

Advances in Intelligent Systems and Computing

Volume 1007

Series Editor

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

Advisory Editors

Nikhil R. Pal, Indian Statistical Institute, Kolkata, India

Rafael Bello Perez, Faculty of Mathematics, Physics and Computing,
Universidad Central de Las Villas, Santa Clara, Cuba

Emilio S. Corchado, University of Salamanca, Salamanca, Spain

Hani Hagras, School of Computer Science & Electronic Engineering,
University of Essex, Colchester, UK

László T. Kóczy, Department of Automation, Széchenyi István University,
Gyor, Hungary

Vladik Kreinovich, Department of Computer Science, University of Texas
at El Paso, El Paso, TX, USA

Chin-Teng Lin, Department of Electrical Engineering, National Chiao
Tung University, Hsinchu, Taiwan

Jie Lu, Faculty of Engineering and Information Technology,
University of Technology Sydney, Sydney, NSW, Australia

Patricia Melin, Graduate Program of Computer Science, Tijuana Institute
of Technology, Tijuana, Mexico

Nadia Nedjah, Department of Electronics Engineering, University of Rio de Janeiro,
Rio de Janeiro, Brazil

Ngoc Thanh Nguyen, Faculty of Computer Science and Management,
Wrocław University of Technology, Wrocław, Poland

Jun Wang, Department of Mechanical and Automation Engineering,
The Chinese University of Hong Kong, Shatin, Hong Kong

The series “Advances in Intelligent Systems and Computing” contains publications on theory, applications, and design methods of Intelligent Systems and Intelligent Computing. Virtually all disciplines such as engineering, natural sciences, computer and information science, ICT, economics, business, e-commerce, environment, healthcare, life science are covered. The list of topics spans all the areas of modern intelligent systems and computing such as: computational intelligence, soft computing including neural networks, fuzzy systems, evolutionary computing and the fusion of these paradigms, social intelligence, ambient intelligence, computational neuroscience, artificial life, virtual worlds and society, cognitive science and systems, Perception and Vision, DNA and immune based systems, self-organizing and adaptive systems, e-Learning and teaching, human-centered and human-centric computing, recommender systems, intelligent control, robotics and mechatronics including human-machine teaming, knowledge-based paradigms, learning paradigms, machine ethics, intelligent data analysis, knowledge management, intelligent agents, intelligent decision making and support, intelligent network security, trust management, interactive entertainment, Web intelligence and multimedia.

The publications within “Advances in Intelligent Systems and Computing” are primarily proceedings of important conferences, symposia and congresses. They cover significant recent developments in the field, both of a foundational and applicable character. An important characteristic feature of the series is the short publication time and world-wide distribution. This permits a rapid and broad dissemination of research results.

**** Indexing: The books of this series are submitted to ISI Proceedings, EI-Compendex, DBLP, SCOPUS, Google Scholar and Springerlink ****


More information about this series at <http://www.springer.com/series/11156>

Rosella Gennari · Pierpaolo Vittorini ·
Fernando De la Prieta · Tania Di Mascio ·
Marco Temperini · Ricardo Azambuja Silveira ·
Demetrio Arturo Ovalle Carranza
Editors

Methodologies and Intelligent Systems for Technology Enhanced Learning, 9th International Conference

Editors

Rosella Gennari
Computer Science Faculty
Free University of Bozen-Bolzano
Bolzano, Italy

Fernando De la Prieta 
Department of Computer Science
and Automation Control
University of Salamanca
Salamanca, Salamanca, Spain

Marco Temperini
Dipartimento di Ingegneria Informatica,
Automatica e Gestionale
Sapienza Università di Roma
Rome, Italy

Demetrio Arturo Ovalle Carranza
Universidad Nacional de Colombia
Medellin, Colombia

Pierpaolo Vittorini
Department of Life, Health
and Environmental Sciences
University of L'Aquila
L'Aquila, Italy

Tania Di Mascio
Department of Information Engineering,
Computer Science and Mathematics
University of L'Aquila
L'Aquila, Italy

