# Preserving and Advancing Pawlak's Legacy: 25 Years of the Rzeszów School of Rough Sets and Petri Nets

**Zbigniew Suraj**

Institute of Computer Science, University of Rzeszów

Symposium on the 100th Anniversary of Prof. Zdzisław Pawlak's Birth
Warsaw University of Technology, Warsaw, November 10, 2026

# The Genesis: Inspired by Professor Pawlak

- Founded in **2001** by **Zbigniew Suraj**, the RSPN group was deeply inspired by Zdzisław Pawlak's pioneering work on granular computing.
- **Our Mission:** To bridge the gap between Pawlak's **Rough Set Theory** and Carl Adam Petri's **Net Theory**.
- **25-Year Trajectory:** Evolved from a local unit into an internationally recognized hub within the **Institute of Computer Science (UR)**.

# Rough Set & Petri Net Research Group: RSPN




From the left: Z. Suraj (leader), Ł. Maciura, L. Pelc, J. Wójtowicz, W. Kozioł, K. Garwol, T. Ruchlewicz, K. Pancerz, P. Grochowalski, W. Paja, P. Lasek (2022).

**More:** `https://ur.edu.pl`
(*developed by P. Lasek and Z. Suraj*)

# Statistical Summary of the RSPN Network

## Community Size

- **Total Core Members:** 23
- **Total Collaborators:** 73
- **Combined Network:** 96 Researchers

## Geographical Synergy

- **Polish Researchers:** 63 (66%)
- **International Partners:** 33 (34%)

## International Collaborators by Country

- **Canada:** 7 collaborators
- **China:** 2 collaborators
- **Egypt:** 2 collaborators
- **Germany:** 3 collaborators
- **Hungary:** 1 collaborator
- **India:** 3 collaborators
- **Italy:** 1 collaborator
- **Portugal:** 1 collaborator
- **Saudi Arabia:** 1 collaborator
- **Spain:** 1 collaborator
- **Sweden:** 1 collaborator
- **Ukraine:** 7 collaborators
- **USA:** 3 collaborators

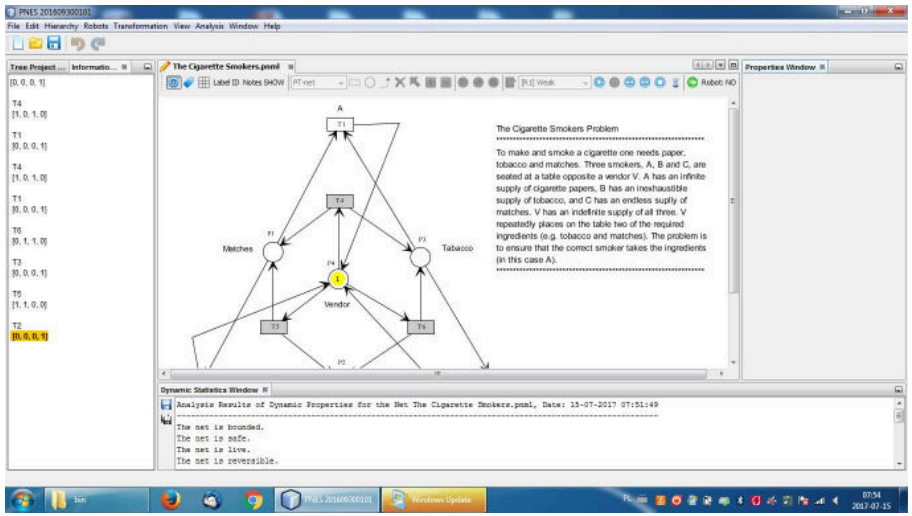
# Core Scientific Synergy: Rough Sets & Concurrency

The Rzeszów school focuses heavily on extracting knowledge from data uncertainty:

- **Concurrent Systems Discovery:** Synthesizing asynchronous processes and discovering modular concurrency models directly from Pawlak's data tables.
- **Approximate Reasoning:** Embedding rough/fuzzy rule-based systems into generalized Petri net structures for decision support.
- **Data Reduction & Pattern Recognition:** Multi-stage feature selection and classification based on rough reducts.

