



# 18th International Conference on Soft Computing Models in Industrial and Environmental Applications (SOCO 2023). Salamanca, Spain, September 5-7, 2023, Proceedings /

García Bringas, Pablo,  
editor

Monografía

This book of Advances in Intelligent and Soft Computing contains accepted papers presented at SOCO 2023 conference held in the beautiful and historic city of Salamanca (Spain) in September 2023. Soft computing represents a collection or set of computational techniques in machine learning, computer science, and some engineering disciplines, which investigate, simulate, and analyze very complex issues and phenomena. After a thorough peer-review process, the 18th SOCO 2023 International Program Committee selected 61 papers which are published in these conference proceedings and represents an acceptance rate of 60%. In this relevant edition, a particular emphasis was put on the organization of special sessions. Seven special sessions were organized related to relevant topics such as: Time Series Forecasting in Industrial and Environmental Applications, Technological Foundations and Advanced Applications of Drone Systems, Soft Computing Methods in Manufacturing and Management Systems, Efficiency and Explainability in Machine Learning and Soft Computing, Machine Learning and Computer Vision in Industry 4.0, Genetic and Evolutionary Computation in Real World and Industry, and Soft Computing and Hard Computing for a Data Science Process Model. The selection of papers was extremely rigorous to maintain the high quality of the conference. We want to thank the members of the Program Committees for their hard work during the reviewing process. This is a crucial process for creating a high-standard conference; the SOCO conference would not exist without their help

<https://rebiunoda.pro.baratznet.cloud:38443/OpacDiscovery/public/catalog/detail/b2FpOmNlbGVicmF0aW9uOmVzLmJhcmF0ei5yZW4vMzYwMTY1ODI>

**Título:** 18th International Conference on Soft Computing Models in Industrial and Environmental Applications (SOCO 2023). Volume 1 Salamanca, Spain, September 5-7, 2023, Proceedings Pablo García Bringas [and eight others], editors

