
Editorial

Special Issue on “Hybrid Intelligent Systems”

This Special Issue contains a selection of papers from the IFSA 2007 World Congress that were extended and significantly improved over the conference proceeding's version of the papers. There are seven papers in this Special Issue, containing a range of topics of the Hybrid Intelligent Systems area. In particular, there are papers on fuzzy logic, neural networks, genetic algorithms, ant colony optimization, and combinations of these techniques.

The first paper, by Miguel Porta *et al.*, describes an “Ant Colony Optimization (ACO) Path Planner Using a FIS for Path Selection Adjusted with a Simple Tuning Algorithm”, which proposes an evolutionary approach for designing paths for autonomous mobile robots that also uses fuzzy logic. Simulation and experimental results with an autonomous robot shows the feasibility of the proposed hybrid approach combining ACO and fuzzy logic.

The second paper, by Ricardo Martinez *et al.*, describes an “Intelligent Control for a Perturbed Autonomous Wheeled Mobile Robot Using Type-2 Fuzzy Logic and Genetic Algorithms”, which proposes the use of interval type-2 fuzzy logic for designing stable intelligent controllers of a mobile robot. Genetic algorithms are also used to automatically obtain the optimal parameters of the interval type-2 fuzzy logic controllers. Simulation results show the effectiveness of the proposed hybrid intelligent approach.

The third paper, by Gerardo Mendez and Angeles Hernandez, describes “Hybrid Learning of Interval Type-2 Fuzzy Systems Based on Orthogonal Least Squares and Back Propagation for Manufacturing Applications”, which proposes a hybrid method for learning the parameters of an interval type-2 fuzzy system and its application for intelligent manufacturing. The hybrid learning method combines orthogonal least squares and backpropagation for achieving better performance. Simulation results illustrate the usefulness of the hybrid learning algorithm.

The fourth paper, by Kadda Zemalache *et al.*, describes the “Control of a Drone: Study and Analysis of the Robustness”, which proposes a method for analysis and design of a stable and robust controller for a drone. Simulation and experimental results show the feasibility of the proposed approach for control.

The fifth paper, by Fevrier Valdez and Patricia Melin, describes a “Comparative Study of Particle Swarm Optimization and Genetic Algorithms for Complex Mathematical functions”, which proposes a combination of two evolutionary methods for achieving optimization of complex mathematical functions. The use of particle swarm optimization and genetic algorithms for complex function optimization is analyzed, and the optimization of neural networks is proposed.

The sixth paper, by Miguel Lopez and Patricia Melin, describes “Response Integration in Ensemble Neural Networks using the Sugeno Integral and Fuzzy Inference System for Pattern Recognition”, which proposes using fuzzy logic models to integrate the results of the modules in an ensemble architecture. The use of the Sugeno integral and fuzzy inference systems is tested for fingerprint recognition. Simulation results are encouraging and other recognition problems can be solved with the same approach.

The seventh paper, by Denisse Hidalgo and Oscar Castillo, describes “Type-1 and Type-2 Fuzzy Inference Systems as Integration Methods in Modular Neural Networks for Multimodal Biometry and its Optimization with Genetic Algorithms”. The paper proposes the use of fuzzy systems for integrating results of modular neural networks, and genetic algorithms for finding the optimal parameters of the fuzzy systems. Simulation results in the recognition of persons illustrate the potential of the proposed approach.

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