# 13th International Joint Conference on Computational Intelligence (IJCCI 2021)

Online 25 – 27 October 2021

# **Editors:**

Thomas Back
Christian Wagner
Jonathan Garibaldi
H. K. Lam

Marie Cottrell Juan Julian Merelo Kevin Warwick

ISBN: 978-1-7138-4005-3

### Printed from e-media with permission by:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2021) by SCITEPRESS – Science and Technology Publications, Lda. All rights reserved.

Printed with permission by Curran Associates, Inc. (2021)

For permission requests, please contact SCITEPRESS – Science and Technology Publications, Lda. at the address below.

SCITEPRESS – Science and Technology Publications, Lda. Avenida de S. Francisco Xavier, Lote 7 Cv. C, 2900-616 Setúbal, Portugal

Phone: +351 265 520 185 Fax: +351 265520 186

info@scitepress.org

# 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

Email: curran@proceedings.com Web: www.proceedings.com

# **CONTENTS**

# INVITED SPEAKERS

KEYNOTE SPEAKERS	
------------------	--

Fuzzy Systems in Health Care Susana M. Vieira	4
Differentiability in Quadratic Mean of Deep Networks  Joseph Rynkiewicz	7
Recent Research Topics in Evolutionary Multiobjective Optimization: A Personal Perspective Carlos C. Coello	Ģ
Machine Learning in Non-Stationary Environments Barbara Hammer	11
13TH INTERNATIONAL CONFERENCE ON EVOLUTIONARY COMPUTATION THEORY AND APPLICATIONS	
FULL PAPERS	
Improving Image Filters with Cartesian Genetic Programming Julien Biau, Dennis Wilson, Sylvain Cussat-Blanc and Hervé Luga	17
An Effective Resistance based Genetic Algorithm for Community Detection Clara Pizzuti and Annalisa Socievole	28
The Dynamic Role Mining Problem: Role Mining in Dynamically Changing Business Environments Simon Anderer, Tobias Kempter, Bernd Scheuermann and Sanaz Mostaghim	37
Pyramid-Z: Evolving Hierarchical Specialists in Genetic Algorithms  Atif Rafiq, Enrique Naredo, Meghana Kshirsagar and Conor Ryan	49
Substitution of the Fittest: A Novel Approach for Mitigating Disengagement in Coevolutionary Genetic Algorithms  Hugo Alcaraz-Herrera and John Cartlidge	59
Towards Automatic Grammatical Evolution for Real-world Symbolic Regression Muhammad Sarmad Ali, Meghana Kshirsagar, Enrique Naredo and Conor Ryan	68

# SHORT PAPERS

A Simulated Annealing based Energy Efficient Task Scheduling Algorithm for Multi-core Processors Pratik S. and Abhishek Mishra	81
Harris Hawks Optimization: A Formal Analysis of Its Variants and Applications Ruba Abu Khurma, Ibrahim Aljarah and Pedro A. Castillo	88
A Strength Pareto Evolutionary Algorithm for Solving the Capacitated Vehicle Routing Problem with Time Windows Wissam Marrouche and Haidar M. Harmanani	96
Solving a Problem of the Lateral Dynamics Identification of a UAV using a Hyper-heuristic for Non-stationary Optimization Evgenii Sopov	107
Continuous Parameter Control in Genetic Algorithms using Policy Gradient Reinforcement Learning Alejandro de Miguel Gomez and Farshad Ghassemi Toosi	115
A Hybrid Evolutionary Algorithm, Utilizing Novelty Search and Local Optimization, Used to Design Convolutional Neural Networks for Handwritten Digit Recognition <i>Tabish Ashfaq, Nivedha Ramesh and Nawwaf Kharma</i>	123
Subset Sum and the Distribution of Information  Daan Van Den Berg and Pieter Adriaans	134
Optimal Scheduling for Flying Taxi Operation Panwadee Tangpattanakul and Ilhem Quenel	141
Multiobjective Evolutionary Computation for Market Segmentation  Ying Liu	149
13TH INTERNATIONAL CONFERENCE ON FUZZY COMPUTATION THEORY AND APPLICATIONS	
FULL PAPER	
Multiobjective Bimatrix Game with Fuzzy Payoffs and Its Solution Method using Necessity Measure and Weighted Tchebycheff Norm <i>Hitoshi Yano and Ichiro Nishizaki</i>	159
SHORT PAPERS	
Mining Linguistic Summaries in Traffic  Jhonny Pincay, Edy Portmann and Luis Terán	169
Application of Graded Fuzzy Preconcept Lattices in Risk Analysis  Māris Krastiņš, Ingrīda Uljane and Alexander Šostak	177
A Modular Autonomous Driving System for Electric Boats based on Fuzzy Controllers and Q-Learning  Emanuele Ferrandino, Antonino Capillo, Enrico De Santis, Fabio M. F. Mascioli and Antonello Rizzi	185

