

2025 International Conference on Recent Advances in Mathematics and Informatics (ICRAMI 2025)

**Sousse, Tunisia
20-23 November 2025**

IEEE Catalog Number: CFP25AJ8-POD
ISBN: 979-8-3315-6388-2



Copyright © 2025, IEEE

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:	CFP25AJ8-POD
ISBN (Print-On-Demand):	979-8-3315-6388-2
ISBN (Online):	979-8-3315-6387-5

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

TABLE OF CONTENTS

Enhanced Finger-Knuckle-Print Recognition Using Deep Texture Feature Analysis	1
<i>Saoussen Djeddi, Yacine Belhocine, Meriem Mebarkia, Abdallah Meraoumia, Hakim Bendjenna</i>	
A Novel Unsupervised Feature Selection Method Utilizing Enhanced Crowding-Based Clustering	7
<i>Abdesslem Layeb</i>	
Designing a Coding Schema and Generating Sequence for Recompression Compressed Data Files	16
<i>Bekir Tevfik Akgün</i>	
Real-Time Fruit Detection and Counting	24
<i>Hassina Ait Issad, Massyl Lakef, Salim Boucherk, Karima Chemoun, Sarah Oubabas, Rachida Aoudjit</i>	
Implementation of the Designed Patient Monitoring System Using the Internet of Things (PMS-IoT) in the Healthcare Room	32
<i>Rostom Khalef, Fateh Moulahcene, Ammar Merazga, Nassima Mellal, Saleh Hanfoug, Imad Benacer</i>	
Improving MOOC Retention Through VARK Classification: A Transformer-Based Analysis	40
<i>Abdenmour Redjaibia, Samia Drissi, Karima Boussaha, Aida Chefrour, Sevinç Gülseçen, Yacine Lafifi</i>	
Graph RAG for Healthcare Question Answering	46
<i>Soumia Bezzaz, Hamda Slimi, Issam Bendib, Mohamed Yassine Haouam</i>	
Combining I-BSIF Fingerprints and FlexenTech for Reversible Medical Image Watermarking	51
<i>Brahim Ferik, Lakhdar Laimeche, Abdallah Meraoumia, Abdelkader Laouid, Khaled Chait</i>	
Unified Backpropagation Fuzzy System for High-efficiency Photovoltaic Maximum Power Point	59
<i>El Moundher Aouiche, Chaima Aouiche, Abdelaziz Aouiche, Xu Liu, Mohamed Mouhafid Mohammed Echarif Aguida</i>	
Sensorless Output Voltage Control of a DC-DC Buck Converter	65
<i>Amira Ayada, Djamel Ounnas, Dhaouadi Guiza, Naoual Tidjani</i>	
Strengthening Digital Defenses: Enhanced Filtering and Dictionary-Learning for Robust Identification	73
<i>Yacine Belhocine, Abdallah Meraoumia, Hakim Bendjenna, Salim Chitroub, Mohammed Saigaa</i>	
Post-hoc Verification of LLMs with Knowledge Graphs for Medical Question Answering	79
<i>Intissar Boutra, Hamda Slimi, Mohamed Yassine Haouam, Issam Bendib</i>	
Improving the Predictive Performance of Chronic Kidney Disease Models Through Data Refinement	84
<i>Safa Boughougal, Mohamed Ridda Laouar, Abderahim Siam</i>	
National Data Centres and Sovereign AI Infrastructure: Designing Scalable Platforms for Jordan and Beyond	91
<i>Ahmad Al-Qerem</i>	
Personalizing Distance Learning Through the Identification of Learners' Difficulties	97
<i>Bourbia Riad, Drissi Samia, Lafifi Yacine, Seridi Ali</i>	
Collaborative Filtering Using Weighted Spearman Rank Similarity	102
<i>Ali Maan Maadarani, Lama Affara, Noura Yassine</i>	

