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Advances in Computational Intelligence

13th International Work-Conference
on Artificial Neural Networks, IWANN 2015
Palma de Mallorca, Spain, June 10–12, 2015
Proceedings, Part I

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Preface

We are proud to present the set of final accepted papers for the 13th edition of the IWANN conference “International Work-Conference on Artificial Neural Networks” held in Palma de Mallorca (Spain) during June 10–12, 2015.

IWANN is a biennial conference that seeks to provide a discussion forum for scientists, engineers, educators, and students about the latest ideas and realizations in the foundations, theory, models, and applications of hybrid systems inspired on nature (neural networks, fuzzy logic, and evolutionary systems) as well as in emerging areas related to the above items. As in previous editions of IWANN, it also aims to create a friendly environment that could lead to the establishment of scientific collaborations and exchanges among attendees. The proceedings will include all the presented communications to the conference. It has also foreseen the publication of an extended version of selected papers in a special issue of several specialized journals (such as *Neurocomputing*, *Soft Computing*, and *Neural Processing Letters*).

Since the first edition in Granada (LNCS 540, 1991), the conference has evolved and matured. The list of topics in the successive Call for Papers has also evolved, resulting in the following list for the present edition:

1. **Mathematical and theoretical methods in computational intelligence.** Mathematics for neural networks. RBF structures. Self-organizing networks and methods. Support vector machines and kernel methods. Fuzzy logic. Evolutionary and genetic algorithms.
2. **Neurocomputational formulations.** Single-neuron modelling. Perceptual modelling. System-level neural modelling. Spiking neurons. Models of biological learning.
3. **Learning and adaptation.** Adaptive systems. Imitation learning. Reconfigurable systems. Supervised, non-supervised, reinforcement, and statistical algorithms.
4. **Emulation of cognitive functions.** Decision Making. Multi-agent systems. Sensor mesh. Natural language. Pattern recognition. Perceptual and motor functions (visual, auditory, tactile, virtual reality, etc.). Robotics. Planning motor control.
5. **Bio-inspired systems and neuro-engineering.** Embedded intelligent systems. Evolvable computing. Evolving hardware. Microelectronics for neural, fuzzy, and bioinspired systems. Neural prostheses. Retinomorph systems. Brain–computer interfaces (BCI). Nanosystems. Nanocognitive systems.
6. **Advanced topics in computational intelligence.** Intelligent networks. Knowledge-intensive problem-solving techniques. Multi-sensor data fusion using computational intelligence. Search and meta-heuristics. Soft Computing. Neuro-fuzzy systems. Neuro-evolutionary systems. Neuro-swarm. Hybridization with novel computing paradigms.
7. **Applications.** Expert Systems. Image and Signal Processing. Ambient intelligence. Biomimetic applications. System identification, process control, and manufacturing. Computational Biology and Bioinformatics. Parallel and Distributed Computing.

Human–Computer Interaction, Internet Modeling, Communication and Networking, Intelligent Systems in Education, Human–Robot Interaction, Multi-Agent Systems, Time series analysis and prediction, Data mining and knowledge discovery.

At the end of the submission process, and after a careful peer-review and evaluation process (each submission was reviewed by at least 2, and on the average 2.7, Program Committee members or additional reviewers), 100 papers were accepted for oral or poster presentation, according to the recommendations of reviewers and the authors’ preferences.

It is important to note, that for the sake of consistency and readability of the book, the presented papers are not organized as they were presented in the IWANN 2015 sessions, but classified under 14 chapters. The organization of the papers is in two volumes arranged basically following the topics list included in the Call for Papers. The first volume (LNCS 9094), entitled “IWANN 2015. Advances on Computational Intelligence. Part I” is divided into eight main parts and includes the contributions on:

1. Computing Languages with Bio-Inspired Devices and Multi-Agent Systems (Special Session, organized by: M. Dolores Jiménez-López and Alfonso Ortega de la Puente)
2. Brain-Computer Interfaces: Applications and Tele-services (Special Session, organized by: Ricardo Ron Angevin and Miguel Angel Lopez)
3. Multi-Robot Systems: Applications and Theory (MRSAT) (Special Session, organized by: José Guerrero and Óscar Valero)
4. Video and Image Processing (Special Session, organized by: Enrique Domínguez and Jose Garcia)
5. Transfer Learning (Special Session, organized by: Luis M. Silva and Jorge M. Santos)
6. Structures, algorithms, and methods in artificial intelligence (Special Session, organized by: Daniela Danciu and Vladimir Răsvan)
7. Interactive and Cognitive Environments (Special Session, organized by: Wei Chen and Albert Samá)
8. Mathematical and theoretical methods in Fuzzy Systems

In the second volume (LNCS 9095), entitled “IWANN 2015. Advances on Computational Intelligence. Part II” is divided into six main parts and includes the contributions on:

1. Pattern Recognition
2. Embedded intelligent systems
3. Expert Systems
4. Advances in Computational Intelligence
5. Applications of Computational Intelligence
6. Invited Talks to IWANN 2015

In this edition of IWANN 2015, the plenary talks were given by Prof. Cristina Urdiales (The shared control paradigm for assistive and rehabilitation robots), Prof. Dan Cireșan (Deep Neural Networks for Visual Pattern Recognition), and finally by Prof. Andrea Cavallaro.

The 13th edition of the IWANN conference was organized by the University of Granada, University of Málaga, Polytechnic University of Catalonia, and University of the Balearic Islands, together with the Spanish Chapter of the IEEE Computational Intelligence Society. We wish to thank the University of the Balearic Islands for their support and grants.

We would also like to express our gratitude to the members of the different committees for their support, collaboration, and good work. We specially thank the Local Committee, Program Committee, the Reviewers, Invited Speaker, and Special Session Organizers. Finally, we want to thank Springer, and especially Alfred Hoffman and Anna Kramer for their continuous support and cooperation.

June 2015

Ignacio Rojas
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Contents – Part I

Computing Languages with Bio-Inspired Devices and Multi-Agent Systems

A Grammatical Inference Model for Measuring Language Complexity	3
<i>Leonor Becerra-Bonache and M. Dolores Jiménez-López</i>	
A Proposal for Contextual Grammatical Inference	18
<i>Leonor Becerra-Bonache, María Galván, and François Jacquenet</i>	
How to Search Optimal Solutions in Big Spaces with Networks of Bio-Inspired Processors	29
<i>José Ramón Sánchez Couso, Sandra Gómez Canaval, and David Batard Lorenzo</i>	
Distributed Simulation of NEPs Based On-Demand Cloud Elastic Computation.	40
<i>Sandra Gómez Canaval, Alfonso Ortega de la Puente, and Pablo Orgaz González</i>	
How Nets of Evolutionary Processors (NEPs) Could be Simulated in a Distributed Way	55
<i>Karina Jiménez, Antonio Jiménez, Marina de la Cruz, and Sandra Gómez Canaval</i>	

Brain-Computer Interfaces: Applications and Tele-services

A Comparison of SSVEP-Based BCI-Performance Between Different Age Groups	71
<i>Felix Gemblar, Piotr Stawicki, and Ivan Volosyak</i>	
Training in Realistic Virtual Environments: Impact on User Performance in a Motor Imagery-Based Brain–Computer Interface	78
<i>Leandro da Silva-Sauer, Luis Valero-Aguayo, Francisco Velasco-Álvarez, Sergio Varona-Moya, and Ricardo Ron-Angevin</i>	
Real-Time Monitoring of Biomedical Signals to Improve Road Safety	89
<i>José Miguel Morales, Leandro Luigi Di Stasi, Carolina Díaz-Piedra, Christian Morillas, and Samuel Romero</i>	

