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Transactions on Rough Sets IV

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Preface

Volume IV of the Transactions on Rough Sets (TRS) introduces a number of new advances in the theory and application of rough sets. Rough sets and approximation spaces were introduced more than 30 years ago by Zdzisław Pawlak. These advances have profound implications in a number of research areas such as the foundations of rough sets, approximate reasoning, artificial intelligence, bioinformatics, computational intelligence, cognitive science, intelligent systems, data mining, machine intelligence, and security. In addition, it is evident from the papers included in this volume that the foundations and applications of rough sets is a very active research area worldwide. A total of 16 researchers from 7 countries are represented in this volume, namely, Canada, India, Norway, Sweden, Poland, Russia and the United States of America. Evidence of the vigor, breadth and depth of research in the theory and applications of rough sets can be found in the 10 articles in this volume.

Prof. Pawlak has contributed a treatise on the philosophical underpinnings of rough sets. In this treatise, observations are made about the Cantor notion of a set, antinomies arising from Cantor sets, the problem of vagueness (especially, *vague (imprecise)* concepts), fuzzy sets, rough sets, fuzzy vs. rough sets as well as logic and rough sets. Among the many vistas and research directions suggested by Prof. Pawlak, one of the most fruitful concerns the model for a rough membership function, which was incarnated in many different forms since its introduction by Pawlak and Skowron in 1994. Recall, here, that Prof. Pawlak introduced approximation spaces in the context of rough sets during the early 1980s. Later, the model for rough membership provided a basis for a model for rough inclusion in generalized approximation spaces introduced by Skowron and Stepaniuk during the early 1990s.

In addition, this volume includes seven papers that explore the theory of rough sets, and two papers that present new applications of rough sets. New developments in rough set theory are represented by papers that investigate a framework for reasoning with rough sets utilizing extended logic programs (Aida Vitória), optimization of decision trees (Igor V. Chikalov, Mikhail Ju. Moshkov, and Maria S. Zelentsova), fuzzy set and rough set approaches to dealing with missing data (Dan Li, Jitender Deogun, William Spaulding, and Bill Stuart), generalization of the indiscernibility relation as an aid to dealing with incompletely specified decision tables (Jerzy W. Grzymała-Busse), deterministic and non-deterministic decision tree complexity in the context of both finite and infinite information systems (Mikhail Ju. Moshkov), analogy-based reasoning in classifier construction (Arkadiusz Wojna), and incremental learning and evaluation of structures of rough decision tables (Wojciech Ziarko). In addition, two papers in this volume introduce new applications of rough sets, namely, super-

vised learning in the gene ontology (Herman Midelfart) and the design of an intrusion detection system (Sanjay Rawat, V.P. Gulati, and Arun K. Pujari).

This issue of the TRS was made possible thanks to the laudable efforts of a great many generous persons and organizations. We express our thanks to the many anonymous reviewers for their heroic efforts in providing detailed reviews of the articles in this issue of the TRS. The editors and authors of this volume also extend an expression of gratitude to Alfred Hofmann, Ursula Barth, Christine Günther and the LNCS staff at Springer for their support in making this volume of the TRS possible. In addition, the editors of this volume extend their thanks to Marcin Szczuka for his consummate skill and care in the compilation of this volume. The editors of this volume have been supported by the Ministry for Scientific Research and Information Technology of the Republic of Poland, Research Grant No. 3T11C00226, and the Natural Sciences and Engineering Research Council of Canada (NSERC) Research Grant 185986.

July 2005

James F. Peters
Andrzej Skowron

LNCS Transactions on Rough Sets

This journal subline has as its principal aim the fostering of professional exchanges between scientists and practitioners who are interested in the foundations and applications of rough sets. Topics include foundations and applications of rough sets as well as foundations and applications of hybrid methods combining rough sets with other approaches important for the development of intelligent systems.

The journal includes high-quality research articles accepted for publication on the basis of thorough peer reviews. Dissertations and monographs up to 250 pages that include new research results can also be considered as regular papers. Extended and revised versions of selected papers from conferences can also be included in regular or special issues of the journal.

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