Robust Trilateral Filtering with Reachability-Based Impulse Detection for Mixed Noise Removal	110
<i>Damian Kusnik, Bogdan Smolka</i>	
Performance Enhancement of Wall-Following Functionality in Mobile Robots Using Sequential and Incremental Learning	118
<i>Nadine Saher, Sarah Moussaoui, Sarah Madi, Ahmed Riadh Baba-Ali</i>	
Post-Vaccination COVID-19 Side Effects in Annaba, Algeria: Construction, Analysis, and Clustering of a Comprehensive Database	124
<i>Soumia Layachi, Amel Slim, Ahlem Melouah, Abdeldjalil Halisse</i>	
A Rules-Based Intelligent Assistant for Personalized Student Learning and Support	132
<i>Ali Seridi, Yamina Bordjiba, Riad Bourbia</i>	
Analytical Study of Arabic Speech Emotion Recognition Using Spectral Features and Machine Learning on the KEDAS Dataset	138
<i>Dalal Djeridi, Bachir Said, Mourad Belhadj</i>	
Bidirectional Lstm Approximation of Backward Stochastic Differential Equations: Application to Sustainable Energy Management	146
<i>Hani Abidi</i>	
Thermal Analysis of TIG Welding: Experimental Study and Comparison with FE and FD Numerical Methods	154
<i>Abdel Halim Zitouni, Mouloud Aissani, Lotfi Beghdadi, Younes Benkheda</i>	
Maximum of Exponential-Pareto Random Variables: Theoretical Perspective with Applications in Skin Image Modeling and Production Control	162
<i>Charif Jneid, Noura Yassine, Ali El-Zaar</i>	
Improving 6G Network Performance with Linear Regression and Stacking GBM	169
<i>Chaima Aouiche, El Moundher Aouiche, Abdelaziz Aouiche, Zeeshan Ali, Yazeed Alkhrjiah Safieddine Hamdi, Ahmed Gaidi, Andrea Marotta, Dajana Cassioli</i>	
A Robust ANOVA-Based Framework for Multi-Metric Comparison of Convolutional Neural Networks in Medical Imaging	175
<i>Mohamed Gasmı, Hakim Bendjenna, Abdallah Meraoumia</i>	
Enhancing Beekeeping with UAV Technology: Applications, Planning, Challenges, and Regulatory Insights	183
<i>Soumya Soundous Toumi, Seloua Haddaoui, Badreddine Miles, Salim Chikhi</i>	
Optic Disc and Cup Segmentation with Bilinear-ResUNet for Automated Glaucoma Screening Using Cup-to-Disc Ratio	190
<i>Mohamed Mouhafid, Yatong Zhou, El Moundher Aouiche, Yassine Jaouad, Poornima Lankani Perera Abdelmounim Boudi</i>	
Secure Post-Quantum Cryptography-Based Authentication for Blockchain-Enabled IoMT Systems	197
<i>Rachida Hireche, Housseem Mansouri, Yasmine Harbi, Al-Sakib Khan Pathan, Saad Harous</i>	
Implementation, Deployment, and Performance Analysis of an End-to-End 5G Network over a Multi-Access Edge Computing Infrastructure	205
<i>Mahamadou Diawara, Andre Faye</i>	

