Lecture Notes in Artificial Intelligence 8480

Subseries of Lecture Notes in Computer Science

LNAI Series Editors

Randy Goebel
University of Alberta, Edmonton, Canada
Yuzuru Tanaka
Hokkaido University, Sapporo, Japan
Wolfgang Wahlster
DFKI and Saarland University, Saarbrücken, Germany

LNAI Founding Series Editor

Joerg Siekmann
DFKI and Saarland University, Saarbrücken, Germany

Marios Polycarpou André C.P.L.F. de Carvalho
Jeng-Shyang Pan Michał Woźniak
Héctor Quintián Emilio Corchado (Eds.)

Hybrid Artificial Intelligence Systems

9th International Conference, HAIS 2014
Salamanca, Spain, June 11-13, 2014
Proceedings

Springer

Volume Editors

Marios Polycarpou
University of Cyprus, Nicosia, Cyprus
E-mail: mpolycar@ucy.ac.cy

André C.P.L.F. de Carvalho
University of Sao Paulo at Sao Carlos, SP, Brazil
E-mail: andre@icmc.usp.br

Jeng-Shyang Pan
Harbin Institute of Technology, Shenzhen Graduate School, China
E-mail: jengshyangpan@gmail.com

Michał Woźniak
Wroclaw University of Technology, Poland
E-mail: michal.wozniak@pwr.edu.pl

Héctor Quintián
University of Salamanca, Spain *and* University of A Coruna, Spain
E-mail: hector.quintian@usal.es *and* hector.quintian@udc.es

Emilio Corchado
University of Salamanca, Spain
E-mail: escorchado@usal.es

ISSN 0302-9743 e-ISSN 1611-3349
ISBN 978-3-319-07616-4 e-ISBN 978-3-319-07617-1
DOI 10.1007/978-3-319-07617-1
Springer Cham Heidelberg New York Dordrecht London

Library of Congress Control Number: 2014939509

LNCS Sublibrary: SL 7 – Artificial Intelligence

© Springer International Publishing Switzerland 2014
This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed. Exempted from this legal reservation are brief excerpts in connection with reviews or scholarly analysis or material supplied specifically for the purpose of being entered and executed on a computer system, for exclusive use by the purchaser of the work. Duplication of this publication or parts thereof is permitted only under the provisions of the Copyright Law of the Publisher's location, in ist current version, and permission for use must always be obtained from Springer. Permissions for use may be obtained through RightsLink at the Copyright Clearance Center. Violations are liable to prosecution under the respective Copyright Law.
The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.
While the advice and information in this book are believed to be true and accurate at the date of publication, neither the authors nor the editors nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Preface

This volume of *Lecture Notes on Artificial Intelligence* (LNAI) includes the accepted papers presented at the 9th International Conference on Hybrid Artificial Intelligence Systems (HAIS 2014) held in the beautiful and historic city of Salamanca, Spain, in June 2014.

The International Conference on Hybrid Artificial Intelligence Systems has become a unique, established, and broad interdisciplinary forum for researchers and practitioners who are involved in developing and applying symbolic and sub-symbolic techniques aimed at the construction of highly robust and reliable problem-solving techniques and in bringing the most relevant achievements in this field.

Hybridization of intelligent techniques, coming from different computational intelligence areas, has become popular because of the growing awareness that such combinations frequently perform better than the individual techniques such as neurocomputing, fuzzy systems, rough sets, evolutionary algorithms, agents and multiagent systems, etc.

Practical experience has indicated that hybrid intelligence techniques might be helpful for solving some of the challenging real-world problems. In a hybrid intelligence system, a synergistic combination of multiple techniques is used to build an efficient solution to deal with a particular problem. This is, thus, the setting of the HAIS conference series, and its increasing success is the proof of the vitality of this exciting field.

HAIS 2014 received 199 technical submissions. After a rigorous peer-review process, the international Program Committee selected 61 papers, which are published in these conference proceedings.

The selection of papers was extremely rigorous in order to maintain the high quality of the conference and we would like to thank the Program Committee for their hard work in the reviewing process. This process is very important to the creation of a conference of high standard and the HAIS conference would not exist without their help.

