

2023 7th IEEE Congress on Information Science and Technology (CiSt 2023)

**Agadir - Essaouira, Morocco
16-22 December 2023**



**IEEE Catalog Number: CFP2367R-POD
ISBN: 978-1-6654-6134-4**

**Copyright © 2023 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP2367R-POD
ISBN (Print-On-Demand):	978-1-6654-6134-4
ISBN (Online):	978-1-6654-6133-7
ISSN:	2327-185X

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

Table of Contents

Learning Colored Petri Nets Using Object-Centric Event Data (OCED2CPN) Wil M.P. van der Aalst (Process and Data Science (PADS), RWTH Aachen University, Aachen, Germany)	P 1
Bandwidth Performance Analysis and Shaping Algorithm on Metro-E Campus Network Amir Din Suad Shamsuddin, Murizah Kassim, Nor Paezah Abdullah (Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia)	P 7
A Comprehensive Review of Watermarking System Applied to Medical Imaging: Techniques and Trends Chaimae Chekira, Hajar Benzakour, Manal Marzouq, Hakim El fadili, Zakia Lakhliai (National School of Applied Sciences, Sidi Mohamed Ben Abdellah University, Fez, Morocco)	P 13
Change Point Analysis in Vasicek Interest Rate Model Gleb Zotov, Petr Lukianchenko (Higher School of Economics, Moscow, Russian Federation)	P 19
Quran Wordnet: A Framework for Semantic and Sentiment Search Abdallah Tubaishat (Zayed University, United Arab Emirates), Saad Razzaq, Fahad Maqbool, Muhammad Ilyas, Muhammad Shahrose Khan (University of Sargodha, Pakistan)	P 24
Study of the SNORT Intrusion Detection System Based on Machine Learning Ouafae El aeraj, Cherkaoui Leghris (Faculty of Sciences and Techniques Mohammedia, Hassan II University of Casablanca, Morocco)	P 33
Incorporating a Cryptographic-Based Blockchain Technology to Revolutionize Degree Automation Oumaima Ouadoud, Tarik Chafiq, Ahmed Eddaoui (Faculty of sciences Ben Msik, Hassan II University, Morocco), Mohammed Ouadoud (University of Mohammed first Oujda, Morocco)	P 38
A Review and Synthesis for Framing the Use of Artificial Intelligence in Cybersecurity Tarik Guemmah, Hakim El fadili, Said Hraoui (Sidi Mohamed Ben Abdellah University, Fez, Morocco)	P 44
A Review of Breast Cancer Diagnostic Using Machine Learning Classification Techniques Zineb Idrissi Janati, Hakim El fadili, Saad Bennani Dosse, Khalid Zenkouar (Sidi Mohamed Ben Abdellah University, Fez, Morocco)	P 50
Integrating Artificial Intelligence and Natural Language Processing in E-Learning Platforms: A Review of Opportunities and Limitations Mouna Kaoui, Fatima Lakrami, Ouidad Labouidya (Faculty of Science, Chouaib Doukkali University, El Jadida, Morocco)	P 56
An Improved KNN Algorithm Based on Ensemble Methods and Correlation Youness Manzali, Khalidou Barry, Mohamed EL Far (Faculty of Sciences Dhar El Mahraz Sidi Mohammed Ben Abdellah University, Fez, Morocco)	P 64
Heart Disease Prediction and Classification Using Machine Learning Algorithms Khalidou Abdoulaye Barry, Youness Manzali, Outmane Labaybi, Mohamed EL Far (Faculty of Sciences Dhar El Mahraz Sidi Mohammed Ben Abdellah University, Fez, Morocco), Flouchi Rachid (Science and Technologies Faculty, Sidi Mohamed Ben Abdellah University, Fez, Morocco)	P 71

