

# Smart Innovation, Systems and Technologies

Volume 111

## Series editors

Robert James Howlett, Bournemouth University and KES International,  
Shoreham-by-sea, UK

e-mail: [rjhowlett@kesinternational.org](mailto:rjhowlett@kesinternational.org)

Lakhmi C. Jain, University of Technology Sydney, Broadway, Australia;  
University of Canberra, Canberra, Australia; KES International, UK

e-mail: [jainlakhmi@gmail.com](mailto:jainlakhmi@gmail.com); [jainlc2002@yahoo.co.uk](mailto:jainlc2002@yahoo.co.uk)

The Smart Innovation, Systems and Technologies book series encompasses the topics of knowledge, intelligence, innovation and sustainability. The aim of the series is to make available a platform for the publication of books on all aspects of single and multi-disciplinary research on these themes in order to make the latest results available in a readily-accessible form. Volumes on interdisciplinary research combining two or more of these areas is particularly sought.

The series covers systems and paradigms that employ knowledge and intelligence in a broad sense. Its scope is systems having embedded knowledge and intelligence, which may be applied to the solution of world problems in industry, the environment and the community. It also focusses on the knowledge-transfer methodologies and innovation strategies employed to make this happen effectively. The combination of intelligent systems tools and a broad range of applications introduces a need for a synergy of disciplines from science, technology, business and the humanities. The series will include conference proceedings, edited collections, monographs, handbooks, reference books, and other relevant types of book in areas of science and technology where smart systems and technologies can offer innovative solutions.

High quality content is an essential feature for all book proposals accepted for the series. It is expected that editors of all accepted volumes will ensure that contributions are subjected to an appropriate level of reviewing process and adhere to KES quality principles.

More information about this series at <http://www.springer.com/series/8767>

Álvaro Rocha · Mohammed Serrhini  
Editors

# Information Systems and Technologies to Support Learning

Proceedings of EMENA-ISTL 2018

 Springer

*Editors*

Álvaro Rocha  
Departamento de Engenharia Informática,  
Faculdade de Ciências e Tecnologia  
Universidade de Coimbra  
Coimbra, Portugal

Mohammed Serrhini  
Departement informatique, Faculté des  
Sciences  
Université Mohammed Ier  
Oujda, Morocco

ISSN 2190-3018

ISSN 2190-3026 (electronic)

Smart Innovation, Systems and Technologies

ISBN 978-3-030-03576-1

ISBN 978-3-030-03577-8 (eBook)

<https://doi.org/10.1007/978-3-030-03577-8>

Library of Congress Control Number: 2018960635

© Springer Nature Switzerland AG 2019

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, express 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 second edition of international conference Europe, Middle East, and North Africa Conference on Information Systems and Technologies to Support Learning 2018 (EMENA-ISTL'18). This Conference had the support of the University Mohamed First Oujda, Morocco, AISTI (Iberian Association for Information Systems and Technologies/Associação Ibérica de Sistemas e Tecnologias de Informação), and Private University of Fez, Morocco. It took place in Fez, Morocco, from October 25 to 27, 2018.

EMENA-ISTLL'18 conference has two aims: First, it provides the ideal opportunity to bring together professors, researchers, and high education students of different disciplines, discuss new issues, and discover the most recent developments, researches, and trends on information and communication technologies, emerging technologies, and security to support in learning. Second goal is focusing on to boost future collaboration and cooperation between researchers and academicians from Europe Middle East and North Africa universities (EMENA).