**Edición:** First edition

**Editorial:** Cham, Switzerland Springer [2023] 2023

**Descripción física:** 1 online resource (305 pages)

**Mención de serie:** Lecture Notes in Networks and Systems Series Volume 749

**Nota general:** Includes index

**Contenido:** Intro -- Preface -- Organization -- Contents -- Deep Learning, Fuzzy Logic and Evolutionary Computation -- Text Classification for Automatic Distribution of Review Notes in Movie Production -- 1 Introduction -- 2 Dataset -- 3 Methodology -- 3.1 Data Cleaning -- 3.2 Label Estimation -- 3.3 Tokenization -- 3.4 Classification -- 4 Experiments and Results -- 5 Conclusions and Future Work -- References -- Extended Rank-Based Ant Colony Optimization Algorithm for Traveling Salesman Problem -- 1 Introduction -- 2 Ant Colony Optimization -- 3 Proposed ACO Algorithm Plus Local Search -- 4 Results -- 5 Conclusions and Future Work -- References -- Multi-scale Neural Model for Tool-Narayanawamy-Moynihan Model Parameter Extraction -- 1 Introduction -- 2 Materials and Methods -- 2.1 TNM Model and Its Parameters -- 2.2 Multi-scale Convolutional Neural Model -- 2.3 Dataset -- 3 Experiments and Results -- 3.1 Training Details -- 3.2 Evaluation of Multi-scale Neural Model -- 4 Conclusion -- References -- Application of Fuzzy Logic to the Risk Assessment of Production Machines Failures -- 1 Introduction -- 2 Linguistic Values and Its Analysis in Risk Assessment -- 3 Fuzzy FMEA in the Risk Assessment of Production Downtime -- 4 Conclusion -- References -- First Approach of an Intelligent Automatic System for Aircraft Flap/Slat Positioning -- 1 Introduction -- 2 Brief State of the Art -- 3 Description of the Problem Addressed -- 4 Automation of the Flap/Slat Positioning System -- 4.1 General System Architecture -- 4.2 Fuzzy Decision Block -- 5 Simulation Results and Discussion -- 6 Conclusions and Future Works -- References -- Fuzzy Aggregators in Practice: Meta-Model and Implementation -- 1 Introduction -- 2 Background -- 3 Meta-Modeling Fuzzy Aggregators -- 4 Novel Constructs in J-CO-QL+ and Case Study -- 4.1 Case Study 4.2 Declaring Fuzzy Operator and Fuzzy Aggregators -- 4.3 Soft Querying -- 5 Conclusions -- References -- Machine Learning and Data Mining -- Model-Based Design of the IMO-NMPC Strategy: Real-Time Implementation -- 1 Introduction -- 2 Workflow: From Simulation to Real-Time Execution -- 2.1 Phases -- 3 iMO-NMPC Strategy Implementation -- 4 Experiments -- 4.1 PHASE 3: Simulink Desktop Real-Time Experiments -- 4.2 PHASE 4: Simulink Real-Time Experiments -- 5 Results -- 5.1 SNL1/SNL5 SISO System Simulink Desktop Real-Time -- 5.2 SNL1/SNL5 SISO System Simulink Real-Time (Speedgoat) -- 5.3 SNL1-SNL1 MIMO System Simulink Real-Time (Speedgoat) -- 5.4 SNL1-SNL5 MIMO System Simulink Real-Time (Speedgoat) -- 6 Conclusions -- References -- Hyperspectral Technology for Oil Spills Detection by Using Artificial Neural Network Classifier -- 1 Introduction -- 2 Materials and Methods -- 2.1 Principal Component Analysis (PCA) -- 2.2 Artificial Neural Networks (ANNs) and Bayesian Optimization -- 3 Results and Discussion -- 4 Conclusions -- References -- Neuron Characterization in Complex Cultures Using a Combined YOLO and U-Net Segmentation Approach -- 1 Introduction -- 2 State of the Art -- 3 Materials and Methods -- 3.1 Experimental Setup -- 3.2 Experimental Procedure -- 4 Results and Discussion -- References -- Effectiveness of Quantum Computing in Image Processing for Burr Detection -- 1 Introduction -- 2 Quantum Computing -- 3 Burr Detection -- 4 Proposed Architecture -- 5 Experimental Results -- 6 Conclusions -- References -- Categorization of CoAP DoS Attack Based on One-Class Boundary Methods -- 1 Introduction -- 2 Case Study -- 3 Methods -- 3.1 Approximate Convex Hull -- 3.2 K Nearest Neighborhood -- 3.3 One-Class Support Vector Machine -- 4 Experiments -- 5 Results -- 6 Conclusions and Future Works -- References TinyNARM: Simplifying Numerical Association Rule Mining for Running on Microcontrollers -- 1 Introduction -- 2 Basic Information -- 2.1 Numerical Association Rule Mining -- 2.2 Classical NARM Using Evolutionary Approaches -- 2.3 TinyML -- 3 TinyNARM -- 4 Experiments and Results -- 4.1 Datasets -- 4.2 Experimental Environment -- 4.3 Results -- 4.4 Discussion -- 5 Conclusion -- References -- Fault Detection in Biological Methanation Process Using Machine Learning: A Comparative Study of Different Algorithms -- 1 Introduction -- 2 Biological Methanation Model and Optimization -- 2.1 Extended Anaerobic Digestion Model (ADM1 ME) -- 2.2 Optimal Operation -- 2.3 ADM1 ME Disturbances and Dataset Generation -- 3 Results and Discussion -- 4 Conclusions and Future Work -- References -- Soft Computing Applications -- Comparative Study of Regression Models Applied to the Prediction of Energy Generated by a Micro Wind Turbine -- 1 Introduction -- 2 Case Study -- 2.1 Sotavento Experimental Bioclimatic House -- 2.2 Dataset -- 3 Applied Methods -- 4 Experiment Setup and Results -- 4.1 Experiments Setup -- 4.2 Metrics -- 4.3 Results -- 5 Conclusions and Future Work -- References -- Comparative Study of Wastewater Treatment Plant Feature Selection for COD Prediction -- 1 Introduction -- 2 Wastewater Treatment Plant Under Study -- 3 Applied Methods -- 3.1 Feature Selection -- 3.2 Regression Techniques -- 4 Experiments and Results -- 4.1 Experiment's Setup -- 4.2 Results -- 4.3 Analysis of Results -- 5 Conclusions and Future Work -- References -- Machine Learning Based System for Detecting Battery State-of-Health -- 1 Introduction -- 2 Case Study -- 3