Gesture Recognition and Computer Vision: A Bibliometric Analysis	P 77
Soukaina Samhale, Khadija Louzaoui, Khalid Benlhachmi (Ibn Tofail University, Kenitra, Morocco)	
Descriptive Analysis of the Use of Industrial Property Rights, Advanced Technologies and ICT by Moroccan Companies During the COVID-19 Period	P 81
Fatima zahra Benbrahim, Abdelhay Benabdelhadi (ENCG Kenitra, Ibn Tofail University, Morocco), Hind Salih (International University of Monaco, Monaco), Najiba El Amrani El Idrissi (FST Fez, Sidi Mohamed Ben Abdellah University, Morocco)	
Big Data Quality Anomaly Scoring Framework Using Artificial Intelligence	P 87
Widad Elouataoui, Saida Elmendili, Youssef Gahi (National School of Applied Sciences, Ibn Tofail University, Kenitra, Morocco)	
Towards a Based Artificial Intelligence Model to Support Marketing Communication	P 93
Khaoula Fath el khair, Mustapha El Hamzaoui, Miloudi Kobiyh (ENCG-J, Chouaib Doukkali University, El Jadida, Morocco)	
Enabling Open Banking and Analytics in the Cloud Through a Distributed Data Anonymization Pipeline	P 99
Abdellah Berkaoui, Youssef Gahi (Ibn Tofail University, Kenitra, Morocco)	
Analysis of Banking Fraud Detection Methods Through Machine Learning Strategies in the Era of Digital Transactions	P 105
Hanae Abbassi, Youssef Gahi, Saida Elmendili (National School of Applied Sciences, Ibn Tofail University, Kenitra, Morocco)	
A State of Art of Cardiovascular Diseases Using Machine Learning Algorithms	P 111
Hajar Benzakour, Chaimae Chekira, Hakim El fadili, Khalid Zenkouar (Sidi Mohamed Ben Abdellah University, Fez, Morocco)	
Empirical Study of the Impact of Industry 4.0 Tools and e-Maintenance on Financial and Operational Performance Indicators of Companies	P 117
Yassine Moumen, Mariam Benhadou, Abdellah Haddout (National High School of Electricity and Mechanics, Hassan II University, Casablanca, Morocco), Basma Benhadou (International University of Casablanca, Morocco)	
Systematic Review on the Conversion of Tacit Knowledge	P 123
Ouissale Zaoui seghroucheni, Mohamed Lazaar (National School of Computer Science and Systems Analysis, Mohammed V University, Rabat, Morocco), Mohammed Al achhab (Abdelmalek Essaadi University, Morocco)	
On the Interpretability of a Tree-Based Ensemble for Predicting Software Effort	P 129
Assia Najm, Abdelali Zakrani (ENSAM, Hassan II University, Morocco)	
Anomaly Detection in PV Modules: A Comparative Study of DBSCAN, k-Means, Isolation Forest, and LOF	P 135
Mohamed Limam El hairach, Insaf Bellamine (Faculty of Sciences, Chouaib Doukkali University, El Jadida, Morocco), Amal Tmiri (National School of Arts and Crafts, Mohammed V University, Rabat, Morocco)	
Towards a Question/Answering System in Moroccan Legal Domain: Data Preparation and Question Classification Phase Using ML Approaches	P 140
Oussama Tahtah, Ahmed Zinedine, Khalid Fardousse, Yassine Akhiat (FSDM, Sidi Mohamed Ben Abdellah University, Fez, Morocco)	

SDN/NFV Security Challenges and Proposed Architecture	P 145
Jaadouni Hatim, Habiba Chaoui (National School of Applied Sciences, Ibn Tofail University, Kenitra, Morocco), Chaimae Saadi (LASTIMI, EST Sale, Morocco)	
Drowsiness Detection Using Dlib: An Overview	P 150
Hoda El boussaki, Latif Rachid, Amine Saddik (National School of Applied Sciences Ibn Zohr University, Agadir, Morocco)	
Time Series Forecasting Using Ensemble Model	P 155
Mohamed Elmahjoub, Mohamed EL Far (FSDM, Sidi Mohamed Ben Abdellah University, Fez, Morocco)	
Comparing Six Computer Vision Techniques for Rice Pest Recognition in the Field	P 160
Christopher Harris (Department of Mathematical Sciences, University of Northern Colorado, United States), Ignatius Andika (Universitas Atma Jaya, Indonesia), Yohanes Trisyono (Universitas Gadjah Mada, Indonesia)	
Plant Leaf Diseases Classification Using Deep Learning	P 166
Hafsa Arid, Insaf Bellamine, Abdelmajid EL Moutaouakkil (Faculty of Sciences, Chouaib Doukkali University, El Jadida, Morocco)	
Machine Learning-Based Prediction of Flight Punctuality and Delays	P 171
Hajar Alla, Lahcen Moumoun, Balouki Youssef (Faculty of Sciences and Techniques, Hassan First University of Settat, Morocco)	
Predicting the Failure of Plain Dent Pipeline Subjected to Cyclic Loads Using an Artificial Neural Network	P 179
Yassine El kiri, Zakaria Mighouar, Laidi Zahiri, Khalifa Mansouri, Soufiane El ouardi, Hammadi Chaiti (ENSET Mohammedia, Hassan II University, Morocco)	
A Review of Recent IDS Proposals Based on Ensemble Learning in IoT Networks	P 187
Zouhir Doumal, Hakim El fadili, Saad Bennani Dosse (ENSA Fez, Sidi Mohamed Ben Abdellah University, Morocco)	
AI-Powered Machine Learning Regulated Emotions in Entrepreneurial Pitching on Investors' Funding Decision	P 193
Wadid Lamine, Shirin Biglari (Telfer School of Management, University of Ottawa, Canada), Jahangir H. Sarker (Canadian Joint Warfare Centre, Department of National Defence, Ottawa, Ontario), Naïcen Ghanmi (Faculty of Medicine and Health Sciences, McGill University, Montreal, Canada)	
Fourier Transform and Machine Learning for Real-Time Monitoring of Froth Flotation in Mining Industry	P 199
Ahmed Bendaouia (MAScIR, Cadi Ayyad University, Marrakech, Morocco), El Hassan Abdelwahed, Sara Qassimi, Oussama Hasidi, Youssef Chafqui (Cadi Ayyad University, Marrakech, Morocco), Abdelmalek Boussetta, Intissar Benzakour (Managem Group, Marrakech, Morocco), Oumkeltoum Amar (MAScIR, Rabat, Morocco)	
Vision Transformers: A Review of Architecture, Applications, and Future Directions	P 205
Abdelhafid Berroukham, Khalid Housni, Mohamed Lahraichi (Faculty of sciences Kenitra, Ibn Tofail University, Morocco)	
Lung Segmentation Using a ConvMixer-Based Framework	P 211
Farah Oubelkas, Lahcen Moumoun, Abdellah Jamali (Faculté Sciences et Technique, Hassan First University of Settat, Morocco)	