The Program Committee of EMENA-ISTL'18 was composed of a multidisciplinary group of experts and those who are intimately concerned with information and communication technologies, artificial intelligence, and security. 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 systems Technologies to support Education; (B) Education in Science, Technology, Engineering and Mathematics; (C) Emerging Technologies in Education Learning innovation in digital age; (D) Software Systems, Architectures, Applications and Tools; (E) Multimedia Systems and Applications; (F) Computer Communications and Networks; (G) IOT, Smart Cities and People, Wireless, Sensor and Ad-Hoc Networks; (H) Organizational Models and Information Systems and Technologies; (I) Human-Computer Interaction; (J) Computers & Security, Ethics and Data-forensic; (K) Health Informatics, and Medical Informatics Security; (L) Information and Knowledge Management; (M) Big Data Analytics and Applications, Intelligent Data Systems, and Machine Learning; (N) Artificial Intelligence, High Performance Computing; (O) Mobile, Embedded and Ubiquitous

Systems; (P) Language and Image Processing, Computer Graphics and vision; (Q) Interdisciplinary Field of Fuzzy Logic and Data Mining.

EMENA-ISTL'18 received 150 contributions from 44 countries around the world. The papers accepted for presentation and discussion at the conference are published by Springer (this book) and by EMENA-ISTL'18 (another e-book) and will be submitted for indexing by ISI, EI-Compendex, SCOPUS, DBLP, and/or Scholar Google, among others. Extended versions of selected best papers will be published in relevant journals, including SCI/SSCI and Scopus indexed journals.

We acknowledge all those who contributed to the staging of EMENA-ISTL'18 (authors, committees, and sponsors); their involvement and support are very much appreciated.

October 2018

Álvaro Rocha  
Mohammed Serrhini

# Organization

## Conference

### General Chair

Mohammed Serrhini                      University Mohammed First Oujda, Morocco

### Conference Co-chairs

Álvaro Rocha                      University of Coimbra, Portugal  
Latif Ladid                      Université du Luxembourg

### Local Chairs

Mohammed Ouazzani Jamil                      Private University of Fez, Morocco  
(Dean)  
El-Mostafa Daoudi                      University Mohamed First Oujda, Morocco  
Ahmed Laaroussi                      Private University of Fez, Morocco  
(Head of ESMAB)  
Abdelaziz Ait Moussa                      University Mohamed First Oujda, Morocco  
Abdelillah Monir                      University Mohamed First Oujda, Morocco  
Tarik Hajji                      Private University of Fez, Morocco  
Ahmed Tahiri                      University Mohamed First Oujda, Morocco  
El Miloud Jaara                      University Mohamed First Oujda, Morocco  
Zakaria Itahriouan                      Private University of Fez, Morocco  
Noura Ouerdi                      University Mohamed First Oujda, Morocco

### Advisory Committee

Mohammed aziz lahlou                      President of the Private University of Fez

Saâd Daoudi	Director of the Private University of Fez
Antonio J. Jara	University of Applied Sciences Western Switzerland
Mohamed Salim Bouhleb	University of Sfax Tunisia

### **Program Committee**

Olaf Maennel	Tallinn University of Technology, Estonia
Gustavo Alves	School of Engineering, Polytechnic of Porto, Portugal
Mohsine Eleuldj	Mohammadia School of Engineering, Morocco
Houda Hakim Guermaz	Manouba University, Tunisia
Ounsa Roudies	Mohammadia School of Engineering, Morocco
Álvaro Rocha	University of Coimbra, Portugal
Ernest Cachia (Dean)	Faculty of ICT University of Malta, Malta
Roza Dumbraveanu	Roza Dumbraveanu, University, Chisinau, Moldova
Raúl Cordeiro Correia	Instituto Politécnico de Setúbal, Portugal
Ronan Champagnat	Universite de La Rochelle, France
Rita Francese	University of Salerno, Italy
Naceur Ben Hadj Braiek	Polytechnic School of Tunis, Tunisia
Fernando Moreira	Oporto Global University, Portugal
Maria José	ISCAP/Polytechnic Institute of Porto, Portugal
Angélico Gonçalves	
Maria José Sousa	Universidade Europeia de Lisboa, Portugal
James Uhomobhi	University of Ulster, UK
Jarno Linnéll	Aalto University, Finland
Esteban Vázquez Cano	Universidad Nacional de Educación a Distancia, Spain
Juarez Bento Silva	Universidade Federal de Santa Catarina, Brasil
Anouar Belahcen	Aalto University, Finland
Peter Mikulecky	University of Hradec Kralove, Czech
Katherine Maillet	Institut Mines-Télécom Paris, France
Rafael Valencia-Garcia	Universidad de Murcia, Spain
Luis Anido Rifon	Universidade de Vigo, Spain
Mraoui Hamid	Faculty of Sciences Oujda, Morocco
Carla Silva	University Lusófona de Humanidades e Tecnologias Lisbon, Portugal
Rolou Lyn Rodriguez Maata	Faculty of Computing Sciences - Gulf College Oman, Oman
Ali Shaqour	An-Najah National University, Palestine
Ahmed Tahiri	University Mohamed First Oujda, Morocco
Abdullah Al-Hamdani	Sultan Qaboos University, Muscat, Oman
Muzafer Saracevic	International University of Novi Pazar, Serbia