Ricardo Azambuja Silveira
Department of Computer Science
and Statistics
Federal University of Santa Catarina
Florianópolis, Brazil

ISSN 2194-5357

ISSN 2194-5365 (electronic)

Advances in Intelligent Systems and Computing

ISBN 978-3-030-23989-3

ISBN 978-3-030-23990-9 (eBook)

<https://doi.org/10.1007/978-3-030-23990-9>

© Springer Nature Switzerland AG 2020

This work is subject to copyright. All rights are reserved 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

Education is the cornerstone of any society, and it serves as one of the foundations for many of its social values and characteristics. Different methodologies and intelligent technologies are employed for creating Technology Enhanced Learning (TEL) solutions. Solutions are innovative when they are rooted in artificial intelligence, deployed as stand-alone solutions or inter-connected to others. They target not only cognitive processes but also motivational, personality, or emotional factors. In particular, recommendation mechanisms enable us tailoring learning to different contexts and people, e.g., by considering their personality. The use of learning analytics also helps us augment learning opportunities for learners and educators alike; e.g., learning analytics can support self-regulated learning or adaptation of the learning material. Besides technologies, methods help create novel TEL opportunities. Methods come from different fields, such as education, psychology or medicine, and from diverse communities where people collaborate, such as *making communities* and *participatory design communities*. Methods and technologies are also used to investigate and enhance learning for “fragile users”, like children, elderly people, or people with special needs.

Both the 9th edition of this conference and its related workshops (i.e., Nursing, Tel4creativity, and TELAssess) contribute to novel research in TEL and expands the topics of the previous editions. The MIS4TEL 2019 papers discuss how diverse methods or technologies are employed to create novel approaches to TEL, valuable TEL experiences, or innovative TEL solutions, taking a critical stance, and promoting innovation.

This volume presents all papers that were accepted for the main track of MIS4TEL 2019, while the workshop papers will be published in a different volume. All underwent a peer-review selection: each paper was assessed by at least two different reviewers, from an international panel composed of about 50 members of 15 countries. The program of MIS4TEL counted 20 contributions from several countries, such as Brazil, Colombia, Germany, Greece, Italy, Mexico, Oman, Romania, Russia, Slovakia, Spain, and Sweden. The quality of submissions was on average good, with an acceptance rate of approximately 70%.

We thank the sponsors (IEEE Systems Man and Cybernetics Society - Spain Section Chapter, IEEE Spain Section, IBM, Indra, Viewnext, Global exchange, AEPIA, AIR institute, and APPIA), the members of the Local Organization team, and the Program Committee members for their hard work, which was essential for the success of MIS4TEL'19.

Rosella Gennari
Pierpaolo Vittorini
Fernando De la Prieta
Tania Di Mascio
Marco Temperini
Ricardo Azambuja Silveira
Demetrio Arturo Ovalle Carranza

Organization of MIS4TEL 2019

<http://www.mis4tel-conference.net/>

General Chair

Rosella Gennari	Free University of Bozen-Bolzano, Italy
-----------------	---

Technical Program Chair

Pierpaolo Vittorini	University of L'Aquila, Italy
---------------------	-------------------------------

Paper Co-chairs

Tania Di Mascio	University of L'Aquila, Italy
Fernando De la Prieta	University of Salamanca, Spain
Ricardo Azambuja Silveira	Universidade Federal de Santa Catarina, Brazil
Marco Temperini	Sapienza University, Rome, Italy

Proceedings Chairs

Ana Belén Gil	University of Salamanca, Spain
Fernando De la Prieta	University of Salamanca, Spain

Publicity Chair

Demetrio Arturo Ovalle Carranza	National University of Colombia, Colombia
------------------------------------	---