Brain-Computer Interface: Usability Evaluation of Different P300 Speller Configurations: A Preliminary Study.	98
<i>Liliana Garcia, Véronique Lespinet-Najib, Sarah Saioud, Victor Meistermann, Samuel Renaud, Jaime Diaz-Pineda, Jean Marc André, and Ricardo Ron-Angevin</i>	
Accessing Tele-Services Using a Hybrid BCI Approach	110
<i>Chris Brennan, Paul McCullagh, Gaye Lightbody, Leo Galway, Diana Feuser, José Luis González, and Suzanne Martin</i>	
Authentication of Brain-Computer Interface Users in Network Applications. . .	124
<i>M.A. Lopez-Gordo, Ricardo Ron-Angevin, and Francisco Pelayo</i>	
A Label-Aided Filter Method for Multi-objective Feature Selection in EEG Classification for BCI	133
<i>Pedro Martín-Smith, Julio Ortega, Javier Asensio-Cubero, John Q. Gan, and Andrés Ortiz</i>	
Multi-Robot Systems: Applications and Theory (MRSAT)	
A First Step Toward a Possibilistic Swarm Multi-robot Task Allocation	147
<i>José Guerrero, Óscar Valero, and Gabriel Oliver</i>	
A Bottom-up Robot Architecture Based on Learnt Behaviors Driven Design . . .	159
<i>Ignacio Herrero, Cristina Urdiales García, José Manuel Peula Palacios, and Francisco Sandoval Hernández</i>	
From Human Eye Fixation to Human-like Autonomous Artificial Vision . . .	171
<i>Viachaslau Kachurka, Kurosh Madani, Cristophe Sabourin, and Vladimir Golovko</i>	
Towards a Shared Control Navigation Function: Efficiency Based Command Modulation.	185
<i>Manuel Fernández-Carmona, José Manuel Peula, Cristina Urdiales, and Francisco Sandoval</i>	
AMiRo: A Mini Robot for Scientific Applications	199
<i>Thomas Schöpping, Timo Korthals, Stefan Herbrechtsmeier, and Ulrich Rückert</i>	
Video and Image Processing	
Visualization of Complex Datasets with the Self-Organizing Spanning Tree. . .	209
<i>Ezequiel López-Rubio, Esteban José Palomo, Rafael Marcos Luque Baena, and Enrique Domínguez</i>	

<p>A Detection System for Vertical Slot Fishways Using Laser Technology and Computer Vision Techniques</p> <p><i>Angel J. Rico-Díaz, Alvaro Rodríguez, Daniel Villares, Juan R. Rabuñal, Jeronimo Puertas, and Luis Pena</i></p>	<p>218</p>
<p>Interactive Relevance Visual Learning for Image Retrieval</p> <p><i>Hsin-Chia Fu, Z.H. Wang, W.J. Wang, and Hsiao-Tien Pao</i></p>	<p>227</p>
<p>Scene Classification Based on Local Binary Pattern and Improved Bag of Visual Words</p> <p><i>Gholam Ali Montazer, Davar Giveki, and Mohammad Ali Soltanshahi</i></p>	<p>241</p>
<p>An Experimental Comparison for the Identification of Weeds in Sunflower Crops via Unmanned Aerial Vehicles and Object-Based Analysis.</p> <p><i>María Pérez-Ortiz, Pedro Antonio Gutiérrez, Jose Manuel Peña, Jorge Torres-Sánchez, César Hervás-Martínez, and Francisca López-Granados</i></p>	<p>252</p>
<p>A Novel Framework for Hyperemia Grading Based on Artificial Neural Networks.</p> <p><i>Luisa Sánchez, Noelia Barreira, Hugo Pena-Verdeal, and Eva Yebra-Pimentel</i></p>	<p>263</p>
<p>Applying a Genetic Algorithm Solution to Improve Compression of Wavelet Coefficient Sign.</p> <p><i>Antonio Martí, Otoniel López, Francisco Rodríguez-Ballester, and Manuel Malumbres</i></p>	<p>276</p>
<p>Finding the Texture Features Characterizing the Most Homogeneous Texture Segment in the Image</p> <p><i>Alexander Goltsev, Vladimir Gritsenko, Ernst Kussul, and Tatiana Baidyk</i></p>	<p>287</p>
<p>Robust Tracking for Augmented Reality</p> <p><i>José M. González-Linares, Nicolás Guil, and Julián Ramos Cózar</i></p>	<p>301</p>
<p>Bio-inspired Motion Estimation with Event-Driven Sensors.</p> <p><i>Francisco Barranco, Cornelia Fermuller, and Yiannis Aloimonos</i></p>	<p>309</p>
Transfer Learning	
<p>Domain Generalization Based on Transfer Component Analysis.</p> <p><i>Thomas Grubinger, Adriana Birlutiu, Holger Schöner, Thomas Natschläger, and Tom Heskes</i></p>	<p>325</p>
<p>Deep Transfer Learning Ensemble for Classification.</p> <p><i>Chetak Kandaswamy, Luís M. Silva, Luís A. Alexandre, and Jorge M. Santos</i></p>	<p>335</p>