Queue Game to Improve the Performance of Cognitive Radio Access Methods	213
<i>Karima Adel-Aissanou, Ouiza Lekadir, Massilia Amoura, Ilhem Afoun</i>	
Improved Bone Fracture Classification Using ConvNextV2 with Optimized GRN and Meta-Ensemble	220
<i>Jaouad Yassine, Yue Chi, Mohamed Mouhafid, Poornima Lankani Perera</i>	
DL-LoEM: Improving Data Locality and Load Balancing for MapReduce-Based Entity Matching	228
<i>Khadidja Midoun, Walid-khaled Hidouci, Malik Loudini, Nadjah Chergui</i>	
Abnormal Action Detection for Surveillance Robot Based on Deep Ensemble Learning	235
<i>Souhila Kahlouche, El-Fani Roufaida, Tazekritt Malika</i>	
Enhancing Fairness in Cluster-Head Selection Through a Historical Weighting Mechanism in Wireless Sensor Networks	243
<i>Djeddar Afrah, Khediri Abderrazak, Khelifa Meriem, Bendjenna Hakim</i>	
Metaheuristics for Multi-Agent Control: An Overview	250
<i>Ferial Laassami, Mohammed Elhabib Souidi, Abdeldjalil Ledmi</i>	
Evaluation and Selection of Startup Ideas Using Decision Support Method	258
<i>Sara Rekkal, Kahina Rekkal, Mohamed Amine Yakoubi</i>	
Dz-Emotion: An Algerian Dialect Dataset for Text-Based Emotion Detection	263
<i>Houdna Khilouf, Amel Ziani, Nada Ahmed Malek, Didier Schwab, Mohamed Amine Yakoubi</i>	
Combinatorics of Inductance States in Reconfigurable Air Coils	269
<i>Michael Helbig, Norbert Seliger</i>	
Study of a Fractional-Order Models for HIV/AIDS	277
<i>Khelifa Bouaziz</i>	
Identifying Precursors to Cardiac Arrest: CNN Superiority in Detecting Arrhythmias and Myocardial Infarction from Vital Signs	282
<i>Chams Eddine Fathoun, Mohamed Ridda Laouar, Safa Abid</i>	
Automatic Annotation of Python Programming Exercises Using Hierarchical Multi-Label Classification	290
<i>Imene Labiod, Nabiha Azizi, Yasmine Chachoui, Tahar Bensebaa</i>	
HOPF-Bogdanov-Takens Bifurcation in a Delayed Hopfield Network Model with Bidirectional Connection	296
<i>Housseem Achouri, Chaouki Aouiti</i>	
Towards an Assistive Eye-Controlled Interface	301
<i>Mohamed Amine Yakoubi, Arslane Aouissi, Issameddine Amaidia, Walid Hariri, Sara Rekkal Ahlem Melouah</i>	
Adaptive Synchronization of Neural Networks Characterized by Fractional-Order Dynamics, Leakage, and Variable Time Delays	306
<i>Maissa Bessifi, El Abed Assali, Chaouki Aouiti</i>	
Quasi-Synchronization of Fractional-Order Quaternion-Valued Memristive Neural Networks via Event Triggered Control	312
<i>Jaweher Smichi, Hediene Jallouli, Chaouki Aouiti</i>	

Automated Diabetic Retinopathy Classification Using ResNet50 with Advanced Preprocessing and Interpretability Techniques	320
<i>Chaouki Makhlouf, Mohamed Ridda Laouar, Sean Eom</i>	
Synchronization of Delayed Fractional-Order Discrete-Time Uncertain Genetic Regulatory Networks	328
<i>Iheb Abdelmajid Albouchi, Chaouki Aouiti</i>	
Tabular Data Transformation into 2D Image for CNN-Based Migraine Classification	335
<i>Hassiba Laifa, Assia Brek, Hakim Bendjenna</i>	
Global Dissipativity of Stochastic Fuzzy Quaternion-Valued Neural Networks with Time-Varying Delays	343
<i>Farid Touati, Chaouki Aouiti</i>	
Synchronization Problem for Delayed Quaternion-Valued Neural Networks	349
<i>El Abed Assali, Maissa Bessifi, Chaouki Aouiti</i>	
Sustainability of AI Use in Higher Education: The Role of Perceived Usefulness and Self-Efficacy	355
<i>Samah AL Hassan, Noura Yassine</i>	
Game-Inspired Metaheuristics for Sharper, Smarter Fake News Detection	362
<i>Nadir Mahammed, Mahmoud Fahsi, Khayra Bencherif, Souad Bennabi, Imène Saidi, Miloud Khaldi</i>	
The Tangent and Affine Space of a Submanifold Defined by Parameterized Diffeomorphism Functions	369
<i>Hamouda Messaadia, Bachir Barrouk</i>	
Feature Selection Using SHAP	374
<i>Naouel Ouafek, Tarek Berghout</i>	
An Online Application to Track Face Mask Wearing	378
<i>Sidi Mohammed Ramzi Chekroun, Mahmoud Fahsi, Nadir Mahammed, Cheikh Mouilah</i>	
Ensemble Deep Learning for Wheat Quality Control: Recognizing Varieties, Species, and Impurities	382
<i>Abdelheq Mokhtari, Ghalia Merzougui, Ali Behloul, Leila Saadi, Abderraouf Hebira, Imene Saadoune</i>	
Besicovitch Almost Automorphic Solutions of Fuzzy Cellular Neural Networks with Caputo Fractional Derivative in Quaternion Field	388
<i>Farah Dridi, Chaouki Aouiti</i>	
Order Statistics of Mixed Random Variables: Theoretical Approach	393
<i>Souad Ilani, Noura Yassine</i>	
A Coverage Criterion for Continuous Dynamics in Hybrid Model-Based Testing	400
<i>Salsabil Goucem, Mohand Cherif Boukala, Hakim Bendjenna</i>	
Hybrid CNN with SGE Attention and Sequencer2D-L for Efficient Classification of Chest X-Rays and CT-Scans in COVID-19 and Pneumonia Detection	406
<i>Benzorgat Mustapha, Yatong Zhou, Benzorgat Nawel</i>	
Optimisation of the Fuzzy Model of Nonlinear Systems by Society-Inspired Heuristics	413
<i>Nouri Benaidja</i>	
Using a New Hybrid Conjugate Gradient Method with Descent Property	418
<i>Amira Hamdi, Alaa Luqman Ibrahim</i>	