Workshop Chair

Elvira Popescu

University of Craiova, România

Program Committee

Sara Rodríguez	University of Salamanca, Spain
Juan M. Alberola	Universitat Politècnica de València, Spain
Juan M. Santos	University of Vigo, Spain
Sonia Verdugo-Castro	Universidad de Salamanca, Spain
Cecília Giuffrã	UFSC, Brazil
Sérgio Gonçalves	University of Minho, Portugal
Vincenza Cofini	University of L'Aquila, Italy
Alessandra Melonio	Free University of Bozen-Bolzano, Italy
Angélica González Arrieta	Universidad de Salamanca, Spain
Vicente Julian	Universitat Politècnica de València, Spain
Samuel González-López	Technological Institute of Nogales, Mexico
Orazio Miglino	NAC Lab, University of Naples "Federico II" and LARAL, Institute of Cognitive Sciences and Technologies, CNR, Italy
Paulo Novais	University of Minho, Portugal
Jorge Gomez-Sanz	Universidad Complutense de Madrid, Spain
Ana Belén Gil González	University of Salamanca, Spain
Ana Faria	ISEP, Portugal
Fridolin Wild	Oxford Brookes University, UK
Ana Almeida	ISEP-IPP, Portugal
Tiago Primo	Federal University of Pelotas, Brazil
Margarida Figueiredo	Universidade de Évora, Portugal
Juan-José Mena-Marcos	University of Salamanca, Spain
Antonio J. Sierra	University of Seville, Spain
Henrique Vicente	University of Évora, Portugal
Diogo Cortiz	Pontificia Universidade Católica de São Paulo, Brazil
Carlos Pereira	ISEC, Portugal
Marcelo Milrad	Linnaeus University, Sweden
Florentino Fdez-Riverola	University of Vigo, Spain
Elvira Popescu	University of Craiova, Romania
Jose Neves	University of Minho, Portugal
Laura Tarantino	Università dell'Aquila, Italy
Ricardo Azambuja Silveira	Universidade Federal de Santa Catarina, Brazil
Davide Carneiro	Polytechnic Institute of Porto, Portugal
Carolina Schmitt Nunes	Universidade Federal de Santa Catarina, Brazil
Dalila Duraes	Department of Artificial Intelligence, Technical University of Madrid, Madrid, Spain

Mauro Caporuscio	Linnaeus University, Sweden
Besim Mustafa	Edge Hill University, UK
Katherine Maillet	Institut Mines-Télécom, Télécom Ecole de Management, France
Giovanni De Gasperis	DISIM, Univ. L'Aquila, Italy
Gerlane R. F. Perrier	Universidade Federal Rural de Pernambuco, Brazil

Local Organising Committee

Juan Manuel Corchado Rodríguez	University of Salamanca, Spain and AIR Institute, Spain
Fernando De la Prieta	University of Salamanca, Spain
Sara Rodríguez González	University of Salamanca, Spain
Sonsoles Pérez Gómez	University of Salamanca, Spain
Benjamín Arias Pérez	University of Salamanca, Spain
Javier Prieto Tejedor	University of Salamanca, Spain and AIR Institute, Spain
Pablo Chamoso Santos	University of Salamanca, Spain
Amin Shokri Gazafroudi	University of Salamanca, Spain
Alfonso González Briones	University of Salamanca, Spain and AIR Institute, Spain
José Antonio Castellanos	University of Salamanca, Spain
Yeray Mezquita Martín	University of Salamanca, Spain
Enrique Goyenechea	University of Salamanca, Spain
Javier J. Martín Mordt	University of Salamanca, Spain
Alberto Rivas Camacho	University of Salamanca, Spain
Ines Sitton Candanedo	University of Salamanca, Spain
Daniel López Sánchez	University of Salamanca, Spain
Elena Hernández Nieves	University of Salamanca, Spain
Beatriz Bellido	University of Salamanca, Spain
María Alonso	University of Salamanca, Spain
Diego Valdeolmillos	University of Salamanca, Spain and AIR Institute, Spain
Roberto Casado Vara	University of Salamanca, Spain
Sergio Marquez	University of Salamanca, Spain
Guillermo Hernández González	University of Salamanca, Spain
Mehmet Ozturk	University of Salamanca, Spain
Luis Carlos Martínez de Iturrate	University of Salamanca, Spain and AIR Institute, Spain
Ricardo S. Alonso Rincón	University of Salamanca, Spain
Javier Parra	University of Salamanca, Spain
Niloufar Shoeibi	University of Salamanca, Spain
Zakieh Alizadeh-Sani	University of Salamanca, Spain

