

Guest editorial

Special issue: Rough and Fuzzy Methods for Data Mining

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This special issue of International Journal of Hybrid Intelligent Systems (IJHIS) published by IOS Press contains a selection of papers presented initially at the RSFDGrC'09 Conference (Rough Sets, Fuzzy Sets, Data Mining and Granular Computing) held in IIT Delhi, India, on December 16–20, 2009. RSFDGrC is the series of international scientific conferences spanning over last 15 years. It investigates the meeting points among the four major areas outlined in its title, with respect to foundations and applications. Five papers included in this special issue are devoted to various aspects of rough sets, fuzzy sets, data mining and granular computing, with a special emphasis on hybrid methodologies for solving theoretical problems and dealing with practical challenges of representing and mining compound data.

The first paper, “Facilitating Efficient Mars Terrain Image Classification with Fuzzy-Rough Feature Selection” by Changjing Shang, Dave Barnes and Qiang Shen, presents an application study of exploiting fuzzy-rough feature selection (FRFS) techniques in aid of efficient and accurate Mars terrain image classification. The employment of FRFS allows for the induction of low-dimensionality feature sets from sample descriptions of feature vectors of a much higher dimensionality. Supported with comparative studies, the work demonstrates that FRFS helps to enhance both the ef-

fectiveness and the efficiency of conventional classification systems such as multi-layer perceptrons and k-nearest neighbors, by minimizing redundant and noisy features. This is of particular significance for the on-board image classification in future Mars rover missions.

The second paper, “An Algorithm for Solving Fuzzy Maximal Flow Problems Using Generalized Triangular Fuzzy Numbers” by Amit Kumar and Manjot Kaur, proposes an algorithm to solve the fuzzy maximal flow problems, where the flows are represented by generalized fuzzy numbers. A numerical example has been presented to illustrate the obtained framework. The results show that the proposed algorithm is significant to understand and to efficiently solve the fuzzy maximal flow problems occurring in real life situations.

In the third paper, “Rough colour quantisation” by Gerald Schaefer, Huiyu Zhou, M. Emre Celebi and Aboul Ella Hassanien, the rough c-means clustering algorithm is used for colour quantisation of images. Experimental results on a standard set of images show that the proposed approach performs significantly better than other, purpose-built colour reduction algorithms. Colour quantisation algorithms are essential for displaying true colour images using a limited palette of distinct colours. The choice of a good colour palette is crucial as it directly determines the quality of the resulting image.

The fourth paper, “A Novel Possibilistic Fuzzy Leader Clustering Algorithm” by Hong Yu and Hu Luo, in-

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troduces the clustering algorithm based on a combination of fuzzy clustering and possibilistic clustering, called a possibilistic fuzzy leader (PFL). PFL provides advantages in both the time complexity and the initialization of clusters. The comparative experiments with synthetic and standard data sets show that the proposed algorithm is valid, efficient, and has better accuracy. The experiments with the web users access paths data set show that PFL is capable of clustering the access paths at an acceptable computational expense.

The last paper, “Stable Rule Extraction and Decision Making in Rough Non-deterministic Information Analysis” by Hiroshi Sakai, Hitomi Okuma, Michinori

Nakata and Dominik ślęzak, extends the Rough Non-deterministic Information Analysis (RNIA) by introducing stability factor that enables to evaluate rules in a more flexible way than known so far. Also, the authors develop a question-answering functionality that enables decision makers to analyze data gathered in Non-deterministic Information Systems (NISs) in case there are no pre-extracted rules that may address specified conditions.

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