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Editorial

Special issue SOCO12

The eight papers included in this special issue represent a selection of extended contributions presented at the 7th International Conference on Soft Computing Models in Industrial and Environmental Applications, SOCO 2012 held in Ostrava, Czech Republic, 5th–7th September 2012, and organized by the BISITE and the GICAP research groups.

This special issue is aimed at practitioners, researchers and postgraduate students who are engaged in developing and applying advanced intelligent systems principles to solving real-world problems. The papers are organized as follows.

The first contribution, by Novák et al., reports on a real application whose task was to recognize characters printed on metal ingots. They present two original recognition methods: the first one is based on application of mathematical fuzzy logic and the second one is based on representation of an image by a fuzzy-valued function. Results of these methods are compared with a simple neural network classifier and few other common methods.

In second contribution, Pop et al., deal with a sustainable supply chain network design problem (SSC-NDP) arising in the public sector. Due to the complexity of the problem, it is proposed an efficient Reverse Distribution System (RDS) consisting of several improved classical heuristic algorithms. The developed approaches were tested and promising results were obtained on benchmark instances based on the literature, involving between 10 and 50 distribution centers and between 10 and 100 customers.

The paper, by Larrea et al., presents a real time testing approach of an Intelligent Multiobjective Nonlinear-Model Predictive Control Strategy (iMO-NMPC). The main goal is the testing and analysis of the feasibility and reliability of some Soft Computing (SC) techniques running on a real time industrial controller. In this predictive control strategy, a Multiobjective Genetic Algorithm is used together with a Recurrent Artificial Neural Network in order to obtain the control action at each sampling time. This work is a contribution to spread the SC techniques in on-line control applications, where currently they are relegated mainly to be used off-line, as is the case of optimal tuning of control strategies.

The contribution, by Bursa et al., details the process of mining information from a hospital information system that has been designed approximately 15 years ago. The information is distributed within database tables in a large textual attributes with a free structure. They have used three different methods: k-means, self-organizing map and a self-organizing approach inspired by ant-colonies that performed clustering of the records. The records were visualized and revealed the most prominent information structure(s) that were consulted with medical experts and served for further mining from the database. The outcome of this task is a set of ordered or nominal attributes with a structural information that is available for rule discovery mining and automated processing for the research of asphyxia prediction during delivery. The proposed methodology has significantly reduced the processing time of loosely structured textual records for both IT and medical experts.

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This paper, by Simić et al., presents a novel hybrid model for supplier assessment and selection, based on hybrid solution including genetic algorithm (GA) and harmony search algorithm (HSA). The chosen data set presents original data, which is used for assessment in "Lames" company. The results show that HSA & GA values constraint model is slightly more restricted then other discussed models, and separates, much better and with greater precision, poor companies from the good ones in business environment.

In this paper, by Nowaková et al., two systems of designing a PID controller (its parameters) with a knowledge base are suggested. Both are built on know-how obtained from the classic design method. The first one from the Ziegler–Nichols step response method and the second one from the Chien, Hrones and Reswick design method which is one of the modification of the Ziegler–Nichols step response design method. The systems created in this way are expert systems (ES) determined to the design parameters of a classical PID controller, which is considered in classic closed feedback control.

In this contribution, Zelinka et al., discuss predictive control of chemical reactor by means of evolutionary algorithm named SOMA – the Self-Organizing Migrating Algorithm, that can be classified like swarm intelligence or memetic algorithm. The SOMA algorithm was used for multiple input–multiple output control of reactor model after static optimization. The MIMO control was defined for 5 inputs and 2 outputs with total number 12 of unknown variables. This contribution is based on simulation results from optimization of static parameters that has been used to set up reactor for its evolutionary control.

The final contribution, by Calvo-Rolle et al., presents a method to obtain a regression model based on intelligent methods, with the aim of calculating the extinction angle of the current of a single-phase half wave controlled rectifier with resistive and inductive load. The model was verified empirically with electronic circuit software simulation, analytical methods and with a practical implementation. The advantage of the proposed method is its low computational cost. Then, the final solution is very appropriate for applications where high computational requirements are not possible, like low-performance microcontrollers or web applications.

The guest editors wish to thank Professor Dov Gabbay (Editor-in-Chief of Journal of Applied Logic) for providing the opportunity to edit this special issue. We would also like to thank the referees who have critically evaluated the papers within the short time. Finally, we hope the reader will share our joy and find this special issue very useful.

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