- Improving Human Action Recognition in Videos With Two-Stream and Self-Attention Module** P 215
Hakim Nasaoui, Insaf Bellamine, Silkan Hassan (Faculty of Sciences, Chouaib Doukkali University, El Jadida, Morocco)
- Enhancing Respiratory Diseases Detection Using GAN Augmentation and Transfer Learning** P 221
Zakaria Benhaili, Youness Abouqora, Youssef Balouki, Lahcen Moumoun (Faculty of Sciences and Techniques, Hassan First University of Settat, Morocco)
- Building an Automatic Agricultural Products Recognition System to Facilitate the Export Process of Fruits and Vegetables** P 228
Mohammed Faiz Idriss, Reda Jourani (National School of Applied Sciences of Tetouan, Abdelmalek Essaadi University, Morocco)
- Complex Annotation Based Approach for Arabic Syntactic Analyzer Using the NooJ Text Annotation Structures** P 235
Azeddin Rhazi (Faculty of Arts Humanity Sciences (FLSH), UCAM, Morocco), Ali Boulaalam (FPD Errachidia, Morocco)
- Pneumonia Classification and Localization in Enhanced X-Ray Images With Transfer Learning and CNN Architectures** P 239
Abd Allah Aouragh, Mohamed Bahaj (Faculty of Sciences and Techniques, Hassan 1st University, Settat, Morocco)
- An Efficient Framework Using Representaion Learning and CRF Models for 3D Shape Co-Segmentation** P 245
Youness Abouqora, Zakaria Benhaili, Lahcen Moumoun (Faculty of Sciences and Techniques, Hassan 1st University, Settat, Morocco)
- Earlier Forecasting of Chronic Kidney Failure: Performance of Artificial Intelligence in Healthcare** P 251
Basma Boukenze (IUT AIX en Provence, Aix Marseille University, France)
- Implementation of Artificial Intelligence for Predicting Non-Quality Failures** P 260
Zaineb Zoubaidi, Brahim Herrou, Hassan Khadiri (FST Fez, University of Sidi Mohamed Ben Abdellah, Morocco), Souhail Sekkat (IASI – ENSAM, Moulay Ismail University, Meknes, Morocco)
- Analyzing US Airline Customer Sentiment on Twitter Using Multinomial Logistic Regression and Feature Reduction** P 265
Lina Abou-Abbas, Khadidja Henni, Neila Mezghani (TELUQ University, Montreal, Canada), Imene Jemal (INRS-Centre Energie, Matériaux et Télécommunications, Montreal, Canada)
- Multilingual Intent Recognition: A Study of Crosslingual Transfer Learning** P 271
Karthika Vijayan (Data Science, Sahaj AI, Pune, India), Oshin Anand (Data Science, Sahaj AI, Austin, Texas)
- Predicting Corporate Solvency Using Sentiment Analysis of Risk Analyst Textual Assessments** P 277
Ayoub El Qadi (Sorbonne University, France), Maria Trocan, Patricia Conde-Cespedes (ISEP, Paris, France), Thomas Frossard (Tinubu Square, Paris, France)
- Named Entity Recognition in the Moroccan Dialect** P 282
Hanane Moussa, Asmaa Mourhir (School of Science and Engineering, Al Akhawayn University, Ifrane, Morocco)