Manuel Caeiro Rodríguez	Universidade de Vigo, Spain
Rafik Zitouni	Ecole d'ingénieur généraliste et high-tech à Paris, France
Utku ZKose	Usak University, Turkey
Noura Ouerdi	University Mohamed First Oujda, Morocco
Tajullah Sky-Lark	Sustainable Knowledge Global Solutions, USA
Otmane Ait Mohamed	Concordia University, Canada
Mohammad Hamdan	Yarmouk University, Jordan
Wail Mardini	Jordan University of Science and Technology, Jordan
Francesca Pozzi	Istituto Tecnologie Didattiche - CNR, Italy
Filipe Cardoso	Polytechnic Institute of Setubal, Portugal
Abdel-Badeeh Salem	Ain Shams University, Egypt
Mohammad Al-Smadi	Jordan University of Science and Technology, Jordan
Mohamad Badra	Zayed University, United Arab Emirates
Amal Zouaq	Royal Military College of Canada, Canada
Pedro Guerreiro	Universidade do Algarve, Portugal
El Bekkay Mermri	University Mohamed First Oujda, Morocco
Martin Llamas-Nistal	University of Vigo, Spain
Camille Salinesi	CRI, Université de Paris 1 Panthéon-Sorbonne, France
Jorge Pires	Polytechnic Institute of Castelo Branco, Portugal
Ali Jaoua	Qatar University, Qatar
Osama Shata	Qatar University, Qatar
Abdelkarim Erradi	Qatar University, Qatar
Mohammed Gabli	University Mohammed Premier, Oujda, Morocco
Osama Halabi	Qatar University, Qatar
Rachid Nourine	Oran University, Algeria
Abdelhafid Bessaid	University of Tlemcen, Algeria
Lehsaini Mohamed	University of Tlemcen, Algeria
Carla Silva	University Lusófona de Lisbonne, Portugal
John Sahalos	University of Nicosia, Cyprus
Lebbah Yahia	University of Oran 1, Algeria
Kashif Saleem	King Saud University, Saudi Arabia
Amjad Gawanmeh	Khalifa University, United Arab Emirates
Abdulmalik Al-Salman	King Saud University, Saudi Arabia
Olivier Markowitch	Université Libre de Bruxelles, Belgium
Ladan Mohammad	Rafik Hariri University, Lebanon
Tolga Ensari	Istanbul University, Turkey
David Baneres	Universitat Oberta de Catalunya, Spain
Yahya Tashtoush	Jordan University of Science and Technology, Jordan
Alberto Cardoso	University of Coimbra, Portugal
StephanieTeufel	University of Fribourg, Switzerland

Associate Dean Majida  
Ali Abed Alasady  
Pierre Manneback  
Mohammed Benjelloun