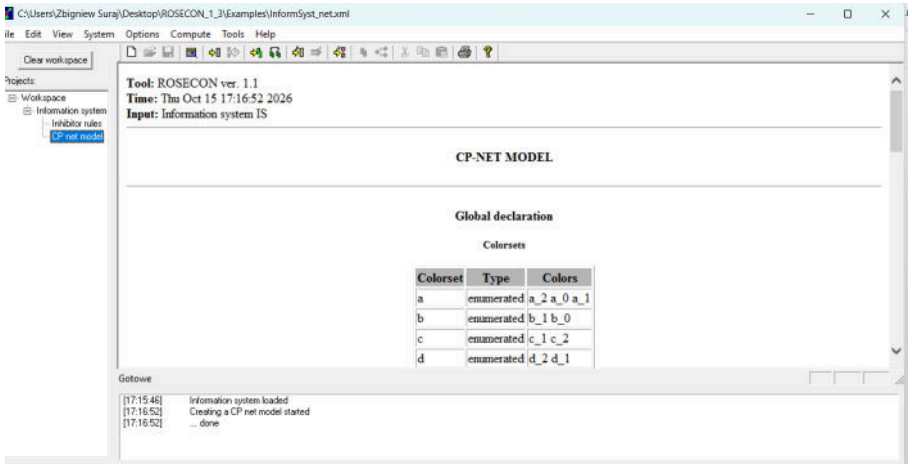
# Software Systems: PNeS & ROSECON

PNeS is devoted to editing, analyzing, and simulating classic and non-classic Petri nets, which can also be specified by data sets.




A. View after editing the exemplary net.

ROSECON is designed for automated net model discovery from tabular data and time-series change prediction.




B. View after reading the tabular data.

**More:** `https://ur.edu.pl` (Oprogramowanie / Software)
(*developed by P. Grochowalski, Z. Suraj and K. Pancerz, Z. Suraj, respectively*)

# Preserving the Community's Memory: The RSDS System

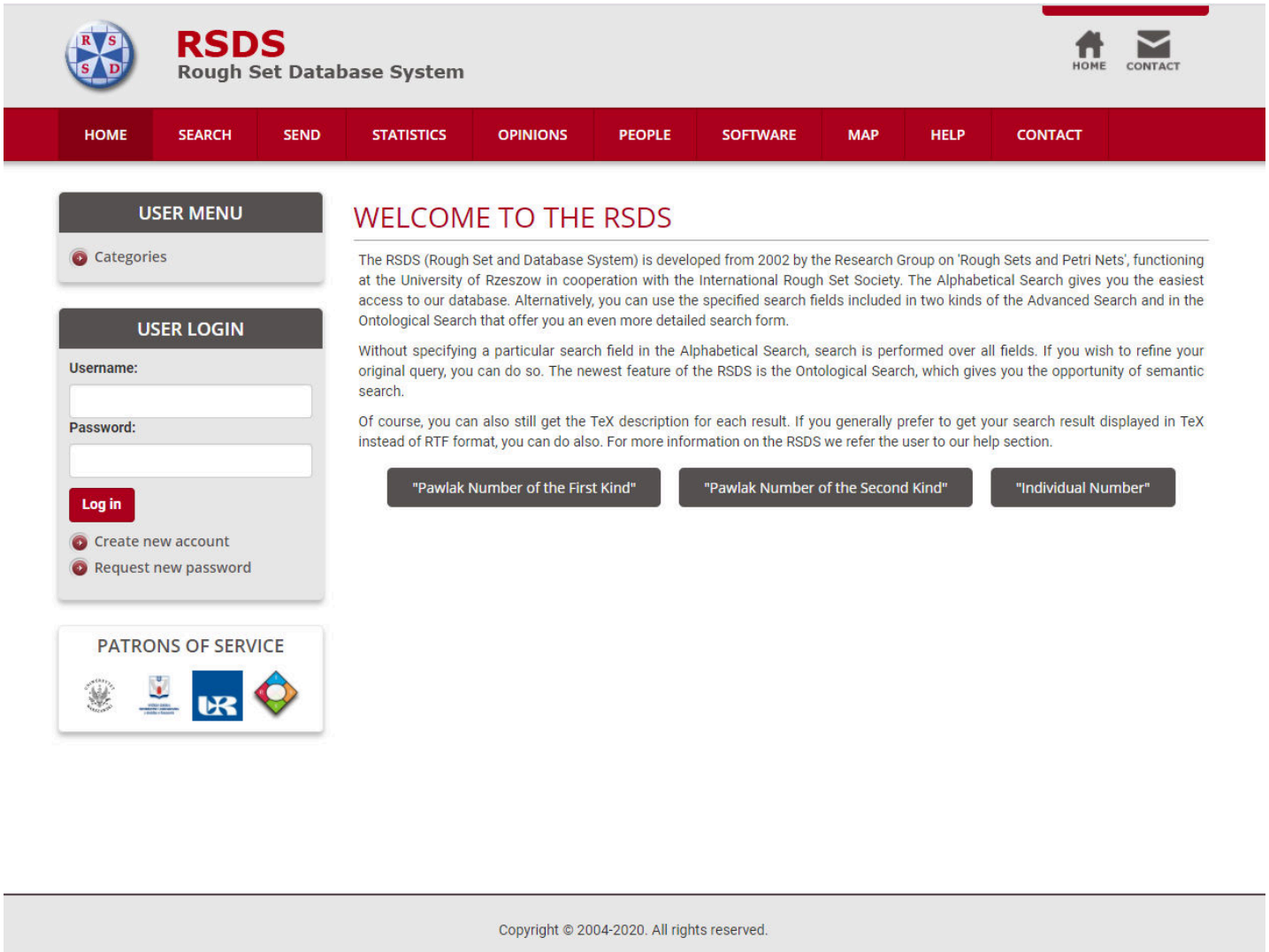
- **RSDS (Rough Set Database System):** Operating since **2003**.
- Serves as a global bibliographic repository for the Rough Set community.
- **The "Pawlak Number" Feature:** Inspired by the Erdős number, RSDS automatically calculates:

## Pawlak Numbers (Automated Metric)

- **1st Kind:** Direct co-authorship with Prof. Z. Pawlak.
- **2nd Kind:** Co-authorship distance graph evaluation.

- **Direct Link:** The group **boasts a direct co-authorship presence** with a Pawlak number of the first kind.

# Rough Set Database System: RSDS




**More:** `https://rsds.ur.edu.pl`

(*developed by P. Grochowalski, K. Garwol and Z. Suraj*)

# International Conferences & Historic Milestones

The group has driven global and regional scientific integration through high-profile events:

- **SCDP 2002 (Rzeszów):** The group independently organized the *Soft Computing and Distributed Processing* conference.
- **A Historic Guest: Professor Zdzisław Pawlak personally attended SCDP 2002 as a Keynote Speaker**, directly blessing the early foundations of the Rzeszów research group.
- **CS&P Workshops:** In collaboration with **Humboldt University (Berlin)** and **Warsaw University**, the group co-hosted three editions of *Concurrency, Specification and Programming* (Czarna 2003, Ruciane-Nida 2005, Rzeszów 2015).

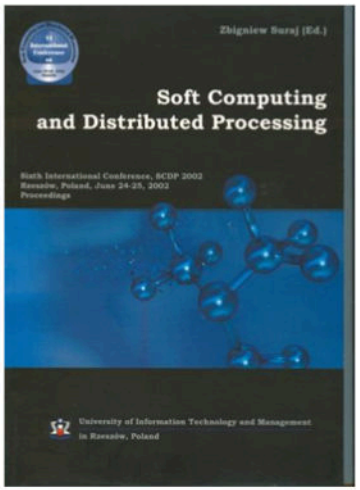
# SCDP 2002 Conference, Rzeszów

**SOFT COMPUTING AND DISTRIBUTED PROCESSING**

**Sixth International Conference, SCDP 2002, Rzeszów, Poland, June 24-25, 2002**
**Proceedings**

**Zbigniew Suraj (Ed.)**

University of Information Technology and Management, Rzeszów, Poland, 2002




This book contains extended abstracts selected for presentation at the Soft Computing and Distributed Processing Conference, which was held in Rzeszów, Poland, in June 2002.

The main theme of the conference was centered around the key ideas and methods of soft computing and distributed processing.

The SCDP 2002 conference was greatly honored to have Zdzisław Pawlak (Poland) as the honorary chair and keynote speaker, Yurii Kułakov (Ukraine) and Andrzej Skowron (Poland) as invited plenary speakers.

184 pages, ISBN 83-87658-28-6



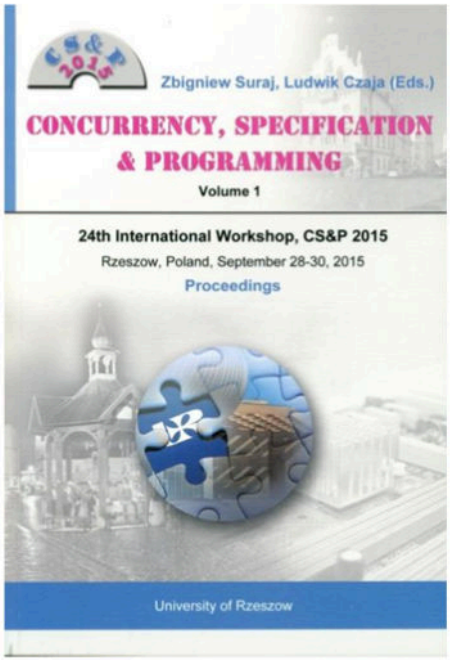
A private meeting with Professors Z. Pawlak and A. Skowron, Rzeszów (2002).

