

2023 International Conference on Innovations in Intelligent Systems and Applications (INISTA 2023)

**Hammamet, Tunisia
20-23 September 2023**



**IEEE Catalog Number: CFP2372N-POD
ISBN: 979-8-3503-3891-1**

**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: | CFP2372N-POD |
| ISBN (Print-On-Demand): | 979-8-3503-3891-1 |
| ISBN (Online): | 979-8-3503-3890-4 |
| ISSN: | 2380-9337 |

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

2023 International Conference on INnovations in Intelligent Systems and Applications (INISTA)

TABLE OF CONTENTS

Session 1: Classification, Clustering, Prediction I

| | |
|--|----|
| A Road Classification Approach Based on Road Traffic Severity Analysis <i>Khedher Ibtissem, Khedher Marwen, Rjaibi Neila and Faiz Sami</i> | 1 |
| An Enhanced Feature Selection Approach Using Capuchin Search Algorithm for High-dimensional Biological Data Classification <i>Iyad Jaber, Yousef Hassouneh and Maha Khemaja</i> | 7 |
| Exploiting Pre-trained Architectures for Dual-Stream Classification of LCA-RCA in a Private AngioData <i>Moalla Hounaida, Aiman Ghrab, Amine Bahloul, Bassem Ben Hamed and Leila Abid</i> | 14 |
| Decision Making Help during Ultrasonic Inspection of Materials <i>Lakhder Boudhane, Mohamed Amine Djennah and Thouraya Merazi Meksen</i> | 20 |

Session 2: Learning I

| | |
|--|----|
| A Hybrid Machine Learning Approach for Automatic Experts Recommendation Systems <i>Amani Drissi, Ahmed Khemiri, Salma Sassi, Anis Tissaoui, Richard Chbeir and Abderrazak Jemai</i> | 24 |
| Benchmarking Robustness of Deep Reinforcement Learning approaches to Online Portfolio Management <i>Marc Velay, Fabrice Popineau, Arpad Rimmel, Bich-Liên Doan and Fabrice Daniel</i> | 30 |
| Deep Reinforcement Learning-based Load Balancer Using Kubernetes <i>Moenes Ben Soussia, Khadija Bousselmi and Hanen Idoudi</i> | 36 |
| Improving Workplace Safety in the Cargo Industry through Posture Monitoring Using Mediapipe and Machine Learning <i>Buket Sonbas Cobb and Fethi Candan</i> | 43 |

Session 3: Classification, Clustering, Prediction II

| | |
|--|----|
| Near Real Time Prediction of Vibration in 3D Printed Flettner Rotor Demonstrator <i>Chetan Parmar, Elmar Wings and Thomas Peetz</i> | 49 |
| PuzzleNN: A Neural Network for Image Segmentation based on Clustering <i>Ada-Astrid Mocanu and Adrian Iftene</i> | 55 |
| PM2.5 Prediction Using Deep Learning Models <i>Marwa Faydi, Amira Zrelli and Tahar Ezzedine</i> | 61 |

Session 4: Arabic Language and Text Processing

| | |
|--|----|
| A Novel Approach for Extracting Summarized RDF Graph from Heterogeneous Corpus | 67 |
|--|----|

| | |
|--|----|
| <i>Beldi Amal, Richa Jean Raphael, Sassi Salma, Chbeir Richard and Jemai Abderrazek</i> | |
| A Text Block Refinement Framework For Text Classification and Object Recognition From Academic Articles <i>Jinghong Li, Koichi Ota, Wen Gu and Shinobu Hasegawa</i> | 74 |
| Arabic-Latin Scene Text Detection based on YOLO models <i>Housseem Turki, Mohamed Elleuch, Monji Kherallah and Alima Damak</i> | 80 |
| Using Embedding Keyphrases to Evaluate Arabic Text Summaries <i>Samira Ellouze and Maher Jaoua</i> | 86 |
| Official Document Text Extraction using Templates and Optical Character Recognition <i>Florin Harbuzariu, Cosmin Irimia and Adrian Iftene</i> | 92 |

Session 5: Learning II

| | |
|--|-----|
| A Comparative Study on Machine Learning Methods through Evaluating the Impact of Contributing Factors on the Accuracy of Soil Moisture Prediction <i>Mohammadd Nahin Islam and Doina Logofătu</i> | 96 |
| New Learner Model for Intelligent and Adaptive E-learning System <i>Asma Ayari, Mariem Chaabouni and Henda Ben Ghezala</i> | 102 |
| Point of Sale Fraud Detection Methods via Machine Learning <i>Ahmet Tuğrul Bayrak, Emre Begen, İsmail Utku Sayan and Olcay Taner Yıldız</i> | 109 |