Tikrit University, Iraq

Faculté Polytechnique de Mons, Belgium  
Faculté Polytechnique de Mons, Belgium

# Contents

<b>Categorization of Types of Internautes Based on Their Navigation Preferences Within Educational Environments</b> .....	1
Hector F. Gomez A, Susana A. Arias T, Carlos E. Martinez, Miguel A. Martínez V, Natalia Bustamante Sanchez, and Estefania Sanchez-Cevallos	
<b>Metaheuristic Approaches for Solving University Timetabling Problems: A Review and Case Studies from Middle Eastern Universities</b> .....	10
Manar Hosny	
<b>Ontology-Based Modeling for a Personalized MOOC Recommender System</b> .....	21
Sara Assami, Najima Daoudi, and Rachida Ajhoun	
<b>A New Model of Learner Experience in Online Learning Environments</b> .....	29
Yassine Safsouf, Khalifa Mansouri, and Franck Poirier	
<b>Hybrid Recommendation Approach in Online Learning Environments</b> .....	39
Mohammed Baidada, Khalifa Mansouri, and Franck Poirier	
<b>Performance Scoring at University: Algorithm of Student Performance</b> .....	44
Adnane Rahhou and Mohammed Talbi	
<b>Introducing Mobile Technology for Enhancing Teaching and Learning at the College of Business Education in Tanzania: Teachers and Students' Perspectives</b> .....	56
Godfrey Mwandosya, Calkin Suero Montero, and Esther Rosinner Mbise	

<b>Information System of Performance Management and Reporting at University: Example of Student Scorecard</b> . . . . .	67
Adnane Rahhou and Mohammed Talbi	
<b>Mobile Learning Oriented Towards Learner Stimulation and Engagement</b> . . . . .	77
Samir Achahod, Khalifa Mansouri, and Franck Poirier	
<b>A Learning Style Identification Approach in Adaptive E-Learning System</b> . . . . .	82
Hanaa El Fazazi, Abderrazzak Samadi, Mohamed Qbadou, Khalifa Mansouri, and Mouhcine Elgarej	
<b>Towards Smart Innovation for Information Systems and Technology Students: Modelling Motivation, Metacognition and Affective Aspects of Learning</b> . . . . .	90
James Ngugi and Leila Goosen	
<b>Key Elements of Educational Augmented and Virtual Reality Applications</b> . . . . .	100
Houda Elkoubaiti and Radouane Mrabet	
<b>Teaching and Learning How to Program Without Writing Code</b> . . . . .	106
Michel Adam, Moncef Daoud, and Patrice Frison	
<b>Towards a Dynamics of Techno-Pedagogical Innovation Within the University: Case Study Hassan II University of Casablanca</b> . . . . .	118
Nadia Chafiq, Mohamed Housni, and Mohamed Moussetad	
<b>Towards the Design of an Innovative and Social Hybrid Learning Based on the SMAC Technologies</b> . . . . .	126
Nadia Chafiq and Mohamed Housni	
<b>Information Systems and Technologies Opening New Worlds for Learning to Children with Autism Spectrum Disorders</b> . . . . .	134
Leila Goosen	
<b>Technologies to Inspire Education in Science, Engineering and Technology Through Community Engagement in South Africa</b> . . . . .	144
Patricia Gouws and Leila Goosen	
<b>Promoting Pro-environmental Practices About Trees in Children Using Infrared Thermography Technology</b> . . . . .	154
Maria Eduarda Ferreira, João Crisóstomo, and Rui Pitarma	
<b>Emerging Technologies and Learning Innovation in the New Learning Ecosystem</b> . . . . .	164
Helene Fournier, Heather Molyneaux, and Rita Kop	

**Exploring the Acceptance of Mobile Technology Application for Enhancing Teaching and Learning at the College of Business Education in Tanzania** . . . . . 171  
 Godfrey Mwandosya, Calkin Suero Montero, and Esther-Rosinner Mbise

