

Tutorial on Rough Sets: Decision Making, Data Mining, Knowledge Representation

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Abstract

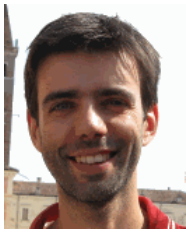
Rough Sets were introduced in the early '80s by Professor Zdzisław Pawlak to deal with imperfect knowledge. Over the years, the subject has attracted many researchers and practitioners, bringing in great developments both in theory and application. They have found interaction with many other related disciplines. Thus, the tutorial is also of interest to those working in related disciplines, such as Decision Making, Knowledge Representation, Data Mining and Big Data. The tutorial focuses on in-depth theory along with practical applications in each of the above discipline areas.

The tutorial is based on the materials gathered and presented at the [Summer School on Rough Sets](#) in Milano, 2016. The complete presentations are available as pdf files at the homepage of IRSS – [International Rough Set Society](#). The tutorial contains shortened versions of the Summer School lectures, which are presented by Davide Ciucci and Dominik Ślęzak (who were the Summer School co-organizers), as well as Yiyu Yao (who was one of the Summer School lecturers).

Agenda

- **PART 1**
 - *Introduction to Rough Sets*, presented by Dominik Ślęzak based on the Summer School lecture prepared by **Andrzej Skowron**
 - *Knowledge Representation: a Rough Set Perspective*, based on the Summer School lecture prepared and presented by **Yiyu Yao**
 - *Three-valued logics, Orthopairs and Rough Sets*, based on the Summer School lecture prepared and presented by **Davide Ciucci**
 - *Rough Set Theoretical Foundations*, presented by Davide Ciucci based on the Summer School lecture prepared by **Jouni Järvinen**
- **PART 2**
 - *Rough Sets and Decision Making*, presented by Davide Ciucci based on the Summer School lecture prepared by **Salvatore Greco**
 - *Applications of Rough Sets in Data Mining and Machine Learning*, presented by Dominik Ślęzak based on the Summer School lecture prepared by **Hung Son Nguyen**
 - *Rough Sets and Big Data*, presented by Dominik Ślęzak based on the Summer School lecture prepared by **Tianrui Li**

Speakers' Biographies



Davide CIUCCI

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Davide Ciucci received a PhD in 2004 in computer science from the University of Milan and the HdR (habilitation) from the University of Toulouse III in 2013. Since 2005, he has held a researcher permanent position at the University of Milano-Bicocca. His research activity is about uncertainty management, with particular reference to rough sets and non-classical logics. He is secretary of IRSS, Area Editor of Int. J. of Approximate Reasoning, Associate Editor of Information Sciences.



Dominik ŚLĘZAK

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Dominik Ślęzak received his D.Sc. in 2011 from Institute of Computer Science, Polish Academy of Sciences, and Ph.D. in 2002 from University of Warsaw, Poland. In 2005, he co-founded Infobright, where he currently works as Chief Scientist. He is also Associate Professor in Institute of Informatics at University of Warsaw. He used to hold positions of Assistant Professor at University of Regina, Canada, and in Polish-Japanese Academy of Information Technology in Warsaw. Dominik edited over 20 books and volumes of conference proceedings. He authored over 150 papers for books, journals and conferences. He is also co-inventor in five granted US patents. He delivered invited lectures at over 20 international conferences, including keynote talk at IEEE/WIC/ACM International Conference on Web Intelligence and Intelligent Agent Technology (WI-IAT) in 2015. His research interests include Knowledge Discovery, Data Mining, Business Intelligence, Approximate Computing and Rough Sets. In 2012-2014 he served as President of IRSS. In 2015 he was appointed as IRSS Fellow.



Yiyu YAO

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Yiyu Yao is a Professor with the Department of Computer Science, University of Regina. His research interests include Three-way Decisions, Granular Computing, Rough Sets, Artificial Intelligence, Web Intelligence, Information Retrieval, Data Analysis, Machine Learning, and Data Mining. He proposed a theory of three-way decisions, a triarchic theory of granular computing, interval sets, and decision-theoretic rough set models. He published over 300 papers. In 2015, he was selected as a Highly Cited Researcher (Thomson Reuters). In 2014, he received University of Regina Alumni Association Faculty Award for Research Excellence. In 2013, a co-authored paper was included in Frontrunner 5000 (Top Articles in Outstanding Science and Technology Journals of China). In 2010, he received the Overseas Friendship Award, Chinese Rough Set and Soft Computing Society. In 2008, he received PAKDD Most Influential Paper Award (1999-2008). He is an Area Editor of International Journal of Approximate Reasoning, an Associate Editor of Information Sciences, an Advisory Board Member of Knowledge-based Systems, and a Track Editor of Web Intelligence. He is also an Editorial Board Member of Granular Computing, LNCS Transactions on Rough Sets, International Journal of Intelligent Information Systems, and several others. He is the elected Vice-President of IRSS.