# CS&P 2015, Rzeszów

**CONCURRENCY, SPECIFICATION AND PROGRAMMING**
**Volume 1**

**Zbigniew Suraj, Ludwik Czaja (Eds.)**

24th International Workshop, CS&P 2015, Rzeszow, Poland, Sept. 28-30, 2015. Proceedings, University of Rzeszow



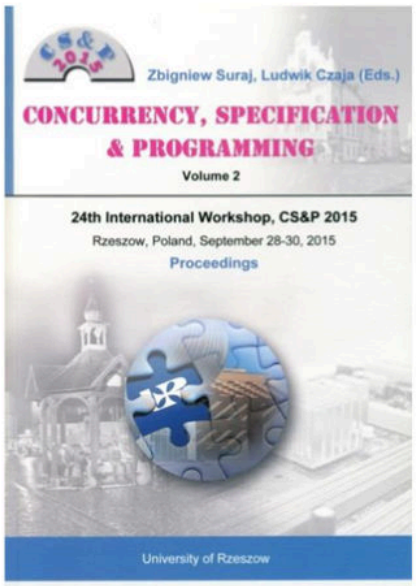

This two-volume book contains the papers selected for presentation at the Concurrency, Specification and Programming (CS&P) Workshop. It was taking place from 28th to 30th September 2015 in Rzeszow, the biggest city in southeastern Poland. The CS&P 2015 was the twenty-fourth meeting after the break. It received 53 submissions that were carefully reviewed by Program Committee members or external reviewers. After a reviewing process, 49 papers were accepted for presentation at the workshop and publication in the CS&P 2015 proceedings. This book also contains three extended abstracts by the plenary keynote speakers.

258 pages, ISBN 978-83-7996-181-8

**CONCURRENCY, SPECIFICATION AND PROGRAMMING**
**Volume 2**

**Zbigniew Suraj, Ludwik Czaja (Eds.)**

24th International Workshop, CS&P 2015, Rzeszow, Poland, Sept. 28-30, 2015. Proceedings, University of Rzeszow




This two-volume book contains the papers selected for presentation at the Concurrency, Specification and Programming (CS&P) Workshop. It was taking place from 28th to 30th September 2015 in Rzeszow, the biggest city in southeastern Poland. The CS&P 2015 was the twenty-fourth meeting after the break. It received 53 submissions that were carefully reviewed by Program Committee members or external reviewers. After a reviewing process, 49 papers were accepted for presentation at the workshop and publication in the CS&P 2015 proceedings. This book also contains three extended abstracts by the plenary keynote speakers.

258 pages, ISBN 978-83-7996-181-8

# Editorial Contributions to the Rough Set Community

Members of the RSPN group have actively shaped the official literature and academic journals dedicated to the field:

- **Transactions on Rough Sets (Springer):** Active and long-standing involvement of group members within the Editorial Board of this flagship journal series.
- **Monumental Editorial Milestones (2013):** Co-editing the prestigious, two-volume definitive tribute anthology published by Springer:

## Honoring the Founder

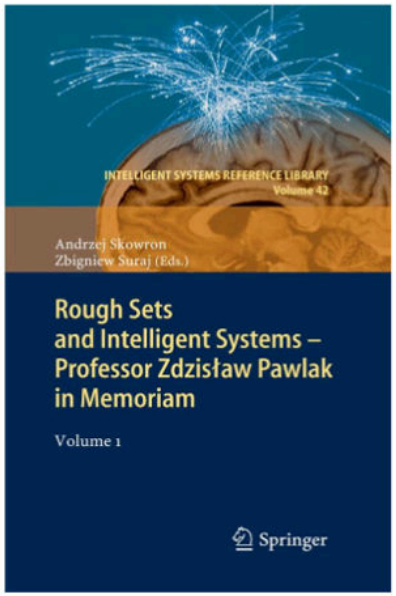
- *Rough Sets and Intelligent Systems – Professor Zdzisław Pawlak in Memoriam, Vol. 1* (2013)
- *Rough Sets and Intelligent Systems – Professor Zdzisław Pawlak in Memoriam, Vol. 2* (2013)

# "Rough Sets and Intelligent Systems – Professor Zdzisław Pawlak in Memoriam", Vols. 1 & 2

**ROUGH SETS AND INTELLIGENT SYSTEMS – Professor Zdzisław Pawlak in Memoriam**
**Volume 1**

**Andrzej Skowron, Zbigniew Suraj (Eds.)**

Intelligent Systems Reference Library, Vol. 42, Springer-Verlag, Berlin Heidelberg, 2013




This book is dedicated to the memory of Professor Zdzisław Pawlak. He is the founder of the Polish school of Artificial Intelligence and one of the pioneers in Computer Engineering and Computer Science with worldwide influence.

