Rough Sets and Knowledge Technology 2011 (RSKT'11)

Preface

_____

This special issue of Fundamenta Informaticae contains a selection of papers initially presented at the 6th International Conference on Rough Sets and Knowledge Technology (RSKT'11) held during October 8-11, 2011 in Banff, Canada. RSKT is an international scientific conference series that has been held every year since 2006. The conferences serve as a major forum that brings researchers and industry practitioners together to discuss and deliberate on fundamental issues of knowledge processing and management and knowledge-intensive practical solutions in the current knowledge age. Experts from around the world meet to present state-of-the-art scientific results, to nurture academic and industrial interaction, and to promote collaborative research in rough sets and knowledge technology. We initially had twelve papers invited. After rigorous review, eight papers were selected to be included in this issue. They are substantially extended versions of respective conference papers. Each paper was review by three domain experts and went through at least two rounds of revisions.

The first paper authored by Yan Yang, Tonny Rutayisire, Chao Lin, Tianrui Li, and Fei Teng entitled "An Improved Cop-Kmeans Clustering for Solving Constraint Violation Based on MapReduce Framework" addresses the issue of constraint violation in Cop-Kmeans by emphasizing a sequenced assignment of cannot-link instances after conducting a Breadth-First Search of the cannot-link set. A parallel CLC-Kmeans algorithm is proposed based on MapReduce framework. Experimental results show that the proposed algorithm performs well on big data while may overcome the problem of constraint violation.

The second paper authored by Abdolreza Hatamlou and Masoumeh Hatamlou, entitled "Hybridization of the Gravitational Search Algorithm and Big Bang-Big Crunch Algorithm for Data Clustering" proposes a hybrid method for data clustering. The gravitational search algorithm is used to explore the problem space. The big bang-big crunch algorithm is used to diversify the population. Experimental results indicate the capability of the proposed method in finding optimal centroids.

The third paper authored by Zbigniew Suraj and Krzysztof Pancerz entitled "ROSECON: a Computer Tool for Synthesis and Verification of Concurrent Systems Specified by Information Systems" focuses on synthesis and verification of concurrent systems specified by information systems using a computer

tool called ROSECON. This tool allows generating appropriate models in the form of colored Petri nets. Analysis of the model behaviors enables users to verify the correctness (optimality) of the models and to provide some modification procedures to get correct (optimal) solutions.

The fourth paper authored by Xiaoping Yang, Zunjing Lu and Tong-Jun Li entitled "Decision-theoretic Rough Set in Incomplete Information System" discusses decision-theoretic rough sets in two kinds of incomplete information systems, in which one is for the crisp decision attribute and the other for the fuzzy decision attribute. Decision rules are derived using total probability instead of conditional probability in decision-theoretic rough sets.

The fifth paper authored by Weibin Deng, Guoyin Wang, Feng Hu, Jerzy Błaszczyński, Roman Słowiński and Marcin Szeląg entitled "A Novel Method for Elimination of Inconsistencies in Ordinal Classification with Monotonicity Constraints" proposes a new way of handling inconsistencies in ordinal and monotonic information systems which consists of iterative elimination of the most inconsistent objects according to a chosen inconsistency measure. In this way, one avoids dependence on a prior knowledge which is characteristic to handling inconsistencies by several relaxed versions of the Dominance-based Rough Set Approach (DRSA), in particular by VC-DRSA. The proposed iterative method of handling inconsistencies, called TIPStoC, is illustrated by an example and compared with VC-DRSA in a computational experiment.

The sixth paper authored by Ming-Wen Shao, Min Liu and Li Guo entitled "Vector-based Attribute Reduction Method of The Concept Lattices" proposes a novel attribute reduction approaches. Compared with previous studies on attribute reduction, one of advantage is that dispensable attributes can be deleted from formal contexts directly, instead of computing discernibility matrices and Boolean functions. The proposed approach is more simple and easy to implement.

The seventh paper authored by Huaxiong Li, Xianzhong Zhou, Jiabao Zhao and Dun Liu entitled "Non-Monotonic Attribute Reduction in Decision-Theoretic Rough Sets" comparatively analyses the monotonicity of positive region defined in Pawlak rough set model and decision-theoretic rough set model, and concludes that positive region in decision-theoretic rough set model is non-monotonic with regard to the number of attributes. It proposes a non-monotonic positive region attribute reduction which is suitable for the decision-theoretic rough set model. The proposed non-monotonic positive region attribute reduction allows us the expansion of positive region instead of remaining the positive region unchanged in the process of attribute reduction, which is consistent with the non-monotonic property of positive region in the decision-theoretic rough set model. It also proposes a heuristic algorithm for the proposed attribute reduction searching. Experimental analysis shows that the proposed algorithm can find reducts with less attributes compared to classical positive region reduction algorithm in the Pawlak rough set model.

The last paper authored by James Peters entitled "Nearness of Local Admissible Covers: Theory and Application in Micropalaeontology" introduces two forms of admissible covers, namely, spatially near admissible covers and descriptively near admissible covers. A practical application of the proposed approach is given terms of detecting small similarities and differences in microfossils, which is useful in the study of climate change, mineral and fossil fuel exploration.

We thank all authors for submitting their best results and reviewers, for their careful, insightful and constructive reviews.

We are especially thankful to Professor Damian Niwiński, Editor-in-Chief of Fundamenta Informaticae, for accepting this special issue and for his help throughout the publication process.

JingTao Yao
University of Regina, Canada

Andrzej Skowron
Warsaw University, Poland

Guoyin Wang
Chongqing University of Posts and Telecommunications, China

Hung Son Nguyen
Warsaw University, Poland

(Editors of the volume)