Session 6: Medical Issues I

| | |
|---|-----|
| A Metaplastic Neural Network Technique for Human Activity Recognition for Alzheimer's Patients <i>Ahmed Zaghdoud and Olfa Jemai</i> | 114 |
| A Multidimensional Framework to Study the Clinical Decision Support System <i>Othmen Fares Ben Ayed and Ines Bayoudh Saadi</i> | 120 |
| A Review of Vision-based Abnormal Human Activity Analysis for Elderly Emergency Detection <i>Raoudha Nouisser, Salma Kammoun Jarraya and Mohamed Hammami</i> | 126 |
| Discovering Drug-Drug Interactions Using Association Rule Mining from Electronic Health Records <i>Nodira Nazyrova, Salma Chahed, Miriam Dwek, Stephen J. Getting and Thierry Chaussalet</i> | 132 |
| A Machine Learning Model for Cancer Staging, Case Study: Uveal Cancer <i>Feriel Hamdaoui, Amra Sghaier, Ahlem Bdioui and Sihem Hmissa</i> | 139 |

Session 7: Optimization and Systems I

| | |
|--|-----|
| A Novel Multi Stage Optimization Algorithm for a 3D-BPP Resolution <i>Meriem Hsayri and Mounira Tlili</i> | 144 |
| Approaches for Solving a Dynamic Stacking Problem in Uncertain Environments <i>Sarah Boeckel and Doina Logofătu</i> | 149 |
| Hierarchical Production Planning Frameworks for Multi Product Multi Stage Batch Plants | 155 |

Session 8: Neural Networks

| | |
|--|-----|
| A Fusion-Based Deep Neural Networks Approach for Face Liveness Detection <i>Melek Aydin, Murat Taskiran, Nihan Kahraman and Hatice Vildan Dudukcu</i> | 161 |
| Evaluation of Deep Neural Network Quality by CleanAI Coverage Metrics Library <i>Abdul Hannan Ayubi, Furkan Taskin, Osman Caglar, Sergen Asik, Cem Baglum and Uğur Yayan</i> | 167 |
| Unraveling the Black Box: Interpreting CNNs for Leaf Disease Detection through Model Analysis and Feature Importance <i>Haythem Ghazouani, Walid Barhoumi, Gwanggil Jeon and Ezzeddine Zagrouba</i> | 173 |

Session 9: Medical Issues II

| | |
|---|-----|
| Automatic Bone Metastasis Classification: An In-depth Comparison of CNN and Transformer Architectures <i>Marwa Afnouch, Olfa Gaddour, Fares Bougourzi, Yosr Hentati, Abdelmalik Taleb Ahmed and Mohamed Abid</i> | 177 |
| Leveraging Convolutional Neural Networks for Malaria Detection from Red Blood Cell Images <i>Daniela Petrea, Georgiana Ingrid Stoleru and Adrian Iftene</i> | 183 |
| Optimization of Home Health Vehicle Routes <i>Moez Balti, Rahma Bouhadida and Abderrazak Jemai</i> | 189 |
| PosiCalculia: An Adaptive Virtual Environment for Children with Learning Difficulties <i>Nadia Hocine, Mohamed Bouasria Ould Moussa and Sara Ait Ali</i> | 195 |
| TreatMedApp – Diagnosis and Treatment System <i>Mihai-Andrei Costandache, Paula-Luiza Balint, Narcis-Ştefan Barat, Cosmin-Constantin Birzu, Daniel-Iustin Bodnariu, Ovidiu Gabor and Adrian Iftene</i> | 201 |

Session 10: Optimization and Systems II

| | |
|--|-----|
| Performance Evaluation of Path Loss Models for Internet of Wearable Things <i>Marwen Amiri, Abdelaziz Hamdi and Aref Meddeb</i> | 206 |
| Prioritizing Barriers to I4.0 Integration in Tunisian Supply Chains <i>Manel Elmsalmi and Abdessalem Jerbi</i> | 212 |
| Transfer Learning-based IoT Botnet Detection <i>Sana Rabhi, Tarek Abbes and Faouzi Zarai</i> | 218 |
| Optimization Model for Electric Vehicle Charging Station Problem in Smart City <i>Softiene Abidi and Amina Soltani</i> | 223 |

Session 11: Education

| | |
|--|-----|
| A Review Study of ChatGPT Applications in Education <i>Marwa Zaabi, Walid Hariri and Nadia Smaoui</i> | 228 |
| Book Reckon – The use of Virtual Reality in the Creation of Libraries of the Future | 233 |

| | |
|---|-----|
| <i>George-Gabriel Constantinescu, Valentin Stamate, Danut Filimon and Adrian Iftene</i> | |
| Student Knowledge Evaluation System: A Case of Application of Fuzzy Logic in Intelligent Education <i>Mounira Chkiwa, Moez Chkiwa and Fatma Achour</i> | 239 |
| Towards a Quality-Driven and Ontology-Based Recommender Framework for Open Educational Resources <i>Mariam Bellal, Asma Mejri and Lilia Cheniti-Belcadhi</i> | 245 |
| NajahniBot: An Intelligent Chatbot aware of Educational Context for Adaptive Learning <i>Walid Bayounes, Ines Bayouadh Saâdi and Lassad Hamroun</i> | 251 |