**Analysis of Atmospheric Monitoring Data Through Micro-meteorological Stations, as a Crowdsourcing Tool for Technology Integration** . . . . . 181  
 Maritza Aguirre-Munizaga, Katty Lagos-Ortiz, Vanessa Vergara-Lozano, Karina Real-Avilés, Mitchell Vásquez-Bermudez, Andrea Sinche-Guzmán, and José Hernández-Rosas

**Infra SEN: Intelligent Information System for Real Time Monitoring of Distributed Infrastructures and Equipments in Rural Areas** . . . . . 188  
 Bala Moussa Biaye, Khalifa Gaye, Cherif Ahmed Tidiane Aidara, Amadou Coulibaly, and Serigne Diagne

**Product-BPAS, A Software Tool for Designing Innovative and Modular Products for Agriculture and Crafts** . . . . . 194  
 Chérif Ahmed Tidiane Aidara, Bala Moussa Biaye, Serigne Diagne, Khalifa Gaye, and Amadou Coulibaly

**An Efficient Next Hop Selection Scheme for Enhancing Routing Performance in VANETS** . . . . . 205  
 Driss Abada, Abdellah Massaq, and Abdellah Boulouz

**Comparative Performance Study of QoS Downlink Scheduling Algorithms in LTE System for M2M Communications** . . . . . 216  
 Mariyam Ouaisa, Abdallah Rhattoy, and Mohamed Lahmer

**Uberisation Business Model Based on Blockchain for Implementation Decentralized Application for Lease/Rent Lodging** . . . . . 225  
 Saleh Hadi, Alexandrov Dmitry, and Dzhonov Azamat

**New Failure Detection Approach for Real Time for Hydraulic Networks Using the Non-acoustic Method** . . . . . 233  
 Bala Moussa Biaye, Cherif Ahmed Tidiane Aidara, Amadou Coulibaly, Khalifa Gaye, Serigne Diagne, and Edouard Ngor Sarr

**Fault-Tolerant Communication for IoT Networks** . . . . . 245  
 Abdelghani Boudaa and Hocine Belouadah

**Emergency Navigation Approach Using Wireless Sensor Networks and Cloud Computing** . . . . . 256  
 Najla Alnabhan, Nadia Al-Aboody, and Hamed Al-Rawishidy

**Security Scheme for IoT Environments in Smart Grids** . . . . . 269  
 Sebastián Cruz-Duarte, Marco Sastoque-Mahecha, Elvis Gaona-García, and Paulo Gaona-García

<b>Dynamic Airspace Sectorization Problem Using Hybrid Genetic Algorithm</b> .....	282
Mohammed Gabli, El Miloud Jaara, and El Bekkaye Mermri	
<b>A Semantic Framework to Improve Model-to-Model Transformations</b> .....	290
Mohamed Elkamel Hamdane, Karima Berramla, Allaoua Chaoui, and Abou El Hasan Benyamina	
<b>An Embedded Prototype System for People with Disabilities Using Google’s Speech</b> .....	301
Maritza Aguirre-Munizaga, Vanessa Vergara-Lozano, Carlota Delgado, Joel Ramirez-Yela, and Néstor Vera Lucio	
<b>Measuring Semantic Coverage Rates Provided by Cached Regions in Mediation Systems</b> .....	312
Ouafa Ajarroud, Ahmed Zellou, and Ali Idri	
<b>Using Probabilistic Direct Multi-class Support Vector Machines to Improve Mental States Based-Brain Computer Interface</b> .....	321
Mounia Hendel and Fatiha Hendel	
<b>Tracking Attacks Data Through Log Files Using MapReduce</b> .....	331
Yassine Azizi, Mostafa Azizi, and Mohamed Elboukhari	
<b>Toward a New Integrated Approach of Information Security Based on Governance, Risk and Compliance</b> .....	337
Mounia Zaydi and Bouchaib Nassereddine	
<b>A Novel Steganography Algorithm Based on Alpha Blending Technique Using Discrete Wavelet Transform (ABT-DWT)</b> .....	342
Ayidh Alharbi and Tahar M. Kechadi	
<b>A Comparison of American and Moroccan Governmental Security Approaches</b> .....	352
Rabii Anass, Assoul Saliha, Ouazzani Touhami Khadija, and Roudiès Ounsa	
<b>Polyvalent Fingerprint Biometric System for Authentication</b> .....	361
Mohamed El Beqqal, Mostafa Azizi, and Jean Louis Lanet	
<b>Bitcoin Difficulty, A Security Feature</b> .....	367
Abdenaby Lamiri, Kamal Gueraoui, and Gamal Zeggwagh	
<b>Result Oriented Time Correlation Between Security and Risk Assessments, and Individual Environment Compliance Framework</b> . . . .	373
Dimo Dimov and Yuliyana Tsonev	