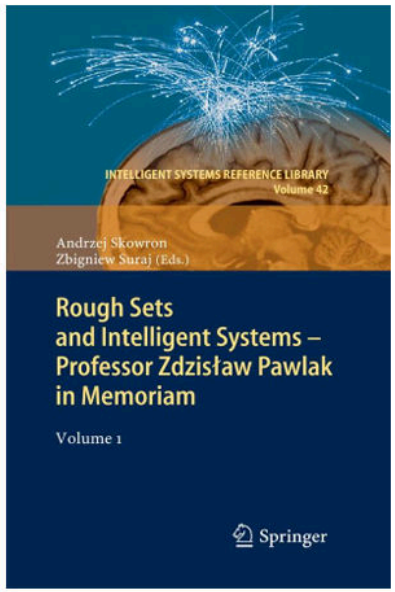
This book prepared in two volumes contains more than 50 chapters. This demonstrates that the scientific approaches discovered by Professor Zdzisław Pawlak, especially the rough set approach, are vivid and intensively explored by many researchers in many places throughout the world. The submitted papers prove that interest in rough set research is growing.

649 pages, ISBN 978-3-642-30343-2

**ROUGH SETS AND INTELLIGENT SYSTEMS – Professor Zdzisław Pawlak in Memoriam**
**Volume 2**

**Andrzej Skowron, Zbigniew Suraj (Eds.)**

Intelligent Systems Reference Library, Vol. 43, Springer-Verlag, Berlin Heidelberg, 2013




This book is dedicated to the memory of Professor Zdzisław Pawlak. He is the founder of the Polish school of Artificial Intelligence and one of the pioneers in Computer Engineering and Computer Science with worldwide influence.

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605 pages, ISBN 978-3-642-30340-1

# The Warsaw–Rzeszów Bridge: Mentorship and Networks

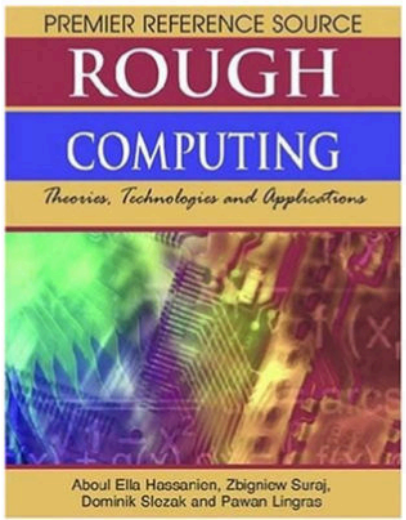
- **Professor Andrzej Skowron (University of Warsaw):**
  - **Group Mentor:** Long-standing mentor to the RSPN research group.
  - **Academic Foundation:** Key substantive and organizational support in establishing Rzeszów's computer science department.
  - **UR Medal (2013):** Awarded for outstanding contributions to the University of Rzeszów.
- **International Collaboration:** Joint monographs and publishing networks with partners from Canada, Saudi Arabia (KAUST), Sweden, USA, India, Ukraine, and Egypt.

# International Collaboration – Selected Examples

**ROUGH COMPUTING: Theories, Technologies and Applications**

**Aboul Ella Hassanien, Zbigniew Suraj, Dominik Ślęzak, Pawan Lingras (Eds.)**

IGI Global, Hershey, New York, 2008



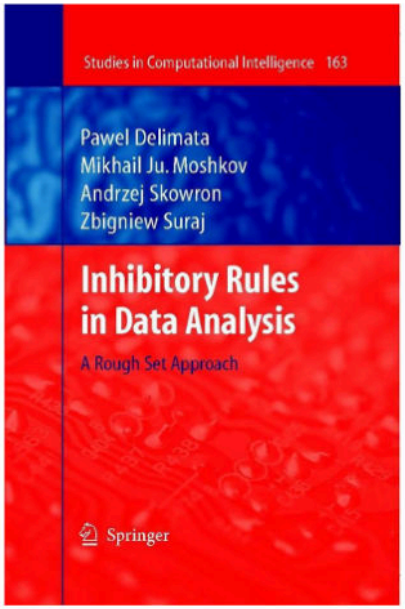

This monograph offers the most comprehensive coverage of key rough computing research, surveying a full range of topics from granular computing to pansystems theory. With its unique coverage of the defining issues of the field, this commanding research collection provides libraries with a single, authoritative reference to this highly advanced technological topic.