- ConflIBERT-Spanish: A Pre-Trained Spanish Language Model for Political Conflict and Violence** P 287
Wooseong Yang, Sultan Alsarra, Luay Abdeljaber, Niamat Zawad, Zeinab Delaram, Latifur Khan, Patrick Brandt (Department of Computer Science, University of Texas at Dallas, USA), Javier Osorio (University of Arizona, USA), Vito D'Orazio (West Virginia University, USA)
- Advancing Dialectal Analysis: Annotating Corpora and Building Lexical Resources for Arabic Dialects** P 293
Nadia Khlif (ILC-CNR, Pisa, Italy & University Mohammed first, Oujda, Morocco), Ouafae Nahli, Elisa Gugliotta, Benotto Giulia (ILC-CNR, Pisa, Italy)
- Compact Transformer-Based Language Models for the Moroccan Darija** P 299
Mohamed Aghzal, Mohamed Amine El Bouni, Saad Driouech, Asmaa Mourhir (School of Science and Engineering, Al Akhawayn University, Ifrane, Morocco)
- A UWB Vibrotactile Safety Monitoring System for Factory Environments** P 305
Sofya Sellak, Oumayma Haberchad, Salma Ibenyahia, Yassine Salih-Alj (School of Science and Engineering, Al Akhawayn University in Ifrane, Morocco)
- Blockchain-Enabled Edge Computing and Sensor Integration for IoT-Based Smart Grid Systems - Implementation and Energy Management: Morocco Case Study** P 311
Mohamed Amine Bounab, Anas El Fali, Walid Hmidou, Yassine Salih-Alj (School of Science and Engineering, Al Akhawayn University in Ifrane, Morocco)
- Anti-Drone Systems: Current Intelligent Countermeasures From Low to High Risks** P 317
Yasmine Ghazlane, Maha Gmira, Ahmed El Hilali Alaoui (School of Digital Engineering and Artificial Intelligence, Euromed University, Fez, Morocco)
- An Internet of Things Approach to Support a High-Tech House** P 323
Mario Casillo, Liliana Cecere, Francesco Colace, Angelo Lorusso, Francesco Marongiu, Domenico Santaniello (DIIn, University of Salerno, Fisciano, Italy)
- Implementation of Real-Time Wind Turbine Emulator Using Induction Motor Controlled by a Linear Control Approach** P 329
Aicha Isser, Loubna Benaouinate, Mohamed Khafallah (ENSEM, Hassan II University of Casablanca, Morocco)
- A Review of Formal Security Verification of Common Internet of Things (IoT) Communication Protocols** P 334
Imane Bouziane, Houda Belmokadem, Mohamed Moussaoui (National Schools of Applied Sciences of Tangier, Abdelmaled Essaadi University, Morocco)
- An Off-Grid Hybrid Piezoelectric-Electromagnetic Tuning System for Vortex Induced Vibration Bladeless Turbines** P 342
Wissal Barday, Zineb Salma Bahri, Sami Ez-zabri, Yassine Salih-Alj (School of Science and Engineering, Al Akhawayn University in Ifrane, Morocco)
- The Inverse Kinematics of 3-DOF Planar Robotic Arm** P 350
Abdelaziz Ed-deryouch, My Elhoussine Ech-chhibat, Khalifa Mansouri (ENSET Mohammedia, Hassan II University Casablanca, Morocco)
- Behavioral Modeling and Prediction in Urban Multimodal Transport: Current Techniques and Future Trends** P 355
Abdellah Bousouf, Naoufal Rouky, Othmane Benmoussa, Mouhsene Fri (Euromed Polytechnique School, University Euromed of Fes, Morocco)