Development of a Power Output Forecasting Tool for Wind Farms Based in Principal Components and Artificial Neural Networks	349
<i>P. del Saz-Orozco, J. Fernández de Cañete, and R. Alba</i>	
CO ² RBFN-CS: First Approach Introducing Cost-Sensitivity in the Cooperative-Competitive RBFN Design	361
<i>María Dolores Pérez-Godoy, Antonio Jesús Rivera, Francisco Charte, and Maria Jose del Jesus</i>	
Transfer Learning for the Recognition of Immunogold Particles in TEM Imaging.	374
<i>Ricardo Gamelas Sousa, Tiago Esteves, Sara Rocha, Francisco Figueiredo, Joaquim Marques de Sá, Luís A. Alexandre, Jorge M. Santos, and Luís M. Silva</i>	
Structures, Algorithms and Methods in Artificial Intelligence	
BSO-FS: Bee Swarm Optimization for Feature Selection in Classification. . .	387
<i>Souhila Sadeg, Leila Hamdad, Karima Benatchba, and Zineb Habbas</i>	
Improved Retrieval for Challenging Scenarios in Clique-Based Neural Networks.	400
<i>Xiaoran Jiang, Max Raphael Sobroza Marques, Pierre-Julien Kirsch, and Claude Berrou</i>	
On Structures with Emergent Computing Properties. A Connectionist versus Control Engineering Approach	415
<i>Daniela Danciu and Vladimir Răsvan</i>	
Deep Neural Networks for Wind Energy Prediction	430
<i>David Díaz, Alberto Torres, and José Ramón Dorronsoro</i>	
Ensemble of Classifiers for Length of Stay Prediction in Colorectal Cancer . . .	444
<i>Ruxandra Stoean, Catalin Stoean, Adrian Sandita, Daniela Ciobanu, and Cristian Mesina</i>	
Interactive and Cognitive Environments	
Monitoring Motor Fluctuations in Parkinson’s Disease Using a Waist-Worn Inertial Sensor	461
<i>Carlos Pérez-López, Albert Samà, Daniel Rodríguez-Martín, Andreu Català, Joan Cabestany, Eva de Mingo, and Alejandro Rodríguez-Molinero</i>	

Convolutional Neural Networks for Detecting and Mapping Crowds
in First Person Vision Applications. 475
*Juan Sebastian Olier, Carlo Regazzoni, Lucio Marcenaro,
and Matthias Rauterberg*

E-COmate: What’s Your Non-consumption? 486
*Veranika Lim, Mathias Funk, Matthias Rauterberg, Lucio Marcenaro,
and Carlo Regazzoni*

Mathematical and Theoretical Methods in Fuzzy Systems

Extended Bag of Visual Words for Face Detection. 503
Gholam Ali Montazer, Mohammad Ali Soltanshahi, and Davar Giveki

Improving Multi-adjoint Logic Programs by Unfolding Fuzzy Connective
Definitions. 511
Pedro J. Morcillo and Ginès Moreno

A Mixed Fuzzy Similarity Approach to Detect Plagiarism in Persian Texts . . . 525
Hamid Ahangarbahar and Gholam Ali Montazer

A Neural-Network-Based Robust Observer for Simultaneous Unknown
Input Decoupling and Fault Estimation 535
Piotr Witczak, Marcin Mrugalski, Krzysztof Patan, and Marcin Witczak