299 pages, ISBN-10: 1599045524, ISBN-13: 978-1599045528

**INHIBITORY RULES IN DATA ANALYSIS. A Rough Set Approach**

**Paweł Delimata, Mikhail Ju. Moshkov, Andrzej Skowron, Zbigniew Suraj**

Springer-Verlag, Berlin Heidelberg, 2009




This monograph is devoted to theoretical and experimental study of inhibitory decision and association rules. The most important feature of this monograph is that it includes an advanced mathematical analysis of problems on inhibitory rules.

The results obtained in the monograph can be useful for researchers in such areas as machine learning, data mining and knowledge discovery, especially for those who are working in rough set theory, test theory, and logical analysis of data. The monograph can be used under the creation of courses for graduate students and for PhD studies.

116 pages, ISBN 978-3-540-85637-5

# International Collaboration – Selected Examples (Continued)

**ROUGH SETS AND KNOWLEDGE TECHNOLOGY**

**6th International Conference, RSKT 2011, Banff, Canada, October 9-12, 2011**
**Proceedings**

**JingTao Yao, Sheela Ramanna, Guoyin Wang, Zbigniew Suraj (Eds.)**

Lecture Notes in Artificial Intelligence, Vol. 6954, Springer-Verlag, Berlin Heidelberg, 2011




This volume contains the papers selected for presentation at the Rough Sets and Knowledge Technology Conference, which was held in Banff, Canada, in October 2011.

Every paper was reviewed by at least two PC members and domain experts. As a result, only top-quality papers were chosen for presentation at the conference, including 48 regular papers and 42 short papers.

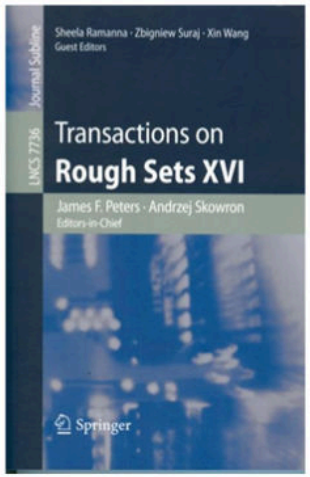
The RSKT 2011 program was further enriched by four keynote speeches given by: Jerzy W. Grzymala-Busse (USA), Jiye Liang (China), Witold Pedrycz (Canada) and James F. Peters (Canada).

771 pages, ISBN 978-3-642-24424-7, DOI: 10.1007/978-3-642-24425-4

**TRANSACTIONS ON ROUGH SETS XVI**

**Sheela Ramanna, Zbigniew Suraj, Xin Wang (Guest Editors)**

LNCS 7736, Springer-Verlag, Berlin Heidelberg, 1-221(2013)




Volume XVI includes extensions of papers from the Rough Sets and Knowledge Technology Conference, which was held in Banff, Canada, in October 2011. In addition, this book contains a long paper based on a PhD thesis. The papers cover both theory and applications of rough, fuzzy and near sets. They offer a continuation of a number of research streams which have grown out of the seminal work by Zdzisław Pawlak during the first decade of the 21st century.

ISBN 978-3-642-36504-1

# International Collaboration – Selected Examples (Continued)

**ROUGH SETS**

**International Joint Conference, IJCRS 2019, Debrecen, Hungary, June 17-21, 2019 Proceedings**

**Tamás Mihálydeák, Fan Min, Guoyin Wang, Mohua Banerjee, Ivo Düntsch, Zbigniew Suraj and Davide Ciucci (Eds.)**

Lecture Notes in Artificial Intelligence, Vol. 11 499, Springer, Heidelberg, 2019