Materials and Methods -- 3.1 Random Forest -- 3.2 Multilayer Perceptron -- 3.3 K-Nearest Neighbors -- 3.4 Gaussian Process Classifier -- 3.5 Support Vector Classifier -- 4 Experimental Setup -- 5 Results and Analysis 6 Conclusions and Future Work -- References -- Leveraging Smart Meter Data for Adaptive Consumer Profiling -- 1 Introduction -- 2 Related Work -- 3 Workflow for Adaptive Clustering Pipeline -- 3.1 General Approach -- 3.2 Dataset for Analysis -- 3.3 Description of the Data Pipeline -- 4 Data Analysis -- 4.1 Ground Truth Cluster Selection and Analysis -- 4.2 Cold-Start Analysis -- 5 Conclusions -- References -- Managing Pandemics Through Agent-Based Simulation: A Case Study Based on COVID-19 -- 1 Managing Pandemics: A Challenging Decision-Making Process -- 2 Review of Simulation Tools to Model Pandemics Evolution -- 3 Modelling Pandemics Evolution Through an Agent-Based Model -- 3.1 Disease Spread Modelling -- 3.2 Disease Evolution and Impact on Healthcare System -- 3.3 Modelling Pharmacological and Non-Pharmacological Measures -- 4 Prototype Implementation Based on COVID-19 -- 5 Validation -- 5.1 Baseline Scenario -- 5.2 Comparison of Non-pharmacological Measures and Baseline Scenario -- 6 Conclusions -- References -- Missing Values Imputation for Visualizing the Air Quality Evolution During the COVID-19 Pandemic in Madrid -- 1 Introduction -- 2 Techniques Applied -- 2.1 Imputation and Regression -- 2.2 Visualization -- 3 A Real-Life Case Study -- 4 Experiments and Results -- 5 Conclusions and Future Work -- References -- Special Session 1: Time Series Forecasting in Industrial and Environmental Applications -- Feature Selection Guided by CVOA Metaheuristic for Deep Neural Networks: Application to Multivariate Time Series Forecasting -- 1 Introduction -- 2 Related Works -- 3 Methodology -- 3.1 Dataset -- 3.2 Models -- 3.3 Evaluation Metric -- 3.4 Optimization Process -- 4 Results and Discussion -- 4.1 Performance Results -- 4.2 Number of Features Analysis -- 4.3 Best and Worst Predictions Analysis -- 5 Conclusions and Future Work -- References -- Neuroevolutionary Transfer Learning for Time Series Forecasting -- 1 Introduction -- 2 Our Proposal -- 3 Results -- 4 Conclusions -- References -- Machine Learning Approaches for Predicting Tree Growth Trends Based on Basal Area Increment -- 1 Introduction -- 2 Related Work -- 3 Methodology -- 3.1 Data Acquisition -- 3.2 Data Cleaning -- 3.3 Data Transformation -- 3.4 Machine Learning Algorithms -- 3.5 Model Evaluation -- 4 Results -- 4.1 Input Data -- 4.2 Tree Growth Prediction -- 5 Conclusions and Future Work -- References -- Forecasting Greenhouse Temperature Using Machine Learning Models: Optimizing Crop Production in Andalusia -- 1 Introduction -- 2 Related Works -- 3 Methodology -- 3.1 Experimental Setup -- 3.2 Machine Learning Models -- 4 Results and Discussion -- 4.1 Data Description -- 4.2 Experimental Results -- 5 Conclusions -- References -- Deep Learning and Metaheuristic for Multivariate Time-Series Forecasting -- 1 Introduction -- 2 Methodology -- 2.1 The Proposed Model -- 2.2 Model Training -- 2.3 Model Evaluation -- 3 Results -- 4 Conclusions -- References -- An Approach to Enhance Time Series Forecasting by Fast Fourier Transform -- 1 Introduction -- 2 Background -- 3 Methodology -- 3.1 Dataset -- 3.2 Feature Engineering -- 3.3 Models to Use -- 4 Results and Discussion -- 5 Conclusions -- References -- Comparative Study of Open Source Database Management Systems to Enable Predictive Maintenance of Autonomous Guided Vehicles -- 1 Introduction -- 2 Use Case -- 3 Methodology -- 3.1 Database Management Systems Under Study -- 3.2 Comparison Procedure -- 3.3 Comparison Perspectives -- 4 Experiments and Results -- 4.1 Functional Comparison -- 4.2 Performance Evaluation -- 5 Conclusions and Future Work -- References -- Integrated Forecast and Optimization for Retailer Allocation in a Two-Echelon Inventory System -- 1 Introduction 2 Related Literature

**ISBN:** 3-031-42529-4

**Materia:** Computational intelligence- Congresses Soft Computing Congresses

**Autores:** García Bringas, Pablo, editor

**Enlace a formato físico adicional:** Print version García Bringas, Pablo. 18th International Conference on Soft Computing Models in Industrial and Environmental Applications (SOCO 2023) Cham : Springer, c2023 9783031425288

**Punto acceso adicional serie-Título:** Lecture notes in networks and systems Volume 749

---

## Baratz Innovación Documental

- Gran Vía, 59 28013 Madrid
- (+34) 91 456 03 60
- [informa@baratz.es](mailto:informa@baratz.es)