**Classification of Ransomware Based on Artificial Neural Networks . . . .** 384  
 Noura Ouerdi, Tarik Hajji, Aurelien Palisse, Jean-Louis Lanet,  
 and Abdelmalek Azizi

**On the Efficiency of Scalar Multiplication on the Elliptic Curves . . . . .** 393  
 Siham Ezzouak and Abdelmalek Azizi

**Patients Learning Process Supporting Change in Identities  
 and Life Styles - A Heart Failure Self-care Scenario . . . . .** 400  
 Linda Askenäs and Jan Aidemark

**Privacy Preserving Requirements for Sharing Health  
 Data in Cloud . . . . .** 412  
 Insaf Boumezbeur and Karim Zarour

**Using IoT and Social Networks for Enhanced Healthy  
 Practices in Buildings . . . . .** 424  
 Gonçalo Marques and Rui Pitarma

**IOT System for Self-diagnosis of Heart Diseases Using Mathematical  
 Evaluation of Cardiac Dynamics Based on Probability Theory . . . . .** 433  
 Juan Piedrahita-Gonzalez, Juan Cubillos-Calvachi,  
 Carlos Gutiérrez-Ardila, Carlos Montenegro-Marin,  
 and Paulo Gaona-García

**Modeling the OWASP Most Critical WEB Attacks . . . . .** 442  
 Yassine Ayachi, El Hassane Ettifouri, Jamal Berrich,  
 and Bouchentouf Toumi

**Measurement of Co-deployment of IT Quality Standard:  
 Application to ISO9001, CMMI and ITIL . . . . .** 451  
 Hind Dahar and Ounsa Roudies

**Rating Microfinance Products Consumers Using Artificial  
 Neural Networks . . . . .** 460  
 Tarik Hajji and Ouazzani Mohammed Jamil

**Applying Agile Procedure Model to Improve ERP Systems  
 Implementation Strategy . . . . .** 471  
 Majda El Mariouli and Jalal Laassiri

**Clustering Strategy for Scientific Workflow Applications  
 in IaaS Cloud Environment . . . . .** 482  
 Sid Ahmed Makhoulf and Belabbas Yagoubi

**Open Government Data: Problem Assessment  
 of Machine Processability . . . . .** 492  
 Hanae Elmekki, Dalila Chiadmi, and Hind Lamharhar

**Toward an Evaluation Model for Open Government Data Portals . . . . .** 502  
 Kawtar Younsi Dahbi, Hind Lamharhar, and Dalila Chiadmi

**NoSQL Scalability Performance Evaluation over Cassandra . . . . .** 512  
 Maryam Abbasi, Filipe Sá, Daniel Albuquerque, Cristina Wanzeller,  
 Filipe Caldeira, Paulo Tomé, Pedro Furtado, and Pedro Martins

**A Novel Filter Approach for Band Selection and Classification  
 of Hyperspectral Remotely Sensed Images Using Normalized  
 Mutual Information and Support Vector Machines . . . . .** 521  
 Hasna Nhaila, Asma Elmaizi, Elkebir Sarhrouni, and Ahmed Hammouch