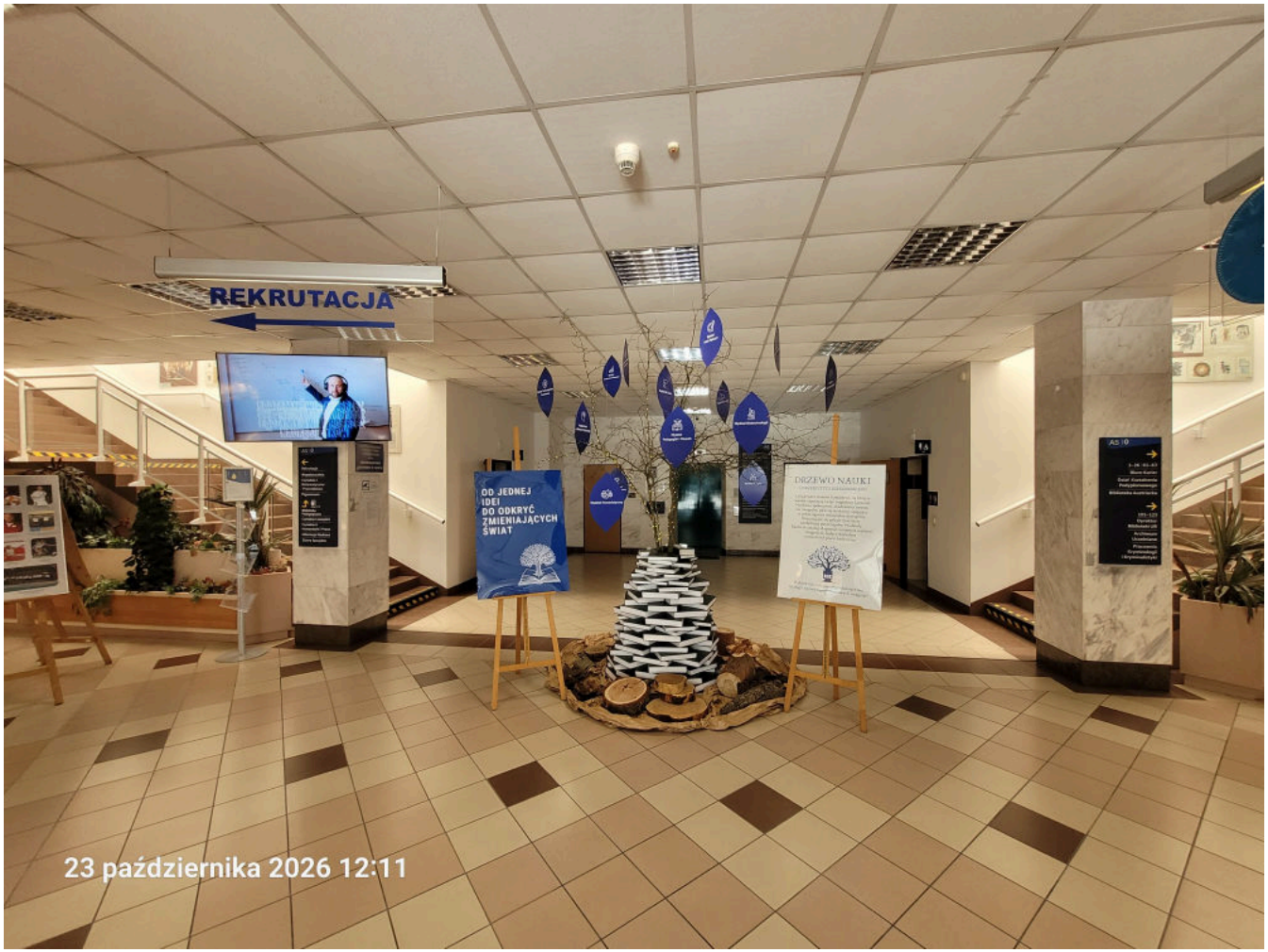

This LNAI 11499 constitutes the proceedings of the International Joint Conference on Rough Sets, IJCRS 2019, held in Debrecen, Hungary, in June 2019.

The 41 full papers were carefully reviewed and selected from 71 submissions. The IJCRS conferences aim at bringing together experts from universities and research centers as well as the industry representing fields of research in which theoretical and applicational aspects of rough set theory already find or may potentially find usage. The papers are grouped in topical sections on core rough set models and methods; related methods and hybridization; areas of application.