Session 12: Image Processing

| | |
|---|-----|
| ACCP-MC-U-Net: Automatic Corpus Callosum Parcellation from brain MRI scans using MultiClass U-Net <i>Amal Jlassi, Khaoula Elbedoui and Walid Barhoumi</i> | 256 |
| Comprehensive Analysis of Image Registration Techniques on Brain MR Images <i>Muazzez Buket Darici and Atilla Ozmen</i> | 262 |
| Evaluating the Impact of Perceptually Uniform Encoding on the Performance of Feature Descriptors for HDR Image Retrieval <i>Raoua Khwildi and Azza Ouled Zaid</i> | 268 |
| Learning Weight of Losses in Multi-Scale Crowd Counting <i>Derya Uysal and Uluğ Bayazit</i> | 274 |
| Multiple Small-Scale Object Detection in Aerial Vehicle Images using Standard or Optimized YOLO Detectors <i>Zekeriya Eren Kaymakçı, Mefun Akarsu and Ceyda Nur Öztürk</i> | 280 |

Session 13: Data Issues

| | |
|--|-----|
| A Journey to Enhance Tabular Data FAIRness: From Annotation to Repair and Augmentation <i>Wiem Baazouzi, Marouen Kachroudi and Sami Faiz</i> | 285 |
| A Management Analysis Tool to Support Healthcare Resource Planning in Public Hospitals during the Covid-19 Pandemic: A Case Study <i>Amal Abid, Mounira Tlili, Feten Maaroufi and Ouajdi Korbaa</i> | 291 |
| Exploring the Benefits of Data Augmentation in Math Word Problem Solving <i>Gülsüm Yiğit and Mehmet Fatih Amasyali</i> | 297 |
| Personalized OLAP Queries under Hierarchical Visualization Constraint <i>Ghassen Hamdi, Abdelmoutia Telli and Mohamed Nazih Omri</i> | 303 |
| Approach For Probabilistic Semantic Big Data Indexing under an Uncertain Environment <i>Asma Omri, Djamel Benslimane and Mohamed Nazih Omri</i> | 309 |

Session 14: Security/Privacy and Ontologies

| | |
|--|-----|
| Complex Ontology Alignments using OWL Ontologies Embedding <i>Houda Akremi, Mouhamed Gaith Ayadi and Sami Zghal</i> | 313 |
|--|-----|

| | |
|--|-----|
| CROWDPRED: Privacy-Preserving Approach for locations on Decentralized Crowdsourcing Application <i>Farid Yessoufou, Elie Chicha, Salma Sassi, Richard Chbeir and Joel Hounsou</i> | 318 |
| Ontology-based Representation for Emergency Management Response <i>Sameh Guerfal, Nourchene Ouerhani and Ahmed Maalel</i> | 324 |
| Towards DDoS-aware Routing in SDN Using Cross-layer Knowledge Transfer <i>Ahmed Saidane and Ali El Kamel</i> | 330 |
| Open Banking API Security: Anomalous Access Behaviour <i>Dawood Behbehani, Nikos Komninos, Khalid Al-Begain and Muttukrishnan Rajarajan</i> | 336 |

Special Sessions

Special Session 1: Data Science at the Service of Biology and Healthcare (DSSBH)

| | |
|--|-----|
| A Fully Automatic Bayesian Model for Adaptive Activation Functions in Artificial Neural Networks <i>Mohamed Fakhfakh and Lotfi Chaari</i> | 340 |
| Arrhythmia Detection with Custom Designed Wavelet-based Convolutional Autoencoder <i>Öykü Eravcı and Nalan Ozkurt</i> | 346 |
| Deep Learning-Based Multi-Stage Analysis for Accurate Skin Cancer Diagnosis using a Lightweight CNN Architecture <i>Marwen Sakli, Chaker Essid, Bassem Ben Salah and Hedi Sakli</i> | 351 |
| Detection of COVID-19 Based on CT-Scan and X-ray Images with Deep Convolutional Neural Network <i>Eya Abidi and Sahbi Bahroun</i> | 357 |
| Early Mild Cognitive Impairment Detection Using Cognitive-motor Tasks and Machine Learning <i>Sivwar Chaabene, Bassem Bouaziz, Amal Boudaya, Lotfi Chaari and Anita Hokelmann</i> | 363 |
| Embedded Gene Expression Data Based On RidgeClassifier For Alzheimer's Disease Classification <i>Bouchra Guelib, Nawres Khelifa and Rayene Bounab</i> | 369 |