**Differences Between Clusterings as Distances  
 in the Covering Graph of Partitions. . . . .** 531  
 Giovanni Rossi

**A New Supervised Learning Based Ontology Matching  
 Approach Using Neural Networks . . . . .** 542  
 Meriem Ali Khoudja, Messaouda Fareh, and Hafida Bouarfa

**VACIT: Tool for Consumption, Analysis and Machine Learning  
 for LOD Resources on CKAN Instances . . . . .** 552  
 Álvaro Varón-Capera, Paulo Alonso Gaona-García,  
 Jhon Francined Herrera-Cubides, and Carlos Montenegro-Marín

**Selecting Best Machine Learning Techniques for Breast Cancer  
 Prediction and Diagnosis . . . . .** 565  
 Youness Khourdifi and Mohamed Bahaj

**Identification of Human Behavior Patterns Based  
 on the GSP Algorithm . . . . .** 572  
 Hector F. Gomez A, Edwin Fabricio Lozada T., Luis Antonio Llerena,  
 Jorge Alonso Benitez Hurtado, Richard Eduardo Ruiz Ordoñez,  
 Freddy Giancarlo Salazar Carrillo, Joselito Naranjo-Santamaria,  
 and Teodoro Alvarado Barros

**Matchstick Games: On Removing a Matchstick Without  
 Disturbing the Others. . . . .** 580  
 Godfried T. Toussaint

**Multi-cloud Resources Optimization for Users  
 Applications Execution . . . . .** 588  
 Anas Mokhtari, Mostafa Azizi, and Mohammed Gabli

**An Algorithm of Conversion Between Relational Data  
 and Graph Schema . . . . .** 594  
 Zakariyaa Ait El Mouden, Abdeslam Jakimi, and Moha Hajar



**Self-calibration of the Fundus Camera Using the Genetic Algorithm . . . 603**  
Mostafa Taibi, Rabha Allaoui, and Raja Touahni

**Utilizing Faults and Time to Finish Estimating the Number  
of Software Test Workers Using Artificial Neural Networks  
and Genetic Programming . . . . . 613**  
Alaa Sheta, Sultan Aljahdali, and Malik Braik

**A Comparative Analysis of Control Strategies  
for Stabilizing a Quadrotor . . . . . 625**  
Moussa Labbadi, Mohamed Cherkaoui, Yassine El Houm,  
and M'hammed Guisser

**A New Approach Based on Bat Algorithm for Inducing  
Optimal Decision Trees Classifiers . . . . . 631**  
Ikram Bida and Saliha Aouat

**A New Parallel Method for Medical Image Segmentation Using  
Watershed Algorithm and an Improved Gradient Vector Flow . . . . . 641**  
Hayat Meddeber and Belabbas Yagoubi

**Object Detecting on Light Field Imaging:  
An Edge Detection Approach . . . . . 652**  
Yessaadi Sabrina and Mohamed Tayeb Laskri

**Arab Handwriting Character Recognition by Curvature . . . . . 662**  
Aissa Kerkour Elmiad

**Language Identification for User Generated Content  
in Social Media . . . . . 672**  
Randa Zarnoufi, Hamid Jaafar, and Mounia Abik

**Vision-Based Distance Estimation Method Using Single Camera:  
Application to the Assistance of Visually Impaired People . . . . . 679**  
Wafa Saad Al-shehri, Salma Kammoun Jarraya, and Manar Salama Ali

**1D Signals Descriptors for 3D Shape Recognition . . . . . 687**  
Kaoutar Baibai, Mohamed Emharraf, Wafae Mrabti,  
Youssef Ech-choudani, Khalid Hachami, and Benaissa Bellach

**Dynamic Textures Segmentation and Tracking Using Optical  
Flow and Active Contours . . . . . 694**  
Ikram Bida and Saliha Aouat

**Author Index . . . . . 705**