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Guest Editorial:
New trends on Soft Computing Models in Industrial and Environmental Applications
A selection of extended and updated papers from the SOCO 2011 International Conference

The Twelve papers included in this special issue represent a selection of extended contributions presented at the Sixth International Conference on Soft Computing Models in Industrial and Environmental Applications, held in Salamanca, Spain, 6-8th April, 2011.

Papers were selected on the basis of fundamental ideas and concepts rather than the direct usage of well-established techniques. This special issue is then aimed at practitioners, researchers and post-graduate students, who are engaged in developing and applying advanced Soft Computing Models to solving real-world problems in the Industrial and Environmental fields. The papers are organized as follows.

In the first contribution, Graña and Gonzalez-Acuña develop a formulation of dendritic classifiers based on lattice kernels and train them using a direct Monte Carlo approach and a Sparse Bayesian Learning. The results of both kinds of training are compared with the Relevance Vector Machines on a collection of benchmark datasets.

In the second contribution by Irigoyen and Miñano, the authors present the results of the identification of the relationship in time, between the required exercise (machine resistance) and the heart rate of the patient in medical effort tests, using a NARX neural network model. In the experimental stage, test data have been obtained by exercising with a cyclo-ergometer in two different tests: Power Step Response and Conconi.

Carneiro et al. in the third contribution present a biologically inspired method to deal with the problem in which genetic algorithms are used to create possible solutions for a given dispute. The approach presented is able to generate a broad number of diverse solutions that cover virtually the whole search space for a given problem. The results of this work are being applied in a negotiation tool that is part of the UMCourt conflict resolution platform.

In the fourth contribution by Donate et al., they propose a novel Evolutionary Artificial Neural Networks (EANN) approach, where a weighted n-fold validation fitness scheme is used to build an ensemble of neural networks, under four different combination methods: mean, median, softmax and rank-based combinations. Several experiments were held, using six real-world time series with different characteristics and from distinct domains. Overall, the proposed approach achieved competitive results when compared with non weighted n-fold EANN ensembles, the simpler 0-fold EANN and also the popular Holt-Winters statistical method.

Dan Burdescu et al. in the fifth contribution, present a system used in the medical domain for three distinct tasks: image annotation, semantic based image retrieval and content based image retrieval. An original image segmentation algorithm based on a hexagonal structure was used to perform the segmentation of medical images. Image's regions are described using a vocabulary of blobs generated from image features using the K-means clustering algorithm. The annotation and semantic based retrieval task is evaluated for two annotation models: Cross Media Relevance Model and Continuous-space Relevance Model. Semantic based image retrieval is performed using the methods provided by the annotation models. The ontology used by the annotation process was created in an original manner starting from the information content provided by the Medical Subject Headings

(MeSH). The experiments were made using a database containing color images retrieved from medical domain using an endoscope and related to digestive diseases.

In sixth paper by Pedraza et al., they develop a face recognition system based on soft computing techniques, which complies with privacy-by-design rules and defines a set of principles that context-aware applications (including biometric sensors) should contain to conform to European and US law. This research deals with the necessity to consider legal issues concerning privacy or human rights in the development of biometric identification in ambient intelligence systems. Clearly, context-based services and ambient intelligence (and the most promising research area in Europe, namely ambient assisted living, ALL) call for a major research effort on new identification procedures.

The aim of the research by Redel-Macías et al. in paper seven is to develop a novel model which can be used in pass-by noise test in vehicles based on ensembles of hybrid Evolutionary Product Unit or Radial Basis function Neural Networks (EPUNN or ERBFNNs) at high frequencies. Statistical models and ensembles of hybrid EPUNN and ERBFNN approaches have been used to develop different noise identification models. The results obtained using different ensembles of hybrid EPUNNs and ERBFNNs show that the functional model and the hybrid algorithms proposed provide a very accurate identification compared to other statistical methodologies used to solve this regression problem.

In the eighth paper, Wu et al. analyze the existence criterion of loop strategies, and then present some corollaries and theorems, by which the loop strategies and chain strategies can be found, also superfluous strategies and inconsistent strategies. It presents a ranking model that indicates the weak node in strategy set and it also introduces a probability-based model which is the basis of evaluation of strategy. Additionally, this research proposes a method to generate offensive strategy, and the statistic results of simulation game prove the validity of the method.

Pop et al. in the ninth paper present an efficient hybrid heuristic algorithm obtained by combining a genetic algorithm (GA) with a local-global approach to the generalized vehicle routing problem (GVRP) and a powerful local search procedure. The computational experiments on several benchmarks instances show that the hybrid algorithm is competitive to all of the known heuristics published to date.

In the tenth paper Kramer et al. illustrate how methods from neural computation can serve as forecasting, and monitoring techniques, contributing to a successful integration of wind into sustainable, and smart energy grids. The study is based on the application of kernel methods like support vector regression and kernel density estimation as prediction methods. Furthermore, dimension reduction techniques like self-organizing maps for monitoring of high-dimensional wind time series are applied. The methods are briefly introduced, related work is presented, and experimental case studies are exemplarily described. The experimental parts are based on real wind energy time series data from the NREL western wind resource dataset.

Vera et al. in the eleventh contribution present a novel soft computing procedure based on the application of artificial neural networks, genetic algorithms and identification systems, which makes it possible to optimise the implementation conditions in the manufacturing process of high precision parts, including finishing precision, while saving both time and financial costs and/or energy. The novel proposed approach was tested under real dental milling processes using a high precision machining centre with five axes, requiring high finishing precision of measures in micrometers with a

large number of process factors to analyse. The results of the experiment, which validate the performance of the proposed approach, are presented in this study.

The final contribution, by Sakalauskas and Kriksciuniene, presents a research about financial market efficiency and to recognize major reversal points of long-term trend of stock market index, which could indicate forthcoming crisis or market raise periods. The study suggests a computational model of financial time series analysis, which combines several approaches of soft computing, including information efficiency evaluation methods (Shannon's entropy, Hurst exponent), neural networks and sensitivity analysis. The model aims to derive the aggregated measure for evaluating efficiency of the financial market and to find its interrelationships with the reversal of long- term trend. The radial basis function neural network was designed for forecasting moments of cardinal changes in stock market behaviour, expressed by its entropy values derived from the symbolized time series of stock market index. The performance of neural network model is explored by applying sensitivity analysis and resulted in selecting smoothing parameters of the input variables. The experimental research investigates behaviour of the long-term trend of the three emerging financial markets within NASDAQ OMX Baltic stock exchange. Introduction of information efficiency measures improve ability of the model to recognize the approaching reversal of long-term trend from temporary market "nervousness" and can be useful for calibrating stock trading strategy.

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