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EDITORIAL

Soft Computing in decision modeling

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1 Introduction

Soft computing offers a large variety of tools for decision making. This special issue focuses on different aspects related to soft computing and its application to decision problems. Papers were selected among the ones presented at the 5th Interantional Conference on Modeling Decisions for Artificial Intelligence (MDAI 2008) celebrated in Sabadell (Catalonia, Spain).

Eight of the papers included in this issue are more oriented to the theoretical foundations of the tools, while the others focus on the applications. With respect to the former, the issue deals with the following topics related to theoretical foundations.

Aggregation operators (Torra and Narukawa 2007) are well-recognized tools within decision making. They focus on the problem of fusing different opinions or criteria, and, as such, they permit users and systems to select on the basis of synthesized, and hopefully better, information.

Clustering algorithms are tools for unsupervised machine learning, or, similarly, for unsupervised knowledge discovery. They explicitly permit us to make the distinctions between collections of objects, so decisions can be done later under a better understanding of the nature of the data.

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Rough sets have also been used in decision-making problems when information is vague, ambiguous or not complete. An extension of rough set theory was developed for multi-criteria decision problems. That is, the dominance-based rough set approach (Greco et al. 2001).

In the next section, we describe in more detail the structure of the issue introducing the papers. As it will be seen later, eight of the papers focus on the foundations of decision, and the rest of the papers (three) are more application oriented.

2 Structure of the special issue

As stated above, in this special issues a few aspects related to the application of soft computing tools in decision modeling are presented. We present shortly the papers included in this issue. We start with the papers devoted to the foundations and finish with the ones on applications.

The issue opens with a paper by Dujmović, De Tré and Van de Weghe where the authors propose the concept of logically aggregated geographic suitability maps (LSP-maps). The approach is based on the LSP method (see, Dujmović 2007).

The second paper, by Ogryczak, focuses on the reference point method (RPM) (Wierzbicki 1982) and develops an extension incorporating the importance weighting of several achievements following the concept of the WOWA operator (Torra 1997).

This paper is followed by another one by Cabrerizo, Moreno, Pérez, and Herrera-Viedma in which the authors analyze different consensus approaches in fuzzy decision making. Advantages and drawbacks of the approaches are discussed. The paper falls in the area of group decision making. Discussion includes tools as, e.g. LOWA (Herrera

et al. 1996) and a variety of similarity functions (Herrera-Viedma et al. 2005, 2007).

The next paper establishes some relationships between a few aggregation operators, focusing on generalizations of the OWA (Yager 1988, 1993) operator and of the Losonczi's mean (1971). A few new aggregation operators as extensions of the OWA and WOWA (Torra 1997) operator are also proposed.

The fifth paper, by Yoshida (2008), deals with weighted quasi-arithmetic means of an interval. It uses utility functions and extends the results.

In the sixth paper, Hamasuna, Endo and Miyamoto introduce two new clustering algorithm based on the concept of tolerance (Murata et al. 2006). One based on fuzzy *c*-means (Bezdek 1981) and the other based on possibilistic clustering (Krishnapuram and Keller 1993).

This paper is followed by another one also devoted to clustering. Szilágyi, Szilágyi and Benyó focus on the evaluation of the suppressed fuzzy *c*-means algorithm.

The next paper focus on rough sets. Kusunoki and Inuiguchi discuss a few kinds of reducts proposed in the dominance-based rough set approach (DRSA) (Greco et al. 2001), and clarify the relationships between the ones they propose in the paper and the existing ones in the literature.

This paper is followed by another one by Nakashima and Fujii in which the authors apply a fuzzy rule-based system to a point-to-point car racing game. The fuzzy rule-based system is used to make the high-level decisions involved in the game. The system includes some weights for aggregating the strategies.

Kikuchi, Nagai, Ogata, and Nishigaki focus on privacy technologies (Lane et al. 2008), and discuss their application to remote biometrics authentication.

The issue is closed by a paper devoted to the application of soft computing tools in the container loading problem. Local search and simulated annealing is applied to the problem of deciding in which order boxes should be loaded and in which position should be located.

To conclude, we would like to thank Antonio Di Nola and Vincenzo Loia, Editor-in-Chief and Co-Editor-in-Chief of the journal, for giving us the opportunity of preparing this special issue. Thanks also go to Brunella Gerla, Managing Editor, for her help. We would also like to thank the reviewers for contributing to this special issue with their time.

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