

Proceedings

2007 IEEE International Conference on Granular Computing

GrC 2007

San Jose, California
2–4 November, 2007

Sponsored by
IEEE Computational Intelligence Society (CIS)



Los Alamitos, California
Washington • Tokyo



International Conference on Granular Computing
2007

TABLE OF CONTENTS

VOLUME 1

KEYNOTE SPEAKERS

On Genetic-Fuzzy Data Mining Techniques	1
<i>T. Hong</i>	
Linguistic Summaries of Static and Dynamic Data: Computing with Words and Granularity	2
<i>J. Kacprzyk</i>	
Granular Computing and Web Processing: Representing Documents in Polyhedron	4
<i>T.Y. Lin</i>	
Towards Mobile Internet: Location Privacy Threats and Granular Computation Challenges	5
<i>L. Liu</i>	

SESSION 1: GRANULAR COMPUTING: METHODOLOGIES

Granulation with Indistinguishability, Equivalence, or Similarity	7
<i>C. Maria Keet</i>	
Some Models of Granular Computing	13
<i>D. Pei</i>	
A Logical Method of Formalization for Granular Computing	18
<i>Y. Lin, L. Qing</i>	
A Scientific Decoding of YinYang1-2-4-8-64 for Equilibrium-based Granular Computing	24
<i>W. Zhang, J. Zhan</i>	
Application of Granular Computing in Extension Criminal Reconnaissance System	28
<i>C. Yunhua, Y. Yongquan, Z. Bi, W. Minghui</i>	
Granular Computing in the Information Transformation of Patten Recognition	32
<i>H. Hu, Z. Shi</i>	
Multitasking is the Primary Choice for Granular Computing	36
<i>T. Wu</i>	
The Granulations Based on Meaning of Rough Logical Formulas and its Lock Resolution	40
<i>Q. Liu, H. Zhu, L. Liu</i>	
A Study of Information Granules	46
<i>X. Wang</i>	

SESSION 2: GRANULAR COMPUTING: STRATEGIES

Modeling Dynamic Processes using Granular Runge-Kutta Methods	51
<i>T. Co</i>	
A Granular Space Model for Ontology Learning.....	57
<i>T. Qiu, X. Chen, Q. Liu, H. Huang</i>	
Perspectives of Granular Computing in Software Engineering.....	62
<i>J. Han, J. Dong</i>	
Structured Writing with Granular Computing Strategies	68
<i>Y. Yao</i>	
Granular Computing Based Sorting Method in Multi-objective Optimization.....	74
<i>G. Yan, G. Xie, K. Xie, T.Y. Lin</i>	

SESSION 3: GRANULAR NETWORK MODELING

Attribute Computing Network Induced by Linear Transformation and Granular Transformation of Qualitative Criterion	79
<i>J. Feng</i>	
The Structure of Granular Network Based on Granular Computing and its Application in Data Reduction	85
<i>S. Deng, M. Li, S. Guan, L. Chen</i>	
Analyzing Software System Quality Risk using Bayesian Belief Network.....	89
<i>H. Yong, C. Juhua, J. Huang, M. Liu, K. Xie</i>	
Optimum Design of a Window Function Based on the Small-World Networks.....	93
<i>L. Kong, Z. Chen, F. Yin</i>	

SESSION 4: FUZZY SET AND FUZZY CONTROL

Reasoning Algorithm of Multi-value Fuzzy Causality Diagram Based on Unitizing Coefficient	97
<i>X. Liang</i>	
Multi-level Formal Concepts in Fuzzy Formal Contexts	101
<i>M. Shao, C. Wan</i>	
On Consistency of Fuzzy Clustering Analysis	106
<i>C. Zhang, B. Wei, G. Chen</i>	
Fuzzy Detection System of Behavior Before Getting out of Bed by Air Pressure and Ultrasonic Sensors.....	110
<i>H. Yamaguchi, H. Nakajima, K. Taniguchi, S. Kobashi, K. Kondo, Y. Hata</i>	
An Efficient Elimination of Input Data in the OWA Aggregation	116
<i>B.S. Ahn</i>	
Anti-congestion Fuzzy Algorithm for Traffic Control of a Class of Traffic Networks	120
<i>W. Zhang, B. Wu, W. Liu</i>	
Statistical Genetic Interval-valued Fuzzy Systems with Prediction in Clinical Trials	125
<i>Y. Qiu, Y. Zhang, Y. Zhao</i>	