Consequences of Structural Differences Between Hierarchical Systems
While Fuzzy Inference 549
Begum Mutlu, Ebru A. Sezer, and Hakan A. Nefeslioglu

SIRMs Fuzzy Inference Model with Linear Transformation of Input
Variables and Universal Approximation. 561
Hirofumi Miyajima, Noritaka Shigei, and Hiromi Miyajima

A New Approach of Fuzzy Neural Networks in Monthly Forecast
of Water Flow 576
Ruben Araújo, Mêuser Valença, and Sérgio Fernandes

Ordering Relations over Intuitionistic Fuzzy Quantities. 587
Elena Mielcova

On Fuzzy *c*-Means and Membership Based Clustering 597
Vicenç Torra

Author Index 609

Contents – Part II

Pattern Recognition

Developing Gene Classifier System for Autism Recognition	3
<i>Tomasz Latkowski and Stanislaw Osowski</i>	
A Distributed Feature Selection Approach Based on a Complexity Measure. . .	15
<i>Verónica Bolón-Canedo, Noelia Sánchez-Marroño, and Amparo Alonso-Betanzos</i>	
Ensemble Feature Selection for Rankings of Features	29
<i>Borja Seijo-Pardo, Verónica Bolón-Canedo, Iago Porto-Díaz, and Amparo Alonso-Betanzos</i>	
A Medical Case-Based Reasoning Approach Using Image Classification and Text Information for Recommendation	43
<i>Sara Nasiri, Johannes Zenkert, and Madjid Fathi</i>	
Non Spontaneous Saccadic Movements Identification in Clinical Electrooculography Using Machine Learning	56
<i>Roberto Becerra-García, Rodolfo García-Bermúdez, Gonzalo Joya-Caparrós, Abel Fernández-Higuera, Camilo Velázquez-Rodríguez, Michel Velázquez-Mariño, Franger Cuevas-Beltrán, Francisco García-Lagos, and Roberto Rodríguez-Labrada</i>	
Applying a Hybrid Algorithm to the Segmentation of the Spanish Stock Market Index Time Series	69
<i>Antonio Manuel Durán-Rosal, Mónica de la Paz-Marín, Pedro Antonio Gutiérrez, and César Hervás-Martínez</i>	
Nonlinear Ordinal Logistic Regression Using Covariates Obtained by Radial Basis Function Neural Networks Models.	80
<i>Manuel Dorado-Moreno, Pedro Antonio Gutiérrez, Javier Sánchez-Monedero, and César Hervás-Martínez</i>	
Energy Flux Range Classification by Using a Dynamic Window Autoregressive Model	92
<i>Pedro Antonio Gutiérrez, Juan Carlos Fernández, Mária Pérez-Ortiz, Laura Cornejo-Bueno, Enrique Alexandre-Cortizo, Sancho Salcedo-Sanz, and César Hervás-Martínez</i>	