Data Gathering From IoT Networks	P 361
Abderrahim Zannou (FSTH, Abdelmalek Essaadi University, Morocco), El Habib Nfaoui, Abdelhak Boulaalam (Sidi Mohamed Ben Abdellah University, Fez, Morocco), Naoufal El Allali, Mourad Fariss (Mohammed First University, Oujda, Morocco)	
A Novel Broadband Millimeter-Wave Microstrip Antenna for 5G Applications	P 366
Youssef Frist, Mohamed Nabil Srifi (ENSA Kenitra, Ibn Tofail University, Morocco), Mourad Elhabchi (FSBM, Hassan II University, Casablanca, Morocco)	
An Optimal Scheduling Process for Electric Vehicle Charging Using a PSO Based Approach	P 371
Ayman Sarti, Widad Zerzari, Salma Azzouzi, Moulay El Hassan Charaf (Faculty of sciences Kenitra, Ibn Tofail University, Morocco)	
Optimizing Energy Generation: Real-Time Performance Management Strategy Leveraging 4.0 Technologies in the Energy 4.0 Era	P 377
Ali El kihel, El Mahdi Bouyahrouzi, Lotfi Sehli, Soufiane Embarki, Bachir El kihel (National School of Applied Sciences, University Mohammed First, Oujda, Morocco)	
RAMI 4.0 Framework Applied to Industry 4.0 Technologies Deployment: Moroccan Chemical Industry Use Case	P 384
Tariq Benslimane, Rajaa Benabbou, Salma Mouatassim, Jamal Benhra (National School of Electrical and Mechanical Engineering, Hassan II University of Casablanca, Morocco)	
Freight on Public Transportation: Assessing the Role of Inter-modality	P 389
Mohamed Amine El amrani, Mouhsene Fri, Othmane Benmoussa , Naoufal Rouky (Euromed Polytechnic School, Euromed University of Fez, Morocco)	
Predicting Grinding Mill Power Consumption in Mining: A Comparative Study	P 395
Chaimae Loudari, Moha Cherkaoui, Imad El Harraki (National School of Mines of Rabat, Morocco), Rachid Bennani, François Bourzeix (MAScIR Rabat, Morocco), EL Hassan Abdelwahed, Mohamed El Adnani (Cadi Ayyad University Marrakech, Morocco), Karim Baina (ENSIAS Rabat, Morocco), Omar Fares, Intissar Benzakour (MANAGEM Group, Morocco)	
Ultrasonic Study of the Bonding Quality Symmetry of a Three-Layer Bonded Structure	P 400
Brahim Irissi, Idris Aboudaoud, Driss Izbaïm, Bouazza Faiz (Faculty of Sciences, Ibn Zohr University, Agadir, Morocco), El Houssaine Ouacha (Higher School of Education and Training, Ibn Zohr University Agadir, Morocco), Hicham Lotfi(Higher School of technology Guelmim, Ibn Zohr University Agadir, Morocco)	
Energy Transition and Digitalization: Small Modular Reactors and Smart Grids	P 405
Hafsa Housni, Nissrine Majit, Naila Amrous, Najima Daoudi (School of Information Sciences Rabat, Morocco), Mohamed Jaoud Malzi (Cadi Ayyad University & School of Information Sciences Rabat, Morocco)	
Thermal and Structural Study of a Brake Disc Using COMSOL	P 411
Mohammed Chaqouri, Mohamed MANIANA, Abedelali Tajmouati (FST Settat, Hassan 1st University, Morocco)	
The Use of Serious Games in Moroccan Educational Context	P 415
Mohamed Achour, Ahmed Tahiri (Normal Superior School, Sidi Mohamed Ben Abdellah University, Fez, Morocco), Jalal Khouna (Normal Superior School, Cadi Ayyad University, Marrakech, Morocco)	

- Students' Related Factors' Effect on Their Performance in Online Learning: A Case Study** P 419
Saida Tayoub, Abderrahmane Sakouili, Razane Chroqui (National School of Applied Sciences Berrechid, Hassan First University of Settat, Morocco)
- A Framework for Predicting Student Academic Path Using Machine Learning** P 425
Chaimae Ouhaddou, Asmaâ Retbi, Samir Bennani (Mohammadia School of Engineers (EMI) Mohammed V University In Rabat, Morocco)
- Assessing Students' UML Class Diagrams: A New Automated Solution** P 431
Rhaydae Jebli, Jaber El Bouhdidi, Mohamed Yassin Chkouri (ENSATE, Abdelmalek Essaadi University, Tetouan, Morocco)
- Unleashing the Potential of Personalized Gamification and Social Learning: An Adaptive Approach to Motivation and Success Improvement** P 436
Hiba Gharbaoui (ENSET Mohammedia, University Hassan II of Casablanca Morocco, Lab-STICC, University Bretagne Sud, France), Khalifa Mansouri (ENSET Mohammedia, University Hassan II of Casablanca, Morocco), Franck Poirier (Lab-STICC, University Bretagne Sud, France)
- Exploring Social Learning Through Virtual Reality: How Technology Can Enhance Collaboration and Learner Engagement** P 442
Oumaima Elkaoun, Abdelhak Chakli, Youssef Sefri (Hassan II University of Casablanca, Casablanca, Morocco)
- Agile Pedagogy: Using Scrum and Project Based Learning for Enhanced Educational Experiences** P 445
Houda Khabbali, Yassine Zaoui Seghrouchni, Soumia Ziti (Faculty of Sciences Rabat, Mohammed V University in Rabat, Morocco)
- Systematic Review of Serious Games in Higher Education: Objectives, Benefits, Limitations, and Perspectives** P 450
Soumia Yamoul, Lynda Ouchaouka, Mohamed Moussetad, Mohamed Radid (Hassan II University of Casablanca, Casablanca, Morocco)
- Applications of AI in Higher Education: A Review of the Literature Engineering Education From Developing Countries** P 456
Mohammed Tahiri, Bahia Ismaïli, Soumia Bakkali (LRI, ENSEM, University of Hassan II Casablanca, Casablanca, Morocco)
- Holistic approach to AI-assisted student development cycles in higher education using the example of the West Saxon University Zwickau** P 462
Nico Kling, Frank Otto, Christian-Andreas Schumann, Claudia Tittmann (Institute for Management and Information, West Saxon University Zwickau, Zwickau, Germany), Thomas Bahn (assono GmbH, Schwentimental, Germany)
- The Use of Digital Technology to Improve Physical Education Learning of Technical Skills: Case of Sprint Running** P 467
Rachid Boujdi, Abdeljabbar Rouani, Driss Lamrioui, El mehdi Al Ibrahim (Faculty of Sciences, Ibn Tofail University, Kenitra, Morocco), Driss Lamri (Regional Center of Education and Training trades Rabat-Sale-Kenitra, Rabat, Morocco), Toufik Hassouni (Regional Center of Education and Training trades Fes-Meknes, Meknes, Morocco)

