>	<b>401</b>
M'hamed Boukhab and Khalid Nafil	
<b>Tracing User Stories and Source Code Using the Language Extended Lexicon . . . . .</b>	<b>413</b>
Matias Urbieto, Leandro Antonelli, Javier Guerra, and Gustavo Rossi	
<b>Information Technologies in Education</b>	
<b>Managing a Successful Educational Role-Playing Game . . . . .</b>	<b>433</b>
Katerina Zdravkova	

<b>Older Adults and Games from a Perspective of Playability, Game Experience and Pervasive Environments: A Systematics Literature Review</b> . . . . .	444
Johnny Salazar Cardona, Jeferson Arango Lopez, Francisco Luis Gutiérrez Vela, and Fernando Moreira	
<b>The System Robustness SOLL in Student Learning Process</b> . . . . .	454
Andreia Magalhães, José Matias Alves, and António Andrade	
<b>Gamification for Learning Aymara Vocabulary in Students from Peru</b> . . . . .	466
Kevin Mario Laura-De La Cruz, Stefany Juliana Noa-Copaja, Ernesto Pino-Nina, Silvia Milagritos Bazán-Velásquez, and Cecilia Claudia Montesinos-Valencia	
<b>Evaluation of a Guidance and Tutoring Recommendation System</b> . . . . .	475
Antonio Pantoja-Vallejo and Beatriz Berrios-Aguayo	
<b>Gamification-Based Tools Embedded in the Helios Educational Platform</b> . . . . .	483
Cosmin Strilețchi, Adriana Cornelia Stan, and Eusebiu Jecan	
<b>English Language Learning Using WhatsApp Application in a Classroom</b> . . . . .	492
Kevin Mario Laura-De La Cruz, Miriam Estefani Condori-Chacolli, Luz Marina Coronel-Roque, Cecilia Claudia Montesinos-Valencia, and Silvia Milagritos Bazán-Velásquez	
<b>Evaluating the Outcomes of Competence-Based Learning Course: The Field Experience for Training 21<sup>st</sup> Century Skills in Sofia University</b> . . . . .	502
Albena Antonova, Eliza Stefanova, Nikolina Nikolova, Pencho Mihnev, Ralitza Stamenkova, and Temenujka Zafirova-Malcheva	
<b>The Use of Digital Technologies to Develop Girls' Creativity: Paths and Practices in Greece, Lithuania, Portugal, and Slovenia</b> . . . . .	512
Célio Gonçalves Marques, António Manso, Laura Grinevičiūtė, and Renata Danielienė	
<b>Innovative Hybrid SPOC Model for Initial and Continuing Education at University</b> . . . . .	523
Said Machwate, Rachid Bendaoud, Daniel Burgos, and Khalid Berrada	
<b>Multimedia Systems and Applications</b>	
<b>The Spread of Cultural Heritage in Second Life: Case Study Amiais</b> . . .	535
Dalila Martins, Lúcia Oliveira, and Ana Carla Amaro	

<b>Virtual Learning Taught by Educational Institutions and Its Relationship with International Business E-business in Peru . . . . .</b>	<b>543</b>
Jehovanni F. Velarde-Molina, Regis André Junior Fernández-Argandoña, Kevin Mario Laura-De La Cruz, and Ben Y. P. Yábar-Vega	
<b>Challenges on Digital Destination Campaigns in Tourism During Covid19 Pandemic Crisis – The Case of Portugal National Tourism Authority . . . . .</b>	<b>552</b>
Sónia Nogueira	
<b>How “Netflix Effect” is (Re)shaping the Media Consumption Patterns of Y-ers and Z-ers? . . . . .</b>	<b>563</b>
Sonja Omukić, Merima Činjurević, and Almir Peštek	
<b>A Personalized Narrative Method to Improve Serious Games . . . . .</b>	<b>573</b>
Tatianna Rosal, Henrique São Mamede, and Miguel Mira da Silva	
<b>AGELESS - Applications for Geriatric Exercises: Learning of the Elderly by Sensors and Software . . . . .</b>	<b>581</b>
Ana Rita Teixeira, Márcio Santos, Álvaro Santos, and Anabela Gomes	
<b>P100 ERP as a Tool to Identifying Problem Solving . . . . .</b>	<b>590</b>
Ana Teixeira, Igor Rodrigues, Anabela Gomes, and Germán Rodríguez	
<b>Impact of Different Levels of Information Presentation on User Experience: A Case Study in a Virtual World . . . . .</b>	<b>600</b>
André Silva, Carlos Sousa, Dennis Paulino, Mário Sousa, Miguel Melo, Maximino Bessa, and Hugo Paredes	
<b>Author Index . . . . .</b>	<b>611</b>