Automatic Eye Blink Detection Using Consumer Web Cameras.	103
<i>Beatriz Remeseiro, Alba Fernández, and Madalena Lira</i>	
Insights on the Use of Convolutional Neural Networks for Document Image Binarization	115
<i>J. Pastor-Pellicer, S. España-Boquera, F. Zamora-Martínez, M. Zeshan Afzal, and Maria Jose Castro-Bleda</i>	
A Genetic Algorithms-Based LSSVM Classifier for Fixed-Size Set of Support Vectors	127
<i>Danilo Avilar Silva and Ajalmar R. Rocha Neto</i>	
Ensemble of Minimal Learning Machines for Pattern Classification	142
<i>Diego Parente Paiva Mesquita, João Paulo Pordeus Gomes, and Amauri Holanda Souza Junior</i>	
Extreme Learning Machines for Multiclass Classification: Refining Predictions with Gaussian Mixture Models	153
<i>Emil Eirola, Andrey Gritsenko, Anton Akusok, Kaj-Mikael Björk, Yoan Miche, Dušan Sovilj, Rui Nian, Bo He, and Amaury Lendasse</i>	
Modeling the EUR/USD Index Using LS-SVM and Performing Variable Selection.	165
<i>Luis-Javier Herrera, Alberto Guillén, Rubén Martínez, Carlos García, Hector Pomares, Oresti Baños, and Ignacio Rojas</i>	
Embedded Intelligent Systems	
Modeling Retina Adaptation with Multiobjective Parameter Fitting	175
<i>Pablo Martínez-Cañada, Christian Morillas, Samuel Romero, and Francisco Pelayo</i>	
Stochastic-Based Implementation of Reservoir Computers	185
<i>Miquel L. Alomar, Vincent Canals, Víctor Martínez-Moll, and Josep L. Rosselló</i>	
FPGA Implementation Comparison Between C-Mantec and Back-Propagation Neural Network Algorithms.	197
<i>Francisco Ortega-Zamorano, José M. Jerez, Gustavo Juárez, and Leonardo Franco</i>	
Expert Systems	
Logic Programming and Artificial Neural Networks in Breast Cancer Detection.	211
<i>José Neves, Tiago Guimarães, Sabino Gomes, Henrique Vicente, Mariana Santos, João Neves, José Machado, and Paulo Novais</i>	

An ANFIS-Based Fault Classification Approach in Double-Circuit Transmission Line Using Current Samples.	225
<i>Mohammad Amin Jarrahi, Haidar Samet, Hossein Raayatpisheh, Ahmad Jafari, and Mohsen Rakhshan</i>	
Evolutionary Hybrid Configuration Applied to a Polymerization Process Modelling	237
<i>Silvia Curteanu, Elena-Niculina Dragoi, and Vlad Dafinescu</i>	
Multi-layer Perceptrons for Voxel-Based Classification of Point Clouds from Natural Environments	250
<i>Victoria Plaza, Jose Antonio Gomez-Ruiz, Anthony Mandow, and Alfonso J. Garcia-Cerezo</i>	
An Improved RBF Neural Network Approach to Nonlinear Curve Fitting . . .	262
<i>Michael M. Li and Brijesh Verma</i>	
QSVM: A Support Vector Machine for Rule Extraction	276
<i>Guido Bologna and Yoichi Hayashi</i>	
Multiwindow Fusion for Wearable Activity Recognition	290
<i>Oresti Baños, Juan-Manuel Galvez, Miguel Damas, Alberto Guillén, Luis-Javier Herrera, Hector Pomares, Ignacio Rojas, Claudia Villalonga, Choong Seon Hong, and Sungyoung Lee</i>	
Ontological Sensor Selection for Wearable Activity Recognition	298
<i>Claudia Villalonga, Oresti Baños, Hector Pomares, and Ignacio Rojas</i>	
Short-Term Spanish Aggregated Solar Energy Forecast.	307
<i>Nicolas Perez-Mora, Vincent Canals, and Víctor Martínez-Moll</i>	
Intelligent Presentation Skills Trainer Analyses Body Movement	320
<i>Anh-Tuan Nguyen, Wei Chen, and Matthias Rauterberg</i>	
Performing Variable Selection by Multiobjective Criterion: An Application to Mobile Payment	333
<i>Alberto Guillén, Luis-Javier Herrera, Francisco Liébana, Oresti Baños, and Ignacio Rojas</i>	
 Advances in Computational Intelligence	
Aggregation of Partial Rankings – An Approach Based on the Kemeny Ranking Problem	343
<i>Gonzalo Nápoles, Zoumpoulia Dikopoulou, Elpiniki Papageorgiou, Rafael Bello, and Koen Vanhoof</i>	
Existence and Synthesis of Complex Hopfield Type Associative Memories . . .	356
<i>Garimella Rama Murthy and Moncef Gabbouj</i>	