The large number of submissions is certainly not only testimony to the vitality and attractiveness of the field but an indicator of the interest in the HAIS conferences themselves.

HAIS 2014 enjoyed outstanding keynote speeches by distinguished guest speakers: Prof. Amparo Alonso Betanzos, University of Coruña (Spain) and President Spanish Association for Artificial Intelligence (AEPIA), Prof. Sung-Bae Cho, Yonsei University (Korea), and Prof. André de Carvalho, University of Saõ Paulo (Brazil).

HAIS 2014 teamed up with the journals *Neurocomputing* (Elsevier) and the *Logic Journal of the IGPL* (Oxford Journals) for a set of special issues including selected papers from HAIS 2014.

Particular thanks go to the conference main Sponsors, IEEE-Sección España, IEEE Systems, Man and Cybernetics–Capítulo Español, AEPIA, Ayuntamiento de Salamanca, University of Salamanca, MIR Labs, The International Federation for Computational Logic, and project ENGINE (7^{th} Marco Program, FP7-316097), who jointly contributed in an active and constructive manner to the success of this initiative.

We would like to thank Alfred Hofmann and Anna Kramer from Springer for their help and collaboration during this demanding publication project.

June 2014

Marios Polycarpou
André C.P.L.F. de Carvalho
Jeng-Shyang Pan
Michał Woźniak
Héctor Quintián
Emilio Corchado

Organization

Honorary Chairs

Alfonso Fernández Mañueco	Mayor of Salamanca
Amparo Alonso Betanzos	University of Coruña, Spain, President of the Spanish Association for Artificial Intelligence (AEPIA)
Costas Stasopoulos	Director-Elect, IEEE Region 8
Hojjat Adeli	The Ohio State University, USA

General Chair

Emilio Corchado	University of Salamanca, Spain

International Advisory Committee

Ajith Abraham	Machine Intelligence Research Labs, Europe
Antonio Bahamonde	President of the Spanish Association for Artificial Intelligence, AEPIA
Andre de Carvalho	University of São Paulo, Brazil
Sung-Bae Cho	Yonsei University, Korea
Juan M. Corchado	University of Salamanca, Spain
José R. Dorronsoro	Autonomous University of Madrid, Spain
Michael Gabbay	King's College London, UK
Ali A. Ghorbani	UNB, Canada
Mark A. Girolami	University of Glasgow, UK
Manuel Graña	University of País Vasco, Spain
Petro Gopych	Universal Power Systems USA-Ukraine LLC, Ukraine
Jon G. Hall	The Open University, UK
Francisco Herrera	University of Granada, Spain
César Hervás-Martínez	University of Córdoba, Spain
Tom Heskes	Radboud University Nijmegen, The Netherlands
Dusan Husek	Academy of Sciences of the Czech Republic, Czech Republic
Lakhmi Jain	University of South Australia, Australia
Samuel Kaski	Helsinki University of Technology, Finland
Daniel A. Keim	University of Konstanz, Germany

Isidro Laso	D.G. Information Society and Media, European Commission
Marios Polycarpou	University of Cyprus, Cyprus
Witold Pedrycz	University of Alberta, Canada
Václav Snášel	VSB-Technical University of Ostrava, Czech Republic
Xin Yao	University of Birmingham, UK
Hujun Yin	University of Manchester, UK
Michał Woźniak	Wroclaw University of Technology, Poland
Aditya Ghose	University of Wollongong, Australia
Ashraf Saad	Armstrong Atlantic State University, USA
Fanny Klett	German Workforce Advanced Distributed Learning Partnership Laboratory, Germany
Paulo Novais	Universidade do Minho, Portugal

Industrial Advisory Committee

Rajkumar Roy	The EPSRC Centre for Innovative Manufacturing in Through-life Engineering Services, UK
Amy Neustein	Linguistic Technology Systems, USA