Belén Pérez Lancho	University of Salamanca, Spain
Ana Belén Gil González	University of Salamanca, Spain
Ana De Luis Reboredo	University of Salamanca, Spain
Emilio Santiago Corchado	University of Salamanca, Spain
Rodríguez	
Angel Luis Sánchez Lázaro	University of Salamanca, Spain

Contents

Towards an Annotation System for Collaborative Peer Review	1
Sebastian Mader and François Bry	
A Moderate Experiential Learning Approach Applied on Data Science	11
Emilio Serrano and Daniel Manrique	
The Automated Grading of R Code Snippets: Preliminary Results in a Course of Health Informatics	19
Anna Maria Angelone and Pierpaolo Vittorini	
Learning by Fiddling: Patterns of Behaviour in Formal Language Learning	28
Niels Heller and François Bry	
Can Text Mining Support Reading Comprehension?	37
Eliseo Reategui, Daniel Epstein, Ederson Bastiani, and Michel Carniato	
Usability of Virtual Environment for Emotional Well-Being	45
Elisa Menardo, Diego Scarpanti, Margherita Pasini, and Margherita Brondino	
Technology-Based Trainings on Emotions: A Web Application on Earthquake-Related Emotional Prevention with Children	53
Daniela Raccanello, Giada Vicentini, Margherita Brondino, and Roberto Burro	
Using Rasch Models for Developing Fast Technology Enhanced Learning Solutions: An Example with Emojis	62
Roberto Burro, Margherita Pasini, and Daniela Raccanello	
Immersive Virtual Reality in Technical Drawing of Engineering Degrees.	71
M. P. Rubio, D. Vergara, and S. Rodríguez	

Learning and Development Is the Key. How Well Are Companies Doing to Facilitate Employees' Learning?	80
Leonardo Caporarello, Beatrice Manzoni, and Beatrice Panariello	
Investigating Gamification and Learning Analytics Tools for Promoting and Measuring Communities of Inquiry in Moodle Courses	89
Maria Tzelepi, Ioannis Petroulis, and Kyparisia Papanikolaou	
Cognitive Emotions Recognition in e-Learning: Exploring the Role of Age Differences and Personality Traits	97
Berardina De Carolis, Francesca D'Errico, Marinella Paciello, and Giuseppe Palestra	
The Role of eXtreme Apprenticeship in Enhancing Educational Background Effect on Performance in Programming	105
Ugo Solitro, Margherita Brondino, and Margherita Pasini	
Grab that Screen! Architecture of a System that Changes the Lecture Recording and the Note Taking Processes	113
Marco Ronchetti and Tiziano Lattisi	
Designing a Self-regulated Online Learning Course Using Innovative Methods: A Case Study	121
Leonardo Caporarello, Federica Cirulli, and Beatrice Manzoni	
Recommending Tasks in Online Judges	129
Giorgio Audrito, Tania Di Mascio, Paolo Fantozzi, Luigi Laura, Gemma Martini, Umberto Nanni, and Marco Temperini	
A Board Game and a Workshop for Co-creating Smart Nature Ecosystems	137
Rosella Gennari, Alessandra Melonio, Maristella Matera, and Eftychia Roumelioti	
On the Importance of the Design of Virtual Reality Learning Environments	146
Diego Vergara, Manuel Pablo Rubio, Miguel Lorenzo, and Sara Rodríguez	
Immersive Virtual Environments: A Comparison of Mixed Reality and Virtual Reality Headsets for ASD Treatment	153
Tania Di Mascio, Laura Tarantino, Giovanni De Gasperis, and Chiara Pino	
Intelligent Agents System for Adaptive Assessment	164
Néstor D. Duque-Méndez, Valentina Tabares-Morales, and Demetrio A. Ovalle	
Author Index	173