A Novel Approach to Generating Fuzzy Rules Based on Dynamic Fuzzy Rough Sets	129
<i>Y. Cheng, D. Miao, Q. Feng</i>	

SESSION 5: TYPE-2 FUZZY SET

Email Granulation Based on Distributed-interval Type-2 Fuzzy Set Methodologies	135
<i>H. Tahayori, A. Visconti, G.D. Antoni</i>	
Type-2 Fuzzy Logic: Theory and Applications.....	141
<i>O. Castillo, P. Melin, J. Kacprzyk, W. Pedrycz</i>	
A New Method for Edge Detection in Image Processing using Interval Type-2 Fuzzy Logic	147
<i>O. Mendoza, P. Melin, G. Licea</i>	
Hybrid Learning Algorithm for Interval Type-2 Fuzzy Neural Networks	153
<i>J.R. Castro, O. Castillo, P. Melin, A. Rodriguez-Diaz</i>	

SESSION 6: ROUGH COMPUTING

MGRS in Complete Information Systems.....	159
<i>Y.H. Qian, J.Y. Liang, C.Y. Dang</i>	
Algorithms for Different Approximations in Incomplete Information Systems with Maximal Compatible Classes as Primitive Granules	165
<i>C. Wu, X. Hu, Z. Li, X. Zhou, P. Achananuparp</i>	
An Incremental Algorithm for Mining Default Decision Rules from Incomplete Decision Tables	171
<i>C. Wu, X. Hu, X. Shen, X. Zhang, Y. Pan</i>	
Rough Sets and Zadeh's Extension Principles.....	176
<i>G. Liu, X. Song, X. Zhao</i>	
Implication Operators Based on Rough Set Model Over Boolean Algebras	182
<i>X. Zhang, Y. Ma, Z. Xue, G. Yao</i>	
Production and Retrieval of Rough Classes in Multi Relations	188
<i>M.R. Tolun, H. Sever, A.K. Gorur</i>	
Approximation Partition Spaces of Covering Space	195
<i>Q. Zhang, G. Wang, J. Hu, H. Teng</i>	
Generalized Rough Set Model on De Morgan Algebras	201
<i>X. Zhang, G. Yao</i>	
Properties of Rough Sets in Normed Linear Space and its Proof	205
<i>H. Sun, Y. Wang, L. He, Q. Liu</i>	
Rough Set Approximation Based on Random Sets	209
<i>W. Wu</i>	
Study on the Axis Problem of Rough 3-Valued Algebras	213
<i>J. Dai</i>	
RoughTree: A Classifier with Naive-Bayes and Rough Sets Hybrid in Decision Tree Representation.....	217
<i>Y. Ji, L. Shang</i>	

Research on Statistical Relational Learning and Rough Set in SRL	223
<i>F. Chen</i>	

SESSION 7: ROUGH SET APPLICATION

Predicting Penetration Across the Blood-Brain Barrier- A Rough Set Approach	227
<i>J. Fang, J.W. Grzymala-Busse</i>	
Extensions in Mobile Ad Hoc Routing using Variable Precision Rough Sets	233
<i>V.M.A. Rajam, V.U. Maheswari, A. Siromoney</i>	
A New Method for Constructing Decision Tree Based on Rough Set Theory	237
<i>L. Huang, M. Huang, B. Guo, Z. Zhang</i>	
The Study of Normal Form of Relational Database Based on Rough Sets Theory	241
<i>A. Qiusheng, G. Wang, W. Zhang</i>	
Knowledge Reduction and its Rough Entropy Representation of Decision Tables in Rough Set	245
<i>J. Xu, L. Sun</i>	