Program Committee

Emilio Corchado	University of Salamanca, Spain (Co-chair)
Marios Polycarpou	University of Cyprus, Cyprus (Co-chair)
André C.P.L.F. de Carvalho	University of São Paulo, Brazil (Co-chair)
Jeng-Shyang Pan	National Kaohsiung University of Applied Sciences, Taiwan (Co-chair)
Michał Woźniak	Wroclaw University of Technology, Poland (Co-chair)
Abdel-Badeeh Salem	Ain Shams University, Egypt
Aboul Ella Hassanien	Cairo University, Egypt
Adolfo R. De Soto	University of Leon, Spain
Alberto Fernandez Gil	University Rey Juan Carlos, Spain
Alfredo Cuzzocrea	ICAR-CNR and University of Calabria, Italy
Alicia Troncoso	Universidad Pablo de Olavide, Spain
Alvaro Herrero	University of Burgos, Spain
Amelia Zafra Gómez	University of Cordoba, Spain
Ana M. Bernardos	Universidad Politécnica de Madrid, Spain

Ana Madureira	Polytechnic University of Porto, Portugal
Anca Andreica	Babes-Bolyai University, Romania
Andreea Vescan	Babes-Bolyai University, Romania
Andres Ortiz	University of Malaga, Spain
Angelos Amanatiadis	Democritus University of Thrace, Greece
Antonio Dourado	University of Coimbra, Portugal
Arkadiusz Kowalski	Wroclaw University of Technology, Poland
Arturo De La Escalera	Universidad Carlos III de Madrid, Spain
Barna Laszlo Iantovics	Petru Maior University of Tg. Mures, Romania
Bogdan Trawinski	Wroclaw University of Technology, Poland
Bozena Skolud	Silesian University of Technology, Poland
Bruno Baruque	University of Burgos, Spain
Camelia Pintea	North University of Baia-Mare, Romania
Carlos Carrascosa	Universidad Politecnica de Valencia, Spain
Carlos D. Barranco	Pablo de Olavide University, Spain
Carlos Laorden	University of Deusto, Spain
Carlos Pereira	ISEC, Portugal
Cerasela Crisan	Vasile Alecsandri University of Bacau, Romania
Cezary Grabowik	Silesian Technical University, Poland
Constantin Zopounidis	Technical University of Crete, Greece
Damian Krenczyk	Silesian University of Technology, Poland
Dario Landa-Silva	University of Nottingham, UK
Darya Chyzhyk	University of the Basque Country, Spain
David Iclanzan	Hungarian Science University of Transylvania, Romania
Diego P. Ruiz	University of Granada, Spain
Dimitris Mourtzis	University of Patras, Greece
Dragan Simic	University of Novi Sad, Serbia
Dragos Horvath	Université de Strassbourg, France
Eiji Uchino	Yamaguchi University, Japan
Eva Volna	Univerzity of Ostrava, Czech Republic
Fabrício Olivetti De França	Universidade Federal do ABC, Brazil
Fermin Segovia	University of Liège, Belgium
Fidel Aznar	Universidad de Alicante, Spain
Florentino Fdez-Riverola	University of Vigo, Spain
Francisco Cuevas	Centro de Investigaciones en Óptica, A.C., Mexico
Francisco Martínez-Álvarez	Universidad Pablo de Olavide, Spain
Frank Klawonn	Ostfalia University of Applied Sciences, Germany
George Papakostas	TEI of Kavala, Greece
Georgios Dounias	University of the Aegean, Greece
Giancarlo Mauri	University of Milano-Bicocca, Italy
Giorgio Fumera	University of Cagliari, Italy

