
Editorial

Editorial to the Special Issue Section on “Hybrid Intelligent Systems for Control and Automation - Part I”

The special issue on hybrid intelligent systems for control and automation comprises four contributions, which are selected and extended versions of papers previously presented at the International Seminar on Computational Intelligence held at Tijuana, Mexico on January of 2010. The papers describe different contributions to the area of hybrid intelligent systems with application on control and automation. In the papers, an optimal combination of intelligent techniques is applied to solve in an efficient and accurate manner a problem in a particular area of application.

In the first paper, by Ieroham Baruch and Carlos-Roman Mariaca-Gaspar, Recurrent Neural Identification and Control of a Continuous Bioprocess via First and Second Order Learning is presented. This paper applied a new Kalman Filter Recurrent Neural Network (KFRNN) topology and a recursive Levenberg-Marquardt (L-M) learning algorithm capable to estimate parameters and states of highly nonlinear unknown plant in noisy environment. The proposed KFRNN identifier, learned by the Backpropagation and L-M learning algorithm, was incorporated in a direct and indirect adaptive neural control schemes. The proposed control schemes were applied for real-time recurrent neural identification and control of a continuous stirred tank bioreactor model, where fast convergence, noise filtering and low mean squared error of reference tracking were achieved.

In the second paper, by Yazmin Maldonado *et al.*, a Novel Method for Genetic Optimization of Membership functions of Fuzzy Logic for Speed Control of a Direct Current Motor for Hardware Applications in FPGAs is presented. This paper proposes a novel method for genetic optimization of triangular and trapezoidal membership functions of fuzzy systems, for hardware applications such as the FPGA (Field Programmable Gate Array). This method consists in taking only certain points of the membership functions, with the purpose of giving more efficiency to the algorithm. The genetic algorithm was tested in a fuzzy controller to regulate engine speed of a direct current (DC) motor, using the Xilinx System Generator (XSG) toolbox of Matlab, which simulate VHDL (Very High Description Language) code.

In the third paper, by Héctor Joaquín Fraire Huacuja *et al.*, a method for Improving the Intensification and Diversification Balance of the Tabu Solution for the Robust Capacitated International Sourcing Problem is presented. This paper addresses the robust capacitated international sourcing problem (RoCIS), which consists of selecting a subset of suppliers with finite capacity, from an available set of potential suppliers internationally located.

In the fourth paper, by Abraham Meléndez *et al.*, the Optimization of a Reactive Controller for a Mobile Robot using Evolutionary Algorithms and Fuzzy Logic is presented. This paper describes an evolutionary algorithm used for the optimization of a reactive controller applied to a particular mobile robot. The algorithm optimizes the Fuzzy Inference System and the position and number of the sensors on the robot, while trying to use the minimum amount of power possible.

In conclusion, this special issue represents a contribution to the state of the art in the area of hybrid intelligent systems with application on control and automation.

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