- Online Certification Training: Quality and Assessment** P 473
Kaoutar Smahi, Ouidad Laboudiya, Khalid El Khadiri (Faculty of Sciences, Chouaib Doukkali University, EL Jadida, Morocco)
- Creative Digital Language Learning Environment: A Model to Foster Creative Experiences for Language Learners** P 479
Hafizoah Kassim, Asiah Kassim, Nor Yazi Khamis, Arulselvi Uthayakumaran (Centre for Modern Languages, Universiti Malaysia Pahang Al-Sultan Abdullah, Pahang, Malaysia), Norhazwanie Jatin (Centre for Languages and Pre-University Academic Development, International Islamic University Malaysia, Pahang, Malaysia), Anealka Aziz Hussin (Akademi Pengajian Bahasa Universiti Teknologi MARA, Selangor, Malaysia)
- E-Learning and Digital Technologies in Lifelong Learning in Prisons** P 483
Ana Machado, Angélica Monteiro (Faculty of Psychology and Educational Sciences, University of Porto, Porto, Portugal), José António Moreira (University of Coimbra, Coimbra, Portugal)
- An Ontology-Based Recommender System for Identifying Learners' Confusion in MOOCs** P 492
Kaoutar Tazi, Salma Azzouzi, Moulay El Hassan Charaf (Faculty of Sciences, Ibn Tofail University, Kenitra, Morocco)
- Design of Indoor Environmental Quality Monitoring System Using Model-Based Systems Engineering** P 497
Wissal Herra (School of Architecture Planning and Design, Mohammed VI Polytechnic University, Morocco), Aicha Rabhi (Chouaib Doukkali University, Morocco), Hicham Mastouri, Hassan Radoine, Hicham El hadraoui, Amine Ennawaoui (Mohammed VI Polytechnic University, Morocco)
- Analytical study of Virtual reality in Moroccan higher education** P 503
Khadija Talbi, Imane Zergout, Souad Ajana, Zineb Aithaddouchane (ENSEM, Hassan II University, Casablanca, Morocco)
- Feeding Two Birds With One Scone: Using AWE to Enhance Writing and Creativity Among Pre-University Students** P 508
Norhazwanie Jatin (Centre for Modern Languages, Universiti Malaysia Pahang Al-Sultan Abdullah & International Islamic University Malaysia, Centre for Languages and PreUniversity, Academic Development, Pahang, Malaysia), Hafizoah Kassim, Nor Yazi Khamis, Asiah Kassim (Centre for Modern Languages, Universiti Malaysia Pahang Al-Sultan Abdullah, Pahang, Malaysia)
- Exploring the Use of Artificial Intelligence (AI) Based Technology to Enhance Creativity in ESL Speaking Classroom** P 512
Hazwani Hassim, Hafizoah Kassim, Asiah Kassim (Universiti Malaysia Pahang Al-Sultan Abdullah, Pahang, Malaysia), Murizah Kassim (Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia & Universiti Teknologi MARA Shah Alam, Selangor, Malaysia)
- Enhancing Learner Resource Recommendations on LMS Through Context and Learning Style Analysis** P 518
Khalid Benabbes, Khalid Housni (Faculty of Sciences, Ibn Tofail University, Kenitra, Morocco), Ahmed Zellou (ENSIAS, Mohammed V University in Rabat, Morocco), Brahim Hmedna, Ali El mezouary (Ibn Zohr University, Agadir, Morocco)