Gonzalo A. Aranda-Corral	Universidad de Huelva, Spain
Guiomar Corral	Ramon Llull University, Spain
Guoyin Wang	Chongqing University of Posts and Telecommunications, China
Héctor Quintián	University of Salamanca, Spain
Henrietta Toman	University of Debrecen, Hungary
Ignacio Turias	Universidad de Cádiz, Spain
Ingo R. Keck	Dublin Institute of Technology, Ireland
Ioannis Hatzilygeroudis	University of Patras, Greece
Irene Diaz	University of Oviedo, Spain
Isabel Barbancho	University of Málaga, Spain
Isabel Nepomuceno	University of Seville, Spain
Jaume Bacardit	University of Nottingham, UK
Javier Bajo	Universidad Politécnica de Madrid, Spain
Javier De Lope	Universidad Politécnica de Madrid, Spain
Javier Sedano	Instituto tecnológico de Castilla y León, Spain
Joaquín Derrac	University of Cardiff, UK
Jorge García-Gutiérrez	University of Seville, Spain
José C. Riquelme	University of Seville, Spain
José Dorronsoro	Universidad Autónoma de Madrid, Spain
José Garcia-Rodriguez	University of Alicante, Spain
José Luis Calvo Rolle	Universidad de A Coruña, Spain
José Luis Verdegay	Universidad de Granada, Spain
José M. Molina	Universidad Carlos III de Madrid, Spain
Jose Manuel Lopez-Guede	Basque Country University, Spain
José María Armingol	Universidad Carlos III de Madrid, Spain
José Ramón Villar	University of Oviedo, Spain
José-Ramón Cano De Amo	University of Jaen, Spain
Joses Ranilla	University of Oviedo, Spain
Juan Álvaro Muñoz Naranjo	University of Almería, Spain
Juan Humberto Sossa Azuela	National Polytechnic Institute, Mexico
Juan J. Flores	Universidad Michoacana de San Nicolas de Hidalgo, Mexico
Juán Pavón	Universidad Complutense de Madrid, Spain
Julio Ponce	Universidad Autónoma de Aguascalientes, Mexico
Krzysztof Kalinowski	Silesian University of Technology, Poland
Lauro Snidaro	University of Udine, Italy
Lenka Lhotska	Czech Technical University in Prague, Czech Republic
Leocadio G. Casado	University of Almeria, Spain
Lourdes Sáiz	University of Burgos, Spain
Manuel Grana	University of the Basque Country, Spain
Marcilio De Souto	LIFO/University of Orleans, France

María Guijarro	Universidad Complutense de Madrid, Spain
María Jose Del Jesus	Universidad de Jaén, Spain
María Martínez Ballesteros	University of Seville, Spain
María R. Sierra	Universidad de Oviedo, Spain
Mario Köeppen	Kyushu Institute of Technology, Japan
Martí Navarro	Universidad Politécnica de Valencia, Spain
Martin Macas	Czech Technical University in Prague, Czech Republic
Matjaz Gams	Jozef Stefan Institute, Slovenia
Miguel Ángel Patricio	Universidad Carlos III de Madrid, Spain
Miguel Ángel Veganzones	GIPSA-lab, Grenoble-INP, France
Miroslav Bursa	Czech Technical University in Prague, Czech Republic
Mohammed Chadli	University of Picardie Jules Verne, France
Nicola Di Mauro	Università di Bari, Italy
Nima Hatami	University of California, USA
Noelia Sanchez-Maroño	University of A Coruña, Spain
Oscar Fontenla-Romero	University of A Coruña, Spain
Ozgur Koray Sahingoz	Turkish Air Force Academy, Turkey
Paula M. Castro Castro	University of A Coruña, Spain
Paulo Novais	University of Minho, Portugal
Pavel Brandstetter	VSB-Technical University of Ostrava, Czech Republic
Peter Rockett	University of Sheffield, UK
Petrica Claudiu Pop	North University of Baia Mare, Romania
Rafael Alcala	University of Granada, Spain
Ramón Moreno	Universidad del País Vasco, Spain
Ramon Rizo	Universidad de Alicante, Spain
Ricardo Del Olmo	Universidad de Burgos, Spain
Robert Burduk	Wroclaw University of Technology, Poland
Rodolfo Zunino	University of Genoa, Italy
Roman Senkerik	Tomas Bata University in Zlin, Czech Republic
Ronald Yager	Iona College, USA
Rubén Fuentes-Fernández	Universidad Complutense de Madrid, Spain
Sean Holden	University of Cambridge, UK
Sebastián Ventura	University of Cordoba, Spain
Stella Heras	Universidad Politécnica de Valencia, Spain
Theodore Pachidis	Kavala Institute of Technology, Greece
Tomasz Kajdanowicz	Wroclaw University of Technology, Poland
Urko Zurutuza	Mondragon University, Spain
Urszula Stanczyk	Silesian University of Technology, Poland
Václav Snášel	VSB-Technical University of Ostrava, Czech Republic

