

Preface

Volume III of the Transactions on Rough Sets (TRS) introduces advances in the theory and application of rough sets. These advances have far-reaching implications in a number of research areas such as approximate reasoning, bioinformatics, computer science, data mining, engineering (especially, computer engineering and signal analysis), intelligent systems, knowledge discovery, pattern recognition, machine intelligence, and various forms of learning. This volume reveals the vigor, breadth and depth in research either directly or indirectly related to the rough sets theory introduced by Prof. Zdzisław Pawlak more than three decades ago. Evidence of this can be found in the seminal paper on data mining by Prof. Pawlak included in this volume. In addition, there are eight papers on the theory and application of rough sets as well as a presentation of a new version of the Rough Set Exploration System (RSES) tool set and an introduction to the Rough Set Database System (RSDS).

Prof. Pawlak has contributed a pioneering paper on data mining to this volume. In this paper, it is shown that information flow in a flow graph is governed by Bayes' rule with a deterministic rather than a probabilistic interpretation. A cardinal feature of this paper is that it is self-contained inasmuch as it not only introduces a new view of information flow but also provides an introduction to the basic concepts of flow graphs. The representation of information flow introduced in this paper makes it possible to study different relationships in data and establishes a basis for a new mathematical tool for data mining.

In addition to the paper by Prof. Pawlak, new developments in rough set theory are represented by five papers that investigate the validity, confidence and coverage of rules in approximation spaces (Anna Gomolińska), decision trees considered in the context of rough sets (Mikhail Ju. Moshkov), study of approximation spaces and information granulation (Andrzej Skowron, Roman Świniarski and Piotr Synak), a new interpretation of rough sets based on inverse probabilities and the foundations for a rough Bayesian model (Dominik Ślęzak), and formal concept analysis and rough set theory considered relative to topological approximations (Marcin Wolski). The theory papers in this volume are accompanied by four papers on applications of rough sets: knowledge extraction from electronic devices for power system substation event analysis and decision support (Ching-Lai Hor and Peter Crossley), processing of musical data using rough set methods, RSES and neural computing (Bożena Kostek, Piotr Szczuko, Paweł Żwan and Piotr Dalka), computational intelligence in bioinformatics (Sushmita Mitra), and an introduction to rough ethology, which is based on a biologically inspired study of collective behavior and reinforcement learning in intelligent systems using approximation spaces (James Peters).

This volume also celebrates two landmark events: a new version of RSES and the availability of a Rough Set Database System (RSDS). The introduction of a new version of the Rough Set Exploration System (RSES 2.2) is given in a

paper by Jan G. Bazan and Marcin Szczuka. This paper gives an overview of the basic features of the new version of RSES: improved graphical user interface as well as production of decomposition trees and rules based on training samples. The decomposition tree and rules resulting from training can be used to classify unseen cases. The paper by Zbigniew Suraj and Piotr Grochowalski gives an overview of RSDS, which now includes over 1900 entries and over 800 authors. RSDS includes a number of useful utilities that make it possible for authors to update the database via the web, namely, append, search, download, statistics and help. In addition, RSDS provides access to biographies of researchers in the rough set community.

This issue of the TRS has been made possible thanks to the 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 other LNCS staff members at Springer for their support in making this volume of the TRS possible. The Editors of this volume have been supported by the Ministry of 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 No. 185986.

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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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