549 pages, ISBN 303-02-28-14-2

# Exhibition at the University of Rzeszów

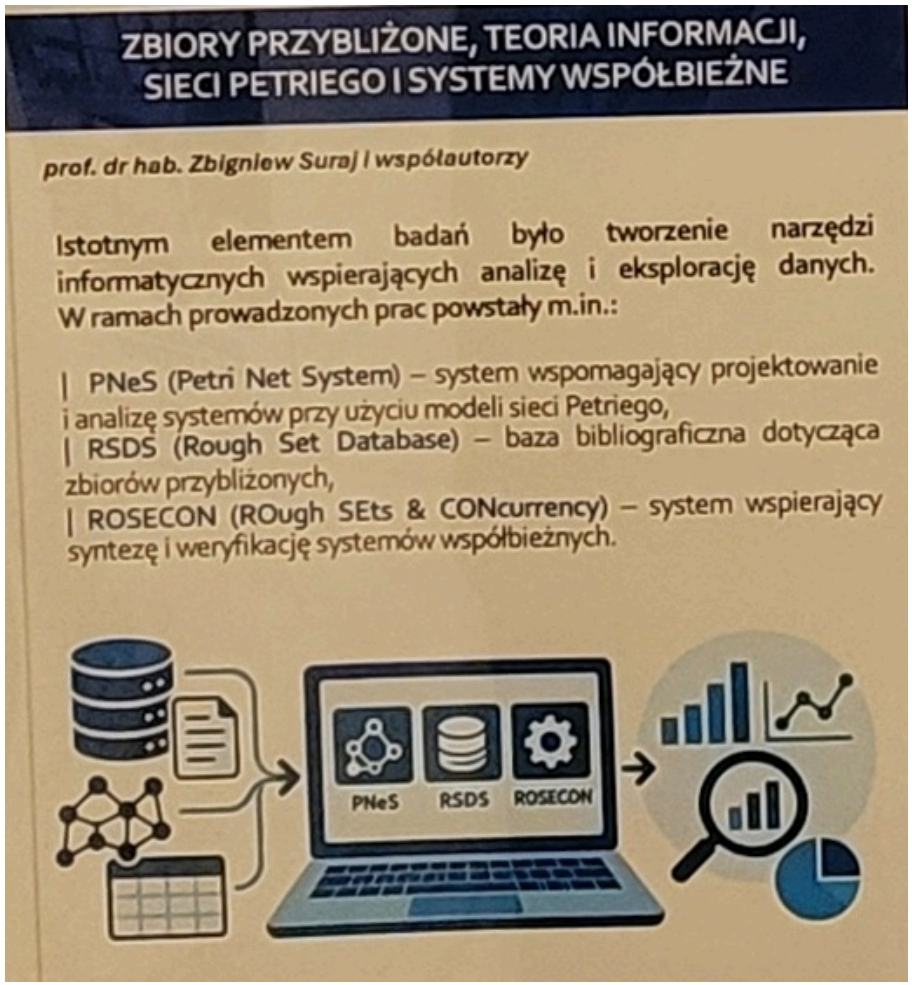
Exhibition of scientific achievements by academic staff, organized to celebrate the 25th anniversary of the University of Rzeszów.



# Faculty of Exact & Technical Sciences and RSPN

The exhibition stand of the Faculty of Exact and Technical Sciences, highlighting the achievements and research scope of the RSPN group.



# Conclusions: Celebrating the Future of Rough Sets

- **A Living Legacy:** 25 years of proving that Pawlak's rough set concepts remain cutting-edge when blended with concurrent systems.
- **Educational Footprint:** A total of **8 PhD degrees** and **3 Habilitations** have been successfully conferred within the group's research framework.
- **Future Outlook:** Integrating classical granular computing with hybrid AI, deep learning paradigms, and non-classical Petri nets.

**Thank You for Your Attention!**

# Members of the RSPN Research Group

1. Paweł Delimata
2. Paweł Drygaś
3. Barbara Fryc (Olejko)
4. Katarzyna Garwol
5. Piotr Grochowalski
6. Mariusz Knap
7. Mariusz Kozdrański
8. Wojciech Kozioł
9. Piotr Lasek
10. Agnieszka Lasek
11. Paweł Leończyk
12. Łukasz Lew
13. Łukasz Maciura
14. Zofia Matusiewicz (Makara)
15. Grzegorz Owsiany
16. Wiesław Paja
17. Artur Paluch
18. Krzysztof Pancerz
19. Tadeusz Ruchlewicz
20. Wojciech Rząsa
21. Grażyna Szostek
22. Roman Szostek
23. Jolanta Wójtowicz

*A cohesive team of 23 researchers driving the Rzeszów school framework.*

# Collaborating Partners – Global & Domestic Networks (A–L)

1. Jan Andreasik **(Poland)**
2. Piotr Artiemjew **(Poland)**
3. Mohua Banerjee **(India)**
4. Sibasis Bandyopadhyay **(India)**
5. Luis Baptista **(Portugal)**
6. Yurii Bloshko **(Ukraine)**
7. Dariusz Bober **(Poland)**
8. Maciej Borkowski **(Canada)**
9. Hans D. Burkhard **(Germany)**
10. Jerzy Grzymała-Busse **(USA)**
11. Janusz Bytnar **(Poland)**
12. Davide Ciucci **(Italy)**
13. Ludwik Czaja **(Poland)**
14. Lesia Dobuliak **(Ukraine)**
15. Ivo Düntsch **(Canada)**
16. Leszek Gajecki **(Poland)**
17. Neamat El Gayar **(Egypt)**
18. Lesław Gniewek **(Poland)**
19. Jesus