Vasile Palade	Oxford University, UK
Waldemar Małopolski	Cracow University of Technology, Poland
Wei-Chiang Hong	Oriental Institute of Technology, Taiwan
Wiesław Chmielnicki	Jagiellonian University, Poland
Yannis Marinakis	Technical University of Crete, Greece
Ying Tan	Peking University, China
Yusuke Nojima	Osaka Prefecture University, Japan
Zuzana Oplatkova	Tomas Bata University in Zlin, Czech Republic

Organizing Committee

Emilio Corchado	University of Salamanca, Spain
Álvaro Herrero	University of Burgos, Spain
Bruno Baruque	University of Burgos, Spain
Héctor Quintián	University of Salamanca, Spain
José Luis Calvo	University of Coruña, Spain

Table of Contents

HAIS Applications

Computer Aided Diagnosis of Schizophrenia Based on Local-Activity Measures of Resting-State fMRI 1
Alexandre Savio, Darya Chyzhyk, and Manuel Graña

A Variable Neighborhood Search Approach for Solving the Generalized Vehicle Routing Problem 13
Petrică C. Pop, Levente Fuksz, and Andrei Horvat Marc

A Framework to Develop Adaptive Multimodal Dialog Systems for Android-Based Mobile Devices 25
David Griol and José Manuel Molina

Wind Power Ramp Event Prediction with Support Vector Machines 37
Oliver Kramer, Nils André Treiber, and Michael Sonnenschein

An Ontology for Human-Machine Computation Workflow Specification 49
Nuno Luz, Carlos Pereira, Nuno Silva, Paulo Novais, António Teixeira, and Miguel Oliveira e Silva

A Fuzzy Reinforcement Learning Approach to QoS Provisioning Transmission in Cognitive Radio Networks 61
Jerzy Martyna

Time Series Segmentation and Statistical Characterisation of the Spanish Stock Market Ibex-35 Index 74
M. Cruz-Ramírez, M. de la Paz-Marín, M. Pérez-Ortiz, and C. Hervás-Martínez

An Approach of Steel Plates Fault Diagnosis in Multiple Classes Decision Making 86
Dragan Simić, Vasa Svirčević, and Svetlana Simić

Developing Adaptive Agents Situated in Intelligent Virtual Environments 98
J.A. Rincon, Emilia Garcia, V. Julian, and C. Carrascosa

Data Mining and Knowledge Discovery

Concurrence among Imbalanced Labels and Its Influence on Multilabel Resampling Algorithms 110
Francisco Charte, Antonio Rivera, María José del Jesus, and Francisco Herrera

Depth-Based Outlier Detection Algorithm 122
Miguel Cárdenas-Montes

Symbolic Regression for Precrash Accident Severity Prediction 133
Andreas Meier, Mark Gonter, and Rudolf Kruse

Constraint and Preference Modelling for Spatial Decision Making with Use of Possibility Theory 145
Jan Caha, Veronika Nevtípilová, and Jiří Dvorský

Mining Incomplete Data with Attribute-Concept Values and "Do Not Care" Conditions 156
Patrick G. Clark and Jerzy W. Grzymala-Busse

An Approach to Sentiment Analysis of Movie Reviews: Lexicon Based vs. Classification 168
Lukasz Augustyniak, Tomasz Kajdanowicz, Przemyslaw Kazienko, Marcin Kulisiewicz, and Wlodzimierz Tuliglowicz

Scalable Uncertainty-Tolerant Business Rules 179
Alfredo Cuzzocrea, Hendrik Decker, and Francesc D. Muñoz-Escoí

Incorporating Belief Function in SVM for Phoneme Recognition 191
Rimah Amami, Dorra Ben Ayed, and Nouerddine Ellouze

