

Guest editorial

Special issue: Hybrid approaches for approximate reasoning

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Abstract. Nature inspired computation is a general term referring to computing inspired by nature. It is an emerging interdisciplinary area and so far a range of techniques and methods are studied for dealing with large, complex, and dynamic problems. The idea is to mimic (concepts, principles and mechanisms) the complex phenomena occurring in the nature as computational processes in order to enhance the way computation is performed mainly from a problem solving point of view. Some of the key paradigms falling under this umbrella are neurocomputing, evolutionary computing, swarm intelligence, membrane computing, artificial immune systems, DNA computation, artificial life and so on. The recent trend is to formulate adaptive nature inspired computational models combining different knowledge representation schemes, decision making models and learning strategies to solve a computational task. This integration aims at overcoming limitations of individual techniques through hybridization or fusion of various techniques.

1. Introduction

This special issue focuses on hybrid approaches and is a collection of five best articles from the First World Congress on Nature and Biologically Inspired Computing (NaBIC 2009) and the First International Conference on Soft Computing and Pattern Recognition (SoCPaR 2009) reflecting some of the current technological innovations in this field and its real world applications.

Chaira [1] illustrates a color cell image-clustering algorithm using intuitionistic fuzzy set theory using different color models. Author used Intuitionistic fuzzy set to overcome the uncertainty in conventional Clustering using fuzzy set theory. Experimental results depict that the two uncertainty parameters in intuitionistic fuzzy set helps in the convergence than the cluster centers obtained by fuzzy C means algorithm.

Wang et al. [4] present a new design pattern matching method based on fuzzy logic, in which matrix model is

used for describing both design pattern and source code. The design pattern's static and dynamic information is defined as fuzzy attribute value for measuring the matching degree. Experimental results demonstrate the accuracy and efficiency of the proposed methodology.

Weiguo et al. [5] illustrate the weakness of conventional decision tree classification algorithms and show that these algorithms based on variable precision rough set have better classification accuracy and can also tolerate the noisy data. Authors introduce a new variable precision rough set based decision tree algorithm, which uses a new attribute selection method that also considers comprehensively the classification accuracy and number of attribute values (weighted roughness and complexity). Experimental results using twelve different data sets from the UCI Machine Learning Repository illustrate the efficiency of the approach.

Tay et al. [3] focus on the use of two similarity reasoning based methods: Analogical Reasoning (AR) and Fuzzy Rule Interpolation (FRI), to deduce

each conclusion separately of a zero-order Sugeno Fuzzy Inference System to preserve the monotonicity property. Experimental results indicate that AR and FRI may not be a direct solution to fulfill the monotonicity property, owing to the difficulty in getting a set of monotonically ordered conclusions. Authors proposed a non-linear programming based scheme for constructing a monotonicity-preserving multi-input fuzzy inference system and the experimental results on a failure mode and effect analysis (FMEA) task, reveal that the scheme is useful for preserving the monotonicity property with an incomplete rule base.

Merline Vinotha et al. [2] propose a procedure for solving the total time minimization in fuzzy transportation problem, where the transportation time, source and destination parameters have been expressed as exponential fuzzy numbers by the decision maker. A novel algorithm is developed to obtain the optimal solution as exponential fuzzy number, which enables the decision maker to obtain more informational results and wider knowledge on the problem under consideration.

The Guest Editor would like to take this opportunity to thank all the contributors of this special issue. We hope this special issue inspires researchers to extend the technologies further and to build advanced applications.

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