Special Session 2: MDLTREM and SIIoT

Machine Learning and Deep Learning Techniques for Remote Elderly Monitoring (MDLTREM)

| | |
|--|-----|
| Novel Approach For Scene Semantic Segmentation Using The Recurrent-Based UNET <i>Ahmed Khelifi, Mohamed Othmani and Monji Kherallah</i> | 375 |
| Pre-Trained Deep Convolutional Neural Network Architectures for Breast Cancer Diagnosis in Mammography: Current State-Of-The-Art <i>Marwa Ben Ammar, Faten Labbene Ayachi, Riadh Ksantini and Halima Mahjoubi</i> | 381 |
| AI Based Video and Image Analytics <i>Moez Balti, Ghada Somrani, Meriem. Bouhachem and Abderrazak Jemai</i> | 388 |
| Context Sensitive Detection of Long-term Elderly Behavior Change | 394 |

Dorsaf Zekri, Ahmed Snoun, Thierry Delot and Marie Thilliez

Scalability and Interoperability Issues in IoT enabled Smart Cities (SIIoT)

Efficient Cluster-Head Selection using BWM-TOPSIS Tool 400
Layla Aziz, Samira Achki and Abdelali El Gourari

Special Session 3: Smart Supply Chain Management (SSCM)

Big Data Analytics Architecture for Intelligent Transportation Systems: A Tunisian Case Study 405
Ines Sbai and Saoussen Krichen

Design of a Fuzzy Controller for Intelligent Control of an Adaptive ConWIP System 411
Khouloud Elloumi, Chawki Saidi and Mounir Benaissa

Sustainability-based Multi-capital Approach for the Agri-Food Supply Chain: Research Trends Based on Bibliometric Review 417
Ayla Amamou, Lilia Sidhom, Alaeddine Zouari and Abdelkader Mami

The Performance of Smart Supply Chain Management within Cloud and IoT Environment 423
Nawel Kortas and Habib Youssef

Special Session 4: Data Science at the Service of Biology and Healthcare (DSSBH)

Enhancing Maternofetal Ultrasound Images Toward Boosting Classification Performance on a Diverse and Comprehensive Data 429
Haifa Ghabri, Wysssem Fathallah, Hedi Sakli and Mohamed Naceur Abdelkarim

Generalized Multi-modal Medical Image Fusion Method using NSML and WLF in NSST Domain and YIQ color space 435
Hajer Ouerghi, Olfa Mourali and Ezzeddine Zagrouba

Genome Classification with Deep Learning Using Heuristic Algorithms for Hyperparameter Optimization 440
Péter Lehotay-Kéry, Gabriella Kicska and Attila Kiss

Lightweight CNN Towards Skin Lesions Automated Diagnosis In Dermoscopic Images 446
Marwen Sakli, Chaker Essid, Bassem Ben Salah and Hedi Sakli

Retinal Pathologies Detection in OCT Images Based on Bilinear Convolutional Neural Network 452
Zainab Haddad, Brahim Mahamat Yaya, Hsouna Zgolli, Desire Sidibe, Hedi Tabia and Nawres Khelifa

Explainable CBMIR Features Extractor Module to Ease Thoracic Aortic Aneurysm Retrieving Preventing Potential Acute Aortic Dissection 459
Abdelbaki Souid, Soufiene Ben Othman, Mohamed Hamroun, Hedi Sakli and Mohamed Naceur Abdelkarim

Special Session 5: LMNLP, SemKS & BeDaBApps

Language Models for Natural Language Processing Tasks (LMNLP)

- Optimizing Arabic Named Entity Recognition through Active Learning and AraBERT 464
Hassen Mahdhaoui, Abdelkarim Mars and Mounir Zrigui

Semantic-based Knowledge Systems (SemKS)

- Survey Semantic Arabic Language in Deep Learning Based Recommendation System 469
Rasha Kadhem, Souheyl Mallat and Mounir Zrigui
- Twice-Trained Agglomerative Clustering Approach Using Topic Modeling over Generic Semantic Core Knowledge Graph 476
Amani Mechergui and Wahiba Ben Abdessalem Karaa

Behavioral Data Based Applications (BeDaBApps)

- Balancing Crop Priorities: PSO-Based Equitable Irrigation Water Distribution for Efficient Resource Management 482
Abdelouafi Ikidid, Abdelaziz El Fazziki and Naima Baba

Poster Session

Student Track

- Classification of soil texture using Machine Learning Techniques 488
Marwen Ghabi, Sofiane Khalfallah and Hela Ltifi
- Data Quality Definitions and Metrics Essential For Data Obsolescence Detection Within Connected Environments 492
Jean Raphael Richa
- A Consortium Model for Managing Nodes in Smart Factories Based on Blockchain and Smart Contracts 498
Anwer Mbiriki