Video and Image Analysis

Evaluation of Bounding Box Level Fusion of Single Target Video Object Trackers 200
Rafael Martín and José M. Martínez

A Hybrid System of Signature Recognition Using Video and Similarity Measures 211
Rafal Doroz, Krzysztof Wrobel, and Mateusz Watroba

Automatic Lane Correction in DGGE Images by Using Hybrid Genetic Algorithms 221
M. Angélica Pinninghoff, Macarena Valenzuela, Ricardo Contreras, and Marco Mora

Augmented Reality: An Observational Study Considering the MuCy Model to Develop Communication Skills on Deaf Children 233
Jonathan Cadeñanes and María Angélica González Arrieta

A 3D Facial Recognition System Using Structured Light Projection 241
Miguel A. Vázquez and Francisco J. Cuevas

Ear Recognition with Neural Networks Based on Fisher and Surf Algorithms 254
Pedro Luis Galdámez, María Angélica González Arrieta, and Miguel Ramón Ramón

Hybrid Sparse Linear and Lattice Method for Hyperspectral Image Unmixing 266
Ion Marques and Manuel Graña

Hyperspectral Image Analysis Based on Color Channels and Ensemble Classifier 274
Bartosz Krawczyk, Paweł Ksieniewicz, and Michał Woźniak

Bio-inspired Models and Evolutionary Computation

Non-dominated Sorting and a Novel Formulation in the Reporting Cells Planning 285
Víctor Berrocal-Plaza, Miguel A. Vega-Rodríguez, and Juan M. Sánchez-Pérez

Improving the k-Nearest Neighbour Rule by an Evolutionary Voting Approach 296
Jorge García-Gutiérrez, Daniel Mateos-García, and José C. Riquelme-Santos

Performance Testing of Multi-Chaotic Differential Evolution Concept on Shifted Benchmark Functions 306
Roman Senkerik, Michal Pluhacek, Donald Davendra, Ivan Zelinka, and Zuzana Kominkova Oplatkova

Time Series Segmentation of Paleoclimate Tipping Points by an Evolutionary Algorithm 318
M. Pérez-Ortiz, P.A. Gutiérrez, J. Sánchez-Monedero, C. Hervás-Martínez, Athanasia Nikolaou, Isabelle Dicaire, and Francisco Fernández-Navarro

Mutual Information-Based Feature Selection in Fuzzy Databases Applied to Searching for the Best Code Metrics in Automatic Grading 330
José Otero, Rosario Suárez, and Luciano Sánchez

Optimizing Objective Functions with Non-Linearly Correlated Variables Using Evolution Strategies with Kernel-Based Dimensionality Reduction 342
Piotr Lipinski

Visual Behavior Definition for 3D Crowd Animation through Neuro-evolution 354
Bruno Fernandez, Juan Monroy, Francisco Bellas, and Richard J. Duro

Hybrid System for Mobile Image Recognition through Convolutional Neural Networks and Discrete Graphical Models 365
William Raveane and María Angélica González Arrieta

Learning Algorithms

Self-adaptive Biometric Classifier Working on the Reduced Dataset 377
Piotr Porwik and Rafal Doroz

Analysis of Human Performance as a Measure of Mental Fatigue 389
André Pimenta, Davide Carneiro, Paulo Novais, and José Neves

CA-Based Model for Hantavirus Disease between Host Rodents 402
E. García Merino, E. García Sánchez, J.E. García Sánchez, and A. Martín del Rey

DHGN Network with Mode-Based Receptive Fields for 2-Dimensional Binary Pattern Recognition 415
Anang Hudaya Muhamad Amin, Asad I. Khan, and Benny B. Nasution

Extending Qualitative Spatial Theories with Emergent Spatial Concepts: An Automated Reasoning Approach 427
Gonzalo A. Aranda-Corral, Joaquín Borrego-Díaz, and Antonia M. Chávez-González

Theory-Inspired Optimizations for Privacy Preserving Distributed OLAP Algorithms 439
Alfredo Cuzzocrea and Elisa Bertino