On Acceleration of Incremental Learning in Chaotic Neural Network	370
<i>Toshinori Deguchi, Toshiki Takahashi, and Naohiro Ishii</i>	
Comparing Optimization Methods, in Continuous Space, for Modelling with a Diffusion Process	380
<i>Nuria Rico, Maribel García Arenas, Desirée Romero, J.M. Crespo, Pedro Castillo, and J.J. Merelo</i>	
Estimating Artificial Neural Networks with Generalized Method Moments . . .	391
<i>Alexandre Street de Aguiar and João Marco Braga da Cunha</i>	
An Hybrid Ensemble Method Based on Data Clustering and Weak Learners Reliabilities Estimated Through Neural Networks	400
<i>Marco Vannucci, Valentina Colla, and Silvia Cateni</i>	
Conventional Prediction vs Beyond Data Range Prediction of Loss Coefficient for Quarter Circle Breakwater Using ANFIS	412
<i>Arkal Vittal Hegde and Raju Budime</i>	
Performance Evaluation of Least Squares SVR in Robust Dynamical System Identification.	422
<i>José Daniel A. Santos, César Lincoln C. Mattos, and Guilherme A. Barreto</i>	
On the Generalization of the Uninorm Morphological Gradient	436
<i>Manuel González-Hidalgo, Sebastia Massanet, Arnau Mir, and Daniel Ruiz-Aguilera</i>	
Revisiting Image Vignetting Correction by Constrained Minimization of Log-Intensity Entropy	450
<i>Laura Lopez-Fuentes, Gabriel Oliver, and Sebastia Massanet</i>	
Hybrid Dynamic Learning Systems for Regression	464
<i>Kaushala Dias and Terry Windeatt</i>	
A Novel Algorithm to Train Multilayer Hardlimit Neural Networks Based on a Mixed Integer Linear Program Model	477
<i>Jose B. da Fonseca</i>	
On Member Labelling in Social Networks	488
<i>Rafael Corchuelo, Antonia M. Reina Quintero, and Patricia Jiménez</i>	
Applications of Computational Intelligence	
Deconvolution of X-ray Diffraction Profiles Using Genetic Algorithms and Differential Evolution	503
<i>Sidolina P. Santos, Juan A. Gomez-Pulido, and Florentino Sanchez-Bajo</i>	

Using ANN in Financial Markets Micro-Structure Analysis 515
Brayan S. Reyes Daza and Octavio J. Salcedo Parra

Cluster Analysis of Finger-to-nose Test for Spinocerebellar Ataxia
 Assessment 524
*Michel Velázquez-Mariño, Miguel Atencia, Rodolfo García-Bermúdez,
 Daniel Pupo-Ricardo, Roberto Becerra-García, Luis Velázquez Pérez,
 and Francisco Sandoval*

Exploiting Neuro-Fuzzy System for Mobility Prediction in Wireless
 Ad-Hoc Networks 536
Mohamed Elleuch, Heni Kaaniche, and Mohamed Ayadi

A New Method for an Optimal SOM Size Determination in Neuro-Fuzzy
 for the Digital Forensics Applications 549
Andrii Shalaginov and Katrin Franke

SVRs and Uncertainty Estimates in Wind Energy Prediction 564
Jesús Prada and José Ramón Dorronsoro

Search for Meaning Through the Study of Co-occurrences in Texts 578
*Nicolas Bourgeois, Marie Cottrell, Stéphane Lamassé,
 and Madalina Olteanu*

Evaluation of Fitting Functions for the Saccade Velocity Profile
 in Electrooculographic Records 592
*Rodolfo García-Bermúdez, Camilo Velázquez-Rodríguez, Fernando Rojas,
 Manuel Rodríguez, Roberto Becerra-García, Michel Velázquez-Mariño,
 José Arteaga-Vera, and Luis Velázquez*

esCam: A Mobile Application to Capture and Enhance Text Images. 601
J. Pastor-Pellicer, Maria Jose Castro-Bleda, and J.L. Adelantado-Torres

Computer Access and Alternative and Augmentative Communication
 (AAC) for People with Disabilities: A Multi-modal Hardware
 and Software Solution 605
Salvador Sancha-Ros and Esther García-Garaluz

Invited Talks to IWANN 2015

The Shared Control Paradigm for Assistive and Rehabilitation Robots 613
Cristina Urdiales

Author Index 617