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Preface

This special issue of *Fundamenta Informaticae* contains a selection of papers presented initially at the RSFDGrC 2003 Conference (Rough Sets, Fuzzy Sets, Data Mining and Granular Computing) held in Chongqing, P. R. China. The RSFDGrC 2003 Conference was scheduled for May 2003 but the outbreak of SARS disease forced the organizers to reschedule it so it was finally held on October 19 – 22, 2003.

The site of the Conference was the Chongqing University of Posts and Telecommunications, the host institution was the College of Computer Science and Technology of the University. The Organizing Committee chaired by the Dean of the College Professor Guoyin Wang went to extremes to ensure the scientific and organizational success of the Conference. The conference participants were impressed by the devoted work of organizers. We also would like to thank Professor Nie Neng, the President of the University, for the support of the Conference.

All accepted and presented at the Conference papers are available in Proceedings published as Volume 2639 of Lecture Notes in Artificial Intelligence by Springer Verlag.

Papers included in the special issue are devoted to various aspects of rough set theory, fuzzy set theory, data mining and granular computation theory, addressing the principal topics in those areas of research from theoretical as well as application point of view.

J. BAZAN, H. S. NGUYEN, and M. SZCZUKA address the problem of concept approximation, discussing, from the point of view of rough set theory [3], mechanisms for maintaining desired degree of exactness of a concept approximation in a multi–level approximation scheme. Various approximation schemes are proposed including those based on ideas of parameterized approximation spaces [6] and ideas of rough mereology [5].

J. W. GUAN, D. A. BELL, and D. Y. LIU present algorithms for finding motifs, i.e., very frequent strings in DNA sequences [4], and then they propose algorithms for mining association rules, cf. [8], based on rough set theory.

X. HU, J. HAN, and T. Y. LIN address the problem of knowledge reduction in rough set theory. They formulate some algorithms for reduct generation cf. [2], [7] in the language of operational databases, making use of operations available therein. Assuming that preprocessing of data tables in the relational database is done and not counting this cost, they evaluate complexity of algorithms achieving results obtained elsewhere by different methods [2].

D. LI and J. DEOGUN are concerned with mining association rules in the context of spatiotemporal reasoning. The specific problem addressed is that of discovering spatiotemporal association rules for

unsampled sites on the basis of data from weather stations. To this end, they examine interpolation methods, IDW (basic as well as modified) and Kriging in three modes: pre–order, in–order, and post–order. Experimental results are presented and discussed.

H. LI, H. HUANG, and Y. LI present an algorithm, DSD, for incremental data maintenance in data warehouses, based on the Mumick algorithm see [1], but operating by means of two delta tables, one for insertion and one for deletion. Experimental results with the proposed algorithm demonstrate improvements in performance as well as acceptable complexity.

L. J. MAZLACK discusses a general problem of causality, examining problems of recognition of causal relationships, the nature of causal relationships, and types of causality, among other topics. Arguments are given for the need to construct a theory proper of causal relationships.

D. MIAO and L. HOU approach inductive machine learning problems with rough set based ideas of knowledge reduction. As a result they propose new learning algorithms that are tested on Monk's problems and that show superiority with respect to accuracy and conciseness over earlier algorithms.

P. PAGLIANI considers generalized approximation spaces, i.e., pairs of the form $(U, \{R_i : i \in I\})$ and studies pre–topologies induced on the universe U by families of binary relations $\{R_i : i \in I\}$.

A. SKOWRON and P. SYNAK propose a reasoning scheme for reasoning about information changes in dynamic contexts of spatiotemporal reasoning. The scheme is rooted in rough set theory and the new notion of an information map is introduced and investigated.

T. T. NGUYEN is concerned with the problem of classifying atypical examples in large feature spaces. A method for passing human expert's domain knowledge to a machine recognition system in the learning process is proposed. The method borrows ideas from rough set theory and rough mereology. The specific problem the method is illustrated with is the problem of handwritten digit recognition.

S. TSUMOTO is concerned with problems of extraction of structure of medical diagnosis from clinical data: rules induced by existing techniques not always represent correctly the expert decision processes. Therefore, a new approach toward extracting plausible rules is presented. The approach is based on rough set theory and uses the idea of grouping of rules. Results show that the new method yields rules that correctly represent decision processes of experts.

L. ZHANG and B. ZHANG present the theory of problem solving based on the quotient space theory allowing to account for distinct granularities of problem spaces.

ZHENG ZHENG and GUOYIN WANG present an algorithm for incremental knowledge acquisition based on rough set theory and rule tree. Results of experiments are presented showing superiority of the new algorithm in many respects over ID4 as well as classical rough set algorithms.

Thanks are due to authors that prepared papers for the special issue as well as to Editors of *Fundamenta Informaticae* for the invitation to prepare this special issue.

The Editors of the special issue:
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