- Incorporating Feature Penalty in Reinforcement Learning for Ludo Game** P 524
Abdallah Tubaishat, Feras Al-Obeidat, Babar Shah (Zayed University, United Arab Emirates), Sajid Anwar (Institute of Management Sciences, Peshawar, Pakistan), Saad Razzaq (University of Sargodha, Pakistan)
- Joint Association and Computing Resource Optimization for Distributed Wireless Metaverse** P 531
Latif U. Khan, Mohsen Guizani (Mohamed Bin Zayed University of Artificial Intelligence, United Arab Emirates), Bassem Ouni (Technology Innovation Institute, UAE), Mohamed Adel Serhani (Sharjah University, UAE)
- Hyperparameter Optimization and Neuroevolution With Binary Quadratic Meta-Heuristics and Evolution Strategies** P 536
David Von Dollen, Thomas Bäck (Leiden University, Leiden, Netherlands), Reuben Brasher, Florian Neukart (Terra Quantum, Zurich, Switzerland)
- BERT-Enhanced Deep Gaussian Regression: A Unified Approach for Sentiment Analysis and Price Prediction** P 541
Asmae Amellal, Issam Amellal, Hamid Seghioeur, Mohammed rida Ech-charat (ENSA Tetouan, Abdelmalek Essaadi University, Tetouan, Morocco)
- Feature Selection and Dimensionality Reduction for Unbalanced Liver Disease Classification With Optimized Machine Learning Algorithms** P 547
Abd Allah Aouragh, Mohamed Bahaj (Faculty of Sciences and Techniques, Hassan 1st University, Settat, Morocco)
- Predictive Maintenance Planning for Railway Systems** P 553
Malak Saiem, Faicel Hnaïen, Hichem Snoussi (LIST3N, University of Technology of Troyes, France), Valeria Borodin (Mines Saint-Etienne University Clermont Auvergne, Saint-Etienne, France)
- Review of a Comparative Survey on the Detection and Classification of Traffic Signs** P 559
Roumaissae El mojahid, Outman EL Hichami, Badr Eddine El Mohajir, Mohammed AL Achhab, Adnan Souri, Abdelali Zbakh (Abdelmalek Essaadi University, Tetouan, Morocco)
- An Empirical Study of Moroccan Industrial Data: Challenges and Benefits of an ERP System** P 566
Karima Moumane, Naoual Chaouni benabdellah, Imane Rafik (ENSIAS, University Mohammed V in Rabat, Morocco)
- Supporting Australian Indigenous Languages From Textual Sources** P 575
Nick Thieberger, Sophie Lewincamp, Marco La Rosa (School of Languages and Linguistics, University of Melbourne, Australia)
- Wikidata for Papyrologists: A Reflection on Data-Modeling** P 581
Jasmine Sahu-Hough (Classics and History, Yale University, New Haven, USA)
- Digitizing Old Nubian Dictionary: Optical Character Recognition for Multi-Lingual and Multi-Script Text From Medieval Africa** P 587
So Miyagawa (Research Department, National Institute for Japanese Language and Linguistics, Tokyo, Japan)
- Two Workflows for the Digital Edition of the Unpublished Elisa Chimenti's Corpus (Naples 1883-Tangier 1969)** P 593
Bianca Vallarano (Dept. of Literary, Linguistic and Comparative studies, University of Naples "L'Orientale", Naples, Italy), Ada Desideri (Dept. of Italian studies, Sorbonne University, Paris, France)