Log-Gamma Distribution Optimisation via Maximum Likelihood for Ordered Probability Estimates 454
M. Pérez-Ortiz, P.A. Gutiérrez, and C. Hervás-Martínez

A Relational Dual Tableau Decision Procedure for Multimodal and Description Logics 466
Domenico Cantone, Joanna Golińska-Pilarek, and Marianna Nicolosi-Asmundo

Hybrid Intelligent Systems for Data Mining and Applications

Daily Power Load Forecasting Using the Differential Polynomial Neural Network 478
Ladislav Zjavka

Metaheuristics for Modelling Low-Resolution Galaxy Spectral Energy Distribution 490
Miguel Cárdenas-Montes, Miguel A. Vega-Rodríguez, and Mercedes Molla

Hybrid Approaches of Support Vector Regression and SARIMA Models to Forecast the Inspections Volume 502
Juan J. Ruiz-Aguilar, Ignacio J. Turias, María J. Jiménez-Come, and M. Mar Cerbán

A Hybrid Approach for Credibility Detection in Twitter 515
Alper Gün and Pınar Karagöz

A Hybrid Recommender System Based on AHP That Awares Contexts with Bayesian Networks for Smart TV 527
Ji-Chun Quan and Sung-Bae Cho

An Ontology-Based Recommender System Architecture for Semantic Searches in Vehicles Sales Portals 537
Fábio A.P. de Paiva, José Alfredo F. Costa, and Cláudio R.M. Silva

Hybrid Systems for Analyzing the Movements during a Temporary Breath Inability Episode 549
María Luz Alonso Álvarez, Silvia González, Javier Sedano, Joaquín Terán, José Ramón Villar, Estrella Ordax Carbajo, and María Jesús Coma del Corral

Hybrid Intelligent Model to Predict the SOC of a LFP Power Cell Type 561
Luis Alfonso Fernández-Serantes, Raúl Estrada Vázquez, José Luis Casteleiro-Roca, José Luis Calvo-Rolle, and Emilio Corchado

Classification and Cluster Analysis

Hierarchical Combining of Classifiers in Privacy Preserving Data Mining 573
Piotr Andruszkiewicz

Classification Rule Mining with Iterated Greedy 585
Juan A. Pedraza, Carlos García-Martínez, Alberto Cano, and Sebastián Ventura

Improving the Behavior of the Nearest Neighbor Classifier against Noisy Data with Feature Weighting Schemes 597
José A. Sáez, Joaquín Derrac, Julián Luengo, and Francisco Herrera

Soft Clustering Based on Hybrid Bayesian Networks in Socioecological Cartography 607
R.F. Ropero, P.A. Aguilera, and R. Rumí

Comparison of Active Learning Strategies and Proposal of a Multiclass Hypothesis Space Search 618
Davi P. dos Santos and André C.P.L.F. de Carvalho

CCE: An Approach to Improve the Accuracy in Ensembles by Using Diverse Base Learners 630
M. Paz Sesmero, Juan M. Alonso-Weber, German Gutierrez, and Araceli Sanchis

A Novel Hybrid Clustering Approach for Unsupervised Grouping of Similar Objects 642
Kaya Kuru

Fusion of Kohonen Maps Ranked by Cluster Validity Indexes 654
Leandro Antonio Pasa, José Alfredo F. Costa, and Marcial Guerra de Medeiros

Maintaining Case Based Reasoning Systems Based on Soft Competence Model 666
Abir Smiti and Zied Elouedi

Clustering-Based Ensemble of One-Class Classifiers for Hyperspectral Image Segmentation 678
Bartosz Krawczyk, Michał Woźniak, and Bogusław Cyganek

Credal Decision Trees to Classify Noisy Data Sets 689
Carlos J. Mantas and Joaquín Abellán

YASA: Yet Another Time Series Segmentation Algorithm for Anomaly Detection in Big Data Problems 697
Luis Martí, Nayat Sanchez-Pi, José Manuel Molina, and Ana Cristina Bicharra Garcia

Author Index 709