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# Rough Sets, Fuzzy Sets, Data Mining, and Granular Computing

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L Part I



# **Rough Fuzzy Mining Granular Computing**

Witold Pedrycz, Andrzej Skowron, Vladik Kreinovich

### **Rough Fuzzy Mining Granular Computing:**

Rough-Fuzzy Pattern Recognition Pradipta Maji, Sankar K. Pal, 2012-02-14 Learn how to apply rough fuzzy computing techniques to solve problems in bioinformatics and medical image processing Emphasizing applications in bioinformatics and medical image processing this text offers a clear framework that enables readers to take advantage of the latest rough fuzzy computing techniques to build working pattern recognition models The authors explain step by step how to integrate rough sets with fuzzy sets in order to best manage the uncertainties in mining large data sets Chapters are logically organized according to the major phases of pattern recognition systems development making it easier to master such tasks as classification clustering and feature selection Rough Fuzzy Pattern Recognition examines the important underlying theory as well as algorithms and applications helping readers see the connections between theory and practice The first chapter provides an introduction to pattern recognition and data mining including the key challenges of working with high dimensional real life data sets Next the authors explore such topics and issues as Soft computing in pattern recognition and data mining A mathematical framework for generalized rough sets incorporating the concept of fuzziness in defining the granules as well as the set Selection of non redundant and relevant features of real valued data sets Selection of the minimum set of basis strings with maximum information for amino acid sequence analysis Segmentation of brain MR images for visualization of human tissues Numerous examples and case studies help readers better understand how pattern recognition models are developed and used in practice This text covering the latest findings as well as directions for future research is recommended for both students and practitioners working in systems design pattern recognition image analysis data mining bioinformatics soft computing and computational intelligence **Handbook of Granular Computing Witold** Pedrycz, Andrzej Skowron, Vladik Kreinovich, 2008-07-31 Although the notion is a relatively recent one the notions and principles of Granular Computing GrC have appeared in a different guise in many related fields including granularity in Artificial Intelligence interval computing cluster analysis quotient space theory and many others Recent years have witnessed a renewed and expanding interest in the topic as it begins to play a key role in bioinformatics e commerce machine learning security data mining and wireless mobile computing when it comes to the issues of effectiveness robustness and uncertainty The Handbook of Granular Computing offers a comprehensive reference source for the granular computing community edited by and with contributions from leading experts in the field Includes chapters covering the foundations of granular computing interval analysis and fuzzy set theory hybrid methods and models of granular computing and applications and case studies Divided into 5 sections Preliminaries Fundamentals Methodology and Algorithms Development of Hybrid Models and Applications and Case Studies Presents the flow of ideas in a systematic well organized manner starting with the concepts and motivation and proceeding to detailed design that materializes in specific algorithms applications and case studies Provides the reader with a self contained reference that includes all pre requisite knowledge augmented with step by step

explanations of more advanced concepts The Handbook of Granular Computing represents a significant and valuable contribution to the literature and will appeal to a broad audience including researchers students and practitioners in the fields of Computational Intelligence pattern recognition fuzzy sets and neural networks system modelling operations research and bioinformatics Novel Developments in Granular Computing: Applications for Advanced Human Reasoning and Soft Computation Yao, JingTao,2010-06-30 This book investigages granular computing GrC which emerged as one of the fastest growing information processing paradigms in computational intelligence and human centric systems Provided by publisher

Rough Sets, Fuzzy Sets, Data Mining, and Granular Computing Guoyin Wang, Qing Liu, Yiyu Yao, 2014-01-15 **Computing** Witold Pedrycz, 2013-06-05 Granular Computing is concerned with constructing and processing carried out at the level of information granules Using information granules we comprehend the world and interact with it no matter which intelligent endeavor this may involve The landscape of granular computing is immensely rich and involves set theory interval mathematics fuzzy sets rough sets random sets linked together in a highly synergetic environment This volume is a first comprehensive treatment of this emerging paradigm and embraces its fundamentals underlying methodological framework and a sound algorithmic environment The panoply of applications covered includes system identification telecommunications linguistics and music processing Written by experts in the field this volume will appeal to all developing intelligent systems either working at the methodological level or interested in detailed system realization Granular Computing and Intelligent Systems Witold Pedrycz, Shyi-Ming Chen, 2011-04-28 Information granules are fundamental conceptual entities facilitating perception of complex phenomena and contributing to the enhancement of human centricity in intelligent systems The formal frameworks of information granules and information granulation comprise fuzzy sets interval analysis probability rough sets and shadowed sets to name only a few representatives Among current developments of Granular Computing interesting options concern information granules of higher order and of higher type The higher order information granularity is concerned with an effective formation of information granules over the space being originally constructed by information granules of lower order This construct is directly associated with the concept of hierarchy of systems composed of successive processing layers characterized by the increasing levels of abstraction This idea of layered hierarchical realization of models of complex systems has gained a significant level of visibility in fuzzy modeling with the well established concept of hierarchical fuzzy models where one strives to achieve a sound tradeoff between accuracy and a level of detail captured by the model and its level of interpretability Higher type information granules emerge when the information granules themselves cannot be fully characterized in a purely numerical fashion but instead it becomes convenient to exploit their realization in the form of other types of information granules such as type 2 fuzzy sets interval valued fuzzy sets or probabilistic fuzzy sets Higher order and higher type of information granules constitute the focus of the studies on Granular Computing presented in this study The book elaborates on sound methodologies of Granular Computing algorithmic pursuits

and an array of diverse applications and case studies in environmental studies option price forecasting and power Pattern Recognition Algorithms for Data Mining Sankar K. Pal, Pabitra Mitra, 2004-05-27 This valuable engineering text addresses different pattern recognition PR tasks in a unified framework with both theoretical and experimental results Tasks covered include data condensation feature selection case generation clustering classification and rule generation and evaluation Organized into eight chapters the book begins by introducing PR data mining and knowledge discovery concepts The authors proceed to analyze the tasks of multi scale data condensation and dimensionality reduction Then they explore the problem of learning with support vector machine SVM and conclude by highlighting the significance of granular computing for different mining tasks in a soft paradigm Rough Sets, Fuzzy Sets, Data Mining and Granular **Computing** Sergei O. Kuznetsov, 2011 **Pattern Recognition and Machine Intelligence** Sanghamitra Bandyopadhyay, 2005-12-09 This book constitutes the refereed proceedings of the First International Conference on Pattern Recognition and Machine Intelligence PReMI 2005 held in Kolkata India in December 2005 The 108 revised papers presented together with 6 keynote talks and 14 invited papers were carefully reviewed and selected from 250 submissions The papers are organized in topical sections on clustering feature selection and learning classification neural networks and applications fuzzy logic and applications optimization and representation image processing and analysis video processing and computer vision image retrieval and data mining bioinformatics application Web intelligence and genetic algorithms as well as rough sets case based reasoning and knowledge discovery Developments in Natural Intelligence Research and Knowledge Engineering: Advancing Applications Wang, Yingxu, 2012-06-30 This book covers the intricate worlds of thought comprehension intelligence and knowledge through the scientific field of Cognitive Science covering topics that have been pivotal at major conferences covering Cognitive Science Provided by publisher

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