Evaluation of the Effect of Synthetic Oversampling on Deep Neural Networks for Skin Lesion Analysis	422
<i>Yamina Bordjiba, Ali Seridi, Randa Salmi, Nabiha Azizi, Hayet Farida Merouani</i>	
Student Dropout Prediction: A Novel Hard Task Approach to Identify Ambiguous-Risk Students	428
<i>Houssam Ahmed Amin Bahi, Karima Boussaha, Zakaria Laboudi, Makhlouf Derdour</i>	
Numerical Study of Composite Asymptotic Expansions to a Singularly Perturbed Linear Ordinary Differential Equation Near Turning Points	435
<i>Abdelali Makhfi</i>	
Detection and Classification of Mobile Radio Disturbances That Uses the Artificial Neural Network Multi-Layer Perceptron	440
<i>Jean François Mayoum Nahong, Fatou Ndiaye, Adoum Kriga, Moustapha Sene, Amadou Seidou H. Maiga</i>	
Brain Tumor Classification in MRI via Hybrid EfficientNetV2L-MobileViT with Coordinate Attention	448
<i>Nawal Benzorgat, Kewen Xia, Mustapha Noure Eddine Benzorgat</i>	
Smart Power Management in PV Systems with Battery–Supercapacitor Hybrid Storage for Electric Vehicle	456
<i>Dounia Touahria, Amel Bouchemha, Sami Kahla</i>	
Common Fixed Point Results Under Generalized Contractive Conditions	463
<i>Safia Bazine</i>	
Hybrid Optimization Over the Pareto Frontier: A Tchebychev-Based Stochastic Approach	466
<i>Leila Younsi-Abbaci, Mustapha Moulai, Baya Takhedmit, Brahmi Boualem</i>	
Quasi-Projective Synchronization of Fractional-Order Complex-Inertial Neural Networks with Time-Varying Delays	473
<i>Hediene Jallouli, Jaweher Smichi, Chaouki Aouiti</i>	
A Mixed Discontinuous Galerkin Scheme for Maxwell's Equations	481
<i>Sayed Sayari, Hatem Zayeni</i>	
Toward Trustworthy Explainable Intrusion Detection Systems (X-IDS): A Comprehensive Survey of Methods, Interpretability Enhancements, and Future Opportunities	486
<i>Abderrazak Khediri, Hamda Slimi, Afrah Djeddar, Hakim Bendjenna, Ayoub Yahiaoui, Mekhlouf Derdour</i>	
Machine Learning for Mental Health Prediction	490
<i>Imene Benatia, Fatiha Ouazar</i>	
Assuring a Secured Communication Protocol for Unmanned Aerial Vehicles	497
<i>Zina Oudina, Mohamed Amine Yakoubi, Amira Hakim, Hakim Bendjenna, Chaouki Chemam Nada Ahmed Malek, Amel Ziani</i>	
Development and Efficacy Evaluation of a Lotus Root-Inspired Surface Plasmon Resonance Sensor Using Photonic Crystal Fibers	504
<i>Assia Hamzaoui, Abdelaziz Aouiche, Soraya Gouder, Yazeed Alkhrijah</i>	