SESSION 8: CONCEPT LEARNING

Learning for Semantic Classification of Conceptual Terms	249
<i>J. Punuru, J. Chen</i>	
Autonomic Learning Model and Algorithm Based on DFL	255
<i>J. Wang, F. Li</i>	
On Detecting an Emerging Class	261
<i>C.H. Park, H. Shim</i>	
Co_NBM: A Semi-supervised Categorization Algorithm Based TEF_WA Technique	267
<i>H. Tang, M. Lu, N. Liu</i>	
On Conceptualization Mismatches Between Ontologies	271
<i>M.A. Qadir, M. Fahad, M.W. Noshairwan</i>	
Incompleteness Errors in Ontology	275
<i>M.A. Qadir, M. Fahad, S.A.H. Shah</i>	
Semantic Inconsistency Errors in Ontology	279
<i>M. Fahad, M.A. Qadir, M.W. Noshairwan</i>	

SESSION 9: DATA MINING

Observational Calculi, Classes of Association Rules and F-Property	283
<i>J. Rauch</i>	
Addressing Missing Attributes During Data Mining using Frequent Itemsets and Rough Set Based Predictions	290
<i>J. Li, N. Cercone, R. Cohen</i>	
A Comparison of Three Approximation Strategies for Incomplete Data Sets	297
<i>J.W. Grzymala-Busse, W.J. Grzymala-Busse, Z.S. Hippe, W. Rzasa</i>	
Interpretations of Discovered Knowledge in Multidimensional Databases	303
<i>Y. Li</i>	

A New Improved K-Means Algorithm with Penalized Term	309
Z. Ding, J. Yu, Y. Zhang	
Speed-up Technique for Association Rule Mining Based on an Artificial Life Algorithm	314
M. Kanakubo, M. Hagiwara	
Finding Soft Relations in Granular Information Hierarchies	320
T. Martin, Y. Shen, B. Azyvine	
A Method of Finding Representative Sets of Rules	326
J. Li, N. Cercone, J. Han	
Prediction of the Input Impedance of Two Coupled Dipole Antennas in the Echelon Form	332
S.R. Ostadzadeh, M. Soleimani, M. Tayarani	
Concept Mining using Association Rule and Combinatorial Topology	337
A. Sutojo	
Overview of Workflow Mining Technology	343
C. Gu, H. Chang, Y. Yi	
Tree Mining Application to Matching of Heterogeneous Knowledge Representations	347
F. Hadzic, T.S. Dillon, E. Chang	
Ontology-assisted Query Formulation in Multidimensional Association Rule Mining	354
C. Wu, W. Lin, C. Wu	
A Study of Data Reduction using Multiset Decision Tables	358
U. Seelam, C. Chan	
Generating Attack Scenarios with Causal Relationship	364
Y. Cheng, C. Chen, C. Chiang, J. Wang, C. Laih	
A Verification Scheme for Data Aggregation in Data Mining	370
K. Shin, J. Zhan	
Privacy Preserving Collaborative Filtering using Data Obfuscation	376
R. Parameswaran, D.M. Blough	
Concept Mining using Association Rules and Combinatorial Topology	383
A. Sutojo	

SESSION 10: CLUSTERING AND CLASSIFICATION

Clustering Time Series with Granular Dynamic Time Warping Method	389
F. Yu, K. Dong, F. Chen, Y. Jiang, W. Zeng	

VOLUME 2

A Necessary Preprocessing in Horizontal Collaborative Fuzzy Clustering	395
F. Yu, J. Tang, R. Cai	
Agglomerative Hierarchical Clustering for Data with Tolerance	400
Y. Endo, Y. Hamasuna, S. Miyamoto	
Automatic Classification of Graphs by Symbolic Histograms	406
G. Del Vescovo, A. Rizzi	
A Weighted Consensus Function Based on Information-theoretic Principles to Combine "Soft" Clusterings	413
Y. Gao, S. Gu, J. Li, Z. Liao	

Positional Analysis in Fuzzy Social Networks.....	419
<i>T. Fan, C. Liau, T. Lin</i>	
Hierarchical Clustering Algorithm Based on Granularity.....	425
<i>J. Liang, G. Li</i>	
A Parallelized and Pipelined Datapath to Implement ISODATA Algorithm for Rosette Scan Images on a Reconfigurable Hardware.....	429
<i>E. Rahimi, S.B. Shokouhi, A. Sadr</i>	
The Worse Clustering Performance Analysis.....	433
<i>J. Yu, P. Hao</i>	
Sparse Possibilistic Clustering with L1 Regularization	438
<i>R. Inokuchi, S. Miyamoto</i>	

SESSION 11: ARTIFICIAL INTELLIGENCE

Perceptual Reasoning: A New Computing with Words Engine	442
<i>J.M. Mendel, D. Wu</i>	
Comparison of Machine Learning and Pattern Discovery Algorithms for the Prediction of Human Single Nucleotide Polymorphisms	448
<i>R. Yan, P.C. Boutros, I. Jurisica, L.Z. Penn</i>	
Evaluation of Learning Costs of Rule Evaluation Models Based on Objective Indices to Predict Human Hypothesis Construction Phases	454
<i>H. Abe, S. Tsumoto, M. Ohsaki, H. Yokoi, T. Yamaguchi</i>	
Meaning of Pearson Residuals- Linear Algebra View	461
<i>S. Tsumoto, S. Hirano</i>	
Multicast Routing Scheme Based on Chaotic Optimization Adaptive Genetic Algorithm.....	467
<i>C. Li, Y. Wang, M. Du, C. Yue</i>	
Immune Evolution Algorithm Based Dynamic Path Planning Approach for the Soccer Robot	473
<i>X. Xu, G. Yan, K. Xie, T.Y. Lin</i>	
A Speech Recognition Method of Isolated Words Based on Modified LPC Cepstrum	477
<i>X. Zhang, Y. Guo, X. Hou</i>	
Discovering Hierarchical Patterns of Students' Learning Behavior in Intelligent Tutoring Systems.....	481
<i>S. Sonamthiang, N. Cercone, K. Naruedomkul</i>	
Object Recognition Architecture using Distributed and Parallel Computing with Collaborator	486
<i>J. Lee, S.J. Lee, Y. Park, S. Lee</i>	
A Maximum Entropy Markov Model for Prediction of Prosodic Phrase Boundaries in Chinese TTS.....	494
<i>Z. Zhao, T. Zhao, Y. Zhu</i>	
A Novel Algorithm for Counting all Common Subsequences	498
<i>H. Wang, Z. Lin</i>	

SESSION 12: NEURAL NETWORK COMPUTING

A Speech Endpoint Detection Algorithm Based on Entropy and RBF Neural Network	502
<i>X. Zhang, G. Li, F. Qiao</i>	
Face Recognition using a Hybrid General Backpropagation Neural Network.....	506
<i>M.S. Charifa, A. Suliman, M. Bikdash</i>	
Use of Neural Networks in Forecasting Financial Market	512
<i>H. Marzi, M. Turnbull</i>	
A New Scheme in EEG Signals Processing in Brain-computer Interface Systems.....	518
<i>M. Esmaeili, M.H. Jabalameli, Z. Moghadam</i>	
The Research for Hopf Bifurcation in a Single Inertial Neuron Model with External Forcing	524
<i>Q. Liu, X. Liao, D. Yang, S. Guo</i>	
Improved Algorithm of BP Neural Network and its Application to Prediction of K/S Value in Dyeing with Reactive Dyes	530
<i>H. Jiang, M. Dong, X. Li, F. Yang</i>	
A Novel Delay-dependent Global Stability Criterion of Delayed Hopfield Neural Networks	534
<i>D. Yang, Q. Liu, Y. Wang</i>	
Knowledge Based Neural Network for Text Classification	538
<i>R.D. Goyal</i>	
Neuro-Fuzzy Model-based CUSUM Method Application in Fault Detection on an Autonomous Vehicle	544
<i>J. Xie, G. Yan, K. Xie, T.Y. Lin</i>	
The Application of Run-length Features in Remote Sensing Classification Combined with Neural Network and Rough Set	548
<i>Z. Cao, Y. Xiao, L. Zou</i>	
An Application of CP Neural Network Based on Rough Set in Image Edge Detection	554
<i>M. Dong, H. Jiang, X. Li, Q. Liu</i>	

SESSION 13: COMPUTER/NETWORK/INTERNET SECURITY

Application of Rough Set Theory to Intrusion Detection System	558
<i>X. Wang, F. He, L. Liu</i>	
Fuzzy Vector Quantization for Network Intrusion Detection.....	562
<i>D. Tran, W. Ma, D. Sharma, T. Nguyen</i>	
Possibility Theory-based Approach to Spam Email Detection.....	567
<i>D. Tran, W. Ma, D. Sharma, T. Nguyen</i>	
Data Encryption Technique using Random Number Generator	572
<i>A.C. Sekhar, K.R. Sudha, P. Reddy</i>	
Research on Adaptive Congestion Control Based on One Way Delay	576
<i>M. Li, S. Deng, C. Zhou</i>	
SRML Learning Game Theory with Application to Internet Security and Management Systems.....	580
<i>J.K. Huang, B. Chen</i>	
Design and Implementation of Intranet Security Audit System Based on Load Balancing	584
<i>B. Chen, X. Fu, X. Zhang, L. Su, D. Wu</i>	

Grid-based Service Creation for New-generation Networks.....	588
<i>Z. Liu</i>	
Secure Similarity Search	594
<i>H. Park, B.H. Kim, D.H. Lee, Y.D. Chung, J. Zhan</i>	

SESSION 14: BIOMEDICAL AND BIOINFORMATICS

MHC Regulation Based Immune Formula Discovering Algorithm (IFDA)	601
<i>M. Hu, W. Sun</i>	
Mining Diagnostic Taxonomy and Diagnostic Rules for Multi-stage Medical Diagnosis from Hospital Clinical Data	607
<i>S. Tsumoto</i>	
Fine Granule Evaluation Model from Coarse Granule in Medical Ultrasonic System.....	613
<i>Y. Hata, K. Kondo, S. Kobashi</i>	
A Study of Bioelectrical Impedance Analysis Methods for Practical Visceral Fat Estimation	618
<i>M. Yoneda, H. Tasaki, N. Tsuchiya, H. Nakajima, T. Hamaguchi, S. Oku, T. Shiga</i>	
On Systems Software Engineering with Application to Bioinformatics.....	624
<i>J.K. Huang</i>	
Fuzzy-ASM Based Automated Skull Stripping Method from Infantile Brain MR Images.....	628
<i>S. Kobashi, Y. Fujimoto, M. Ogawa, K. Ando, R. Ishikura, K. Kondo, S. Hirota, Y. Hata</i>	
Fuzzy Logic Approach to Identification of Cellular Quantity by Ultrasonic System	632
<i>S. Yamaguchi, K. Nagamune, K. Oe, S. Kobashi, K. Kondo, Y. Hata</i>	
New Computational Model from Ant Colony.....	636
<i>G. Wei</i>	
Gene Function Classification using Fuzzy K-Nearest Neighbor Approach	640
<i>D. Li, J.S. Deogun, K. Wang</i>	
Semantic Smoothing the Multinomial Naive Bayes for Biomedical Literature Classification	644
<i>J. Wen, Z. Li</i>	

SESSION 15: SUPPORT VECTOR MACHINE

Precision and Recall in Rough Support Vector Machines.....	650
<i>P. Lingras, C.J. Butz</i>	
Mining Stock Market Tendency by RS-Based Support Vector Machines	655
<i>Y. Sai, Z. Yuan</i>	
Nursing-care Freestyle Text Classification using Support Vector Machines.....	661
<i>M. Nii, S. Ando, Y. Takahashi, A. Uchinuno, R. Sakashita</i>	

SESSION 16: WEB INTELLIGENCE

Intelligent Search Engine Based on Formal Concept Analysis	665
<i>X. Shen, Y. Xu, J. Yu, K. Zhang</i>	

An Extension-based Dynamic Load Balancing Model of Heterogeneous Server Cluster.....	671
<i>X. Zhang, Y. Yu, B. Chen, F. Ye, T. Xingxing</i>	
Granular Index for XML Database.....	676
<i>L. Lu, T.Y. Lin</i>	
Onlining Handwriting Recognition by the Symbolic Histograms Approach.....	682
<i>G. Del Vescovo, A. Rizzi</i>	
Research of Web Pages Categorization.....	687
<i>Z. Lin, K. Deng, Y. Hong</i>	
Enhancing Discovery of Web Services through Optimized Algorithms.....	691
<i>J. Hicks, M. Govindaraju, W. Meng</i>	
Identifying Opinion Holders in Opinion Text from Online Newspapers	695
<i>Y. Kim, Y. Jung, S. Myaeng</i>	

SESSION 17: INFORMATION RETRIEVAL AND TEXT MINING

Syntactic Information Retrieval.....	699
<i>C. Liu, H. Wang, S. McClean, J. Liu, S. Wu</i>	
Naive Bayes Text Classifier	704
<i>H. Zhang, D. Li</i>	
Visual Search of Web Multimedia Information Supported by the XHMG System	708
<i>I.S. Radev</i>	

SESSION 18: QUOTIENT AND QUANTUM COMPUTING

Fuzzy Quotients in Reactive Common Sense Reasoning	714
<i>M. Cebulla</i>	
A Symmetrical Linear Transform Learning Algorithm on Quantum Group	720
<i>S. He, F. Li</i>	
Application of Quantum Genetic Algorithm on Finding Minimal Reduct	724
<i>Y.J. Lv, N.X. Liu</i>	

SESSION 19: OTHERS

A Ten-year Review of Granular Computing	730
<i>J. Yao</i>	
A Study of Query Target of the Chinese Query Sentence	736
<i>F. Zheng, X. Shen, Q. Ge</i>	
Visualization of Affect-relations of Message Races for Debugging MPI Programs	741
<i>M. Park, S.Y. Kim, H. Park</i>	
Unit Sizing of a Stand-alone Hybrid Power System using Model-free Optimization.....	747
<i>S.M. Hakimi, S.M.M. Tafreshi, M.R. Rajati</i>	
Application of Swarm Intelligence Algorithm to Improve on Multiple Regression	753
<i>S. Chen, H. Sun</i>	
Nonlinear Target Identification and Tracking using UKF.....	757
<i>D.G. Khairnar, S. Nandakumar, S.N. Merchant, U.B. Desai</i>	

Comparing Centralized and Distributed Approaches for Operational Impact Analysis in Enterprise Systems.....	761
<i>M.B. Moss</i>	
Measuring Topological Anonymity in Social Networks.....	766
<i>L. Singh, J. Zhan</i>	
Privacy in the Information and Communications Technologies	771
<i>A. Martinez-Balleste, A. Solanas</i>	
Enhancing Privacy of Released Database	777
<i>T. Chen, S. Zhong</i>	
Improved Customers' Privacy Preference Policy.....	783
<i>R. Wei, J. Zhan</i>	
Author Index	