- Preprocessing of Recto-Verso Printed Documents Based on Neural Networks for Text Analysis** P 600
Pasquale Savino, Anna Tonazzini (Istituto di Scienza e Tecnologie dell'Informazione, Consiglio Nazionale delle Ricerche, Pisa, Italy)
- Document Analysis and Philological Operations. is Category Theory a Suitable Approach?** P 605
Riccardo Del Gratta, Simone Zenzaro, Angelo Del Grosso (Institute for Computational Linguistics, "A. Zampolli", National Council of Research, Pisa, Italy), Federico Boschetti (Institute for Computational Linguistics, "A. Zampolli", National Council of Research & VeDPH, Pisa & Venice, Italy)
- On the Role of Models and Modularity in the Design and Development of Digital Humanities Tools** P 611
Simone Zenzaro (Institute for Computational Linguistics, "A. Zampolli", National Council of Research, Pisa, Italy)
- Bellini Digital Correspondence: A Model for Making Collaborative Digital Scholarly Editions** P 615
Salvatore Cristofaro (Università di Catania, Italy), Angelo Mario Del Grosso (ILC-CNR Pisa, Italy), Laura Mazzaguo (Università di Pisa, Italy), Pietro Sichera (Ministero Istruzione e del Merito, Ragusa, Italy), Daria Spampinato (CNR - Istituto di Scienze e Tecnologie Della Cognizione, Italy)
- GreekSchools: Making Traditional Papyrology Machine Actionable Through Domain-Driven Design** P 621
Angelo Mario Del Grosso, Simone Zenzaro (ILC-CNR Pisa, Italy), Federico Boschetti (CNR-ILC URT Venezia, Italy), Graziano Ranocchia (Università di Pisa Pisa, Italy)
- Preserving Cultural Heritage: Digitizing the Historical Archive of the Former Psychiatric Hospital of Girifalco (South Italy)** P 627
Maria Teresa Chiaravalloti, Maria Taverniti (Institute of Informatics and Telematics, National Research Council, Rende (CS), Italy), Francesca Dovetto (Department of Humanities, University Federico II of Naples, Italy)
- From the Internet of Things (IoT) to the Internet of Behaviors (IoB) for Data Analysis** P 634
Imane Moustati, Noredine Gherabi, Hakim El Massari, Mostafa Saadi (ENSA Khouribga, Sultan Moulay Slimane University, Khouribga, Morocco)
- The Digital Transformation of the HR Function: Which Performance Tool?** P 640
Basma El ouaghlidi, Fatima El Amrany, Abderrahmane Ouddasser (Sidi Mohamed Ben Abdellah University, Morocco)
- Predicting Heart Disease Risk in Patients Using Various Kinds of Analytical Models** P 649
Fatma Al Ali, Hanan Hussein, Feras Al-Obeidat (College of Technological Innovation, Zayed University, United Arab Emirates)
- Machine Learning based Identity and Access Management Systems (ML_I&AM): A Taxonomy** P 657
Sara Aboukadri, Aafaf Ouaddah, Abdellatif Mezrioui (National Institute of Posts and Telecommunications, Rabat, Morocco)
- Beyond the Bug Bounty Programs Trilemma: Bounty 3.0's Blockchain-ZKP Approach** P 663
Inas Hasnaoui, Maria Zrikem, Raja Ellassali (National School of Applied Sciences, Cadi Ayyad University, Marrakech, Morocco)
- A Patient-Centric Blockchain-Based System for Access Management in Telehealth and Telemedicine Domain** P 669
Ayoub Ghani, Ahmed Zinedine (Faculty of Sciences, Sidi Mohamed Ben Abdellah University Fez, Morocco), Mohammed El Mohajir (Faculty of Sciences, Abdelmalek Essaadi University, Tetouan, Morocco)

- Enhancing Image Security through AI-based Fingerprint, Watermarking Approach** P 675
Manale Boughanja, Ahmed Srhir, Tomader Mazri (Ibn Tofail University, Kenitra, Morocco)
- Measuring the Effectiveness of the Augmented Reality Technology on Muscular Rehabilitation Endurance and Coordination** P 682
JaeHo Yu (dept. of physical therapy, SunMoon University, Asan, South Korea)
- Comparative Analysis of Datasets for Response-Based Knowledge Distillation in Image Classification** P 688
Ange Gabriel Belinga (Faculty of Sciences, Mohammed V University in Rabat, Morocco), Mohamed El Haziti (High School of Technology, Mohammed V University in Rabat, Morocco)
- Validation of Lean PLM Implementation Models- A Survey-Based Study at an Automotive Manufacturer in Morocco** P 692
Nada El Faydy, Laila El Abbadi (National School of Applied Sciences, Ibn Tofail University, Kenitra, Morocco)
- Managing Occupancy Rates in a Hospital Emergency Department: Combining Model-Based and Model-Free Control Approaches** P 698
Danielle Nya Nyakam, Hassane Abouaissa (University of Artois, Béthune, France)
- A Framework for Solving the Job Shop Scheduling Problem** P 704
Mohamed Kriouich, Hicham Sarir (ENSA Tetouan, Abdelmalek Essaadi University, Morocco)
- An Extended Review of the Manufacturing Transition Under the Era of Industry 5.0** P 709
Hajar Mouhib, Samah Elrhani, Laila El Abbadi (National School of Applied Sciences, Ibn Tofail University, Kenitra, Morocco), Sara Amar (Bowling Green State University, USA)
- Evaluation of the Impact of Diagnostic Coverage and Common Cause Failures on Multi-Sensor Architectures in SIS Design** P 715
Fatima Ezzahra Nadir (Higher School of Technology, Ibn Zohr University, Agadir, Morocco), Mohammed Bsiss, Benaissa Amami (Faculty of Sciences and Technologies, Abdelmalek Essaadi University, Tangier, Morocco)
- Optimizing Supplier Selection for Environmental Sustainability: A Novel Approach Based on Enhanced Fuzzy Best-Worst Method** P 721
Wissal El Bettioui, Mounia Zaim, Mohamed Sbihi (Superior School of Technology Sale, Mohammed V University in Rabat, Morocco)
- Analysis of the Role of Machine Learning in the Internet of Things (IoT)** P 725
Kamel Haouam (Al Yamamah University, Riyadh, Saudi Arabia)