# 13TH INTERNATIONAL CONFERENCE ON NEURAL COMPUTATION THEORY AND APPLICATIONS

### FULL PAPERS

Medoid-based MLP: An Application to Wood Sawing Simulator Metamodeling Sylvain Chabanet, Philippe Thomas and Hind Bril El-Haouzi	201
Unsupervised Grammatical Pattern Discovery from Arabic Extra Large Corpora  Adelle Abdallah, Hussein Awdeh, Youssef Zaki, Gilles Bernard and Mohammad Hajjar	211
Relaxed Dissimilarity-based Symbolic Histogram Variants for Granular Graph Embedding Luca Baldini, Alessio Martino and Antonello Rizzi	221
Revising Conceptual Similarity by Neural Networks  Arianna Pavone and Alessio Plebe	236
Accurate 3D Object Detection from Point Cloud Data using Bird's Eye View Representations Nerea Aranjuelo, Guus Engels, David Montero, Marcos Nieto, Ignacio Arganda-Carreras, Luis Unzueta and Oihana Otaegui	246
Zero-Shot Action Recognition with Knowledge Enhanced Generative Adversarial Networks Kaiqiang Huang, Luis Miralles-Pechuán and Susan Mckeever	254
SHORT PAPERS	
Reward Prediction for Representation Learning and Reward Shaping Hlynur Davíð Hlynsson and Laurenz Wiskott	267
Is It Possible to Recognize Apple Employees by Their LinkedIn Profile Picture? Thanakij Wanavit and Leslie Klieb	277
Overview of Arabic Sentence Corpora Hussein Awdeh, Adelle Abdallah, Gilles Bernard and Mohammad Hajjar	285
Multivariate Short Term Load Forecasting Strategy: Application to Anomalous Days of ISO New England Data  Innocent Sizo Duma and Bhekisipho Twala	293
Object Detection with TensorFlow on Hardware with Limited Resources for Low-power IoT Devices <i>Jurij Kuzmic and Günter Rudolph</i>	302
Pervasive Hand Gesture Recognition for Smartphones using Non-audible Sound and Deep Learning Ahmed Ibrahim, Ayman El-Refai, Sara Ahmed, Mariam Aboul-Ela, Hesham M. Eraqi and Mohamed Moustafa	310
Benzene Prediction: A Comparative Study of ANFIS, LSTM and MLR Andreas Humpe, Holger Günzel and Lars Brehm	318
Augmenting Machine Learning with Flexible Episodic Memory  Hugo Chateau-Laurent and Frédéric Alexandre	326
A Multi-agent Approach for Graph Classification  Luca Baldini and Antonello Rizzi	334
An Approach to One-shot Identification with Neural Networks  Janis Mohr, Finn Breidenbach and Jörg Frochte	344

Spatio-temporal Attention Mechanism and Knowledge Distillation for Lip Reading Shahd Elashmawy, Marian Ramsis, Hesham M. Eraqi, Farah Eldeshnawy, Hadeel Mabrouk, Omar Abugabal and Nourhan Sakr	352
Hierarchical Relation Networks: Exploiting Categorical Structure in Neural Relational Reasoning <i>Ruomu Zou and Constantine Dovrolis</i>	359
Speech Emotion Recognition using MFCC and Hybrid Neural Networks Youakim Badr, Partha Mukherjee and Sindhu Madhuri Thumati	366
Recurrent Neural Networks Analysis for Embedded Systems Gonçalo Fontes Neves, Jean-Baptiste Chaudron and Arnaud Dion	374
$2\mathrm{ND}$ INTERNATIONAL WORKSHOP ON SMART, PERSONALIZED AND AGE-FRIENDLY WORKING ENVIRONMENTS	
FULL PAPERS	
Breaking up Long Sedentary Periods of Office Workers through a Virtual Coach using Activity Data Jasmijn Franke, Christiane Grünloh, Dennis Hofs, Boris Van Schooten, Andreea Bondrea and Miriam Cabrita	389
SmartWork: An IoT Enabled Unobtrusive Worker Health, Well-being and Functional Ability Monitoring Framework  Dimitrios Amaxilatis, Nikolaos Tsironis, George Papoulias, Dennis Hofs, Rita Kovordanyi, Hugo Marcos, João Jordão and João Quintas	398
Micro-moment-based Interventions for a Personalized Support of Healthy and Sustainable Ageing at Work: Development and Application of a Context-sensitive Recommendation Framework <i>Georgios Athanassiou, Maria Pateraki and Iraklis Varlamis</i>	409
Cardio: An Edge-enabled Wearable ECG Vest for Office Worker's Heart Condition Monitoring Dimitrios Amaxilatis, Athanasios Antoniou and Ioannis Chatzigiannakis	420
Low-invasive Neurophysiological Evaluation of Human Emotional State on Teleworkers Vincenzo Ronca, Gianluca Di Flumeri, Andrea Giorgi, Alessia Vozzi, Pietro Aricò, Nicolina Sciaraffa, Luca Tamborra, Ilaria Simonetti, Antonello Di Florio, Fabio Babiloni and Gianluca Borghini	427
Sleep Quality Monitoring with Human Assisted Corrections  Ioannis Konstantoulas, Otilia Kocsis, Elias Dritsas, Nikos Fakotakis and Konstantinos Moustakas	435
Long-term Cholesterol Risk Prediction using Machine Learning Techniques in ELSA Database Nikos Fazakis, Elias Dritsas, Otilia Kocsis, Nikos Fakotakis and Konstantinos Moustakas	445
SHORT PAPERS	
A Data Quality Assessment Approach in the SmartWork Project's Time-series Data Imputation Paradigm Georgios Papoulias, Otilia Kocsis and Konstantinos Moustakas	453
Digital Inclusion at the Workplace Post Covid19 Ignacio Peinado, Eva de Lera, José Martínez Usero, Colin Clark, Jutta Treviranus and Gregg Vanderheiden	460
Collecting Data for Machine Learning on Office Workers' Attention, Fatigue, Overload, and Stress during Computer Use <i>Rita Kovordanyi</i>	468

AUTHOR INDEX 477