EDITORIAL PREFACE

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IJCINI 4(2) is a special issue on granular computing co-edited by co-edited by Prof. Tsau Young Lin and Prof. Shusaku Tsumoto. This issue encompasses six research papers on: 1) Some Remarks on the Concept of Approximations from the View of Knowledge Engineering; 2) Further Considerations of Classification-oriented and Approximation-oriented Rough Sets in Generalized Settings; 3) Generalized Rough Logics with Rough Algebraic Semantics; 4) An Evaluation Method of Relative Reducts Based on Roughness of Partitions; 5) Approximations in Rough Sets vs Granular Computing for Coverings; and 6) Feature Reduction with Inconsistency.

The Editor-in-Chief would like to take this opportunity to report that, following the successful organization of the 8th IEEE International Conference on Cognitive Informatics (ICCI’09) at The Hong Kong Polytechnic University during June 15-17, 2009, ICCI’10 will be held at Tsinghua University, Beijing during July 7-9, 2010. A number of special issues in IJCINI will be organized on cognitive informatics, cognitive computing, and computational intelligence. Submissions to these special issues in particular, and/or to the regular issues in general, are welcome.

IJCINI has been indexed in DBLP, PsycINFO, CSA Illumina, CORE, and Google Scholar. IJCINI is well recognized by EI and DBLP in the fields of computing, artificial intelligence, and computational intelligence, as well as PsycINFO, the largest American index in the field of psychology and cognitive science.

The Editor-in-Chief expects that readers of the International Journal of Cognitive Informatics and Natural Intelligence (IJCINI) will benefit from the papers presented in this issue in order to aware the recent advances in this field. I would like to thank the authors, guest co-editors, and reviewers for their great contributions to this issue. I would like to acknowledge the publisher of IJCINI, Ideal Group Global (IGI) Publishing, USA, and to thank Mehdi Khosrow-Pour (President of IGI), Jan Travers (Managing Director), Kristin M. Klinger (Managing Acquisitions Editor), Jennifer Neidig (Senior Managing Editor) and the editorial staff of IGI, Jamie Wilson and Elizabeth C. Duke, for their excellent professional support.

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This special issue on granular computing is derived from a panel in RSCTC 2008, Akron, OH, USA, October 23-25, 2008. However, the topics, which were on the approximation theories, have been extended to granular and rough computing. This special issue includes six selected papers as introduced below:

In *Some Remarks on the Concept of Approximations from the View of Knowledge Engineering*, T.Y. Lin, R. Barot and S. Tsumoto present the concept of approximations based on a knowledge engineering view (KE), which are illustrated in global GrC Model (2nd GrC Model) that is in pre-GrC terms called partial coverings. Roughly, RS approximation is “subbase” based, while global GrC model is “base” based, where subbase and base are two concepts in topological spaces. Examples are constructed to show their extreme differences. The meaning of GrC approximations can be explained from KE view, while RS approximations seem rather obscure.

The article on *Further Considerations of Classification-oriented and Approximation-oriented Rough Sets in Generalized Settings* by Masahiro Inuiguchi interprets rough sets from two views: classification of objects and approximation of a set. From this point of view, the author studied the classification-oriented and approximation-oriented rough set theory; many interesting phenomena are discovered.

In *Generalized Rough Logics with Rough Algebraic Semantics*, Jian-Hua Dai reviews that Pawlak introduced an equivalence relation into the power set based on the collection of the rough set pairs <lower approximation, upper approximation>. The paper takes a logic view on this direction of consideration, where the author used the rough set pairs to view the approximation \((U, R)\) algebraically, or more precisely, the algebraic semantic views of rough logics. The author introduces various structures, such as Stone algebra, regular double Stone algebra, rough algebras, rough Stone algebras, Stone algebras, rough double Stone algebras, and regular double Stone algebras.

Yasuo Kudo and Tetsuya Murai, in *An Evaluation Method of Relative Reducts Based on Roughness of Partitions*, introduce an evaluation criterion for relative reducts using roughness of partitions constructed from them based on the approximation measure theory. This is quite an innovative view because approximations are often based on set theories in rough set and granular computing.

The paper on *Approximations in Rough sets vs Granular Computing for Coverings* by Guilong Liu and William Zhu presents that rough set theory can be generalized from two views: In algebraic view, rough set theory is based on equivalence relations. So a natural generalization in this direction is the binary relation based granular computing and rough set theory. In geometric view, it is based on partitions. Hence a natural generalization is the covering based theory. The authors dedicate their efforts in finding the relationships between these two generalizations.
In Feature Reduction with Inconsistency, Yong Liu, Yunliang Jiang and Jianhua Yang presents a new approach to feature selection in granular computing and rough set theory based on a proposed concept named inconsistency. This new approach can keep the selected features with the same semantic correlation as the original feature set. The authors show that the concept of inconsistency can be used to calculate the positive region easily and quickly with linear temporal complexity.

The term granular computing (GrC) was coined, roughly speaking, by T. Y. Lin and L. A. Zadeh in 1996 (Zadeh, 1998). See paper 1 in this special issue for the informal and formal definitions. Though the label is relatively recent, the concept is ancient. It has occurred in daily routine (human body is granulated into neck, head and etc.), ancient intuition (infinitesimal that led to the invention of calculus), natural science (Heisenberg’s uncertainty principle), mathematics (simplicial complex), computer security (the discretionary access control), database (information table in rough set theory), data mining (frequent itemsets are constant sub-relations), web informatics (Lin, 2008), social computing (Atkin, 1977) and etc. One of the simplest granulation is partition, its theory called rough set theory or rough computing has played a guiding role in GrC development (Lin, 2009).

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REFERENCES


Tsau Young (T.Y.) Lin received his PhD in Mathematics from Yale University. He is a Professor of Computer Science at San Jose State University and a fellow in Berkeley Initiative in Soft Computing, University of California. He is the President of International Granular Computing Society and the Founding President of International Rough Set Society. He shares the Editor-in-Chief with Tony Xiaohua Hu for the International Journal of Granular Computing, Rough Sets and Intelligent Systems. He has served on various roles in reputable international journals and conferences. His interests include data/text/web mining, data security and granular/rough/soft computing. He received the best contribution awards from ICDM01 and International Rough Set Society (2005), best service award from IEEE/WIC/ACM WI-IAT2007 and a pioneer award from GrC 2008.
Shusaku Tsumoto graduated from Osaka University, School of Medicine in 1989. After a resident of neurology in Chiba University Hospital, he was involved in developing hospital information system in Chiba University Hospital from 1991. He moved to Tokyo Medical University in 1993 and started his research on rough sets and data mining in biomedicine. He received his PhD (Computer Science) on application of rough sets to medical data mining from Tokyo Institute of Technology in 1997 and has become a Professor at Department of Medical Informatics, Shimane University in 2000. His interests include approximate reasoning, data mining, fuzzy sets, granular computing, knowledge acquisition, mathematical theory of data mining, medical informatics and rough sets (alphabetical order). He served as President of International Rough Set Society from 2000 to 2005 and served as a PC chair of RSCTC2000, IEEE ICDM2002, RSCTC2004, ISMIS2005 and IEEE GrC2007, as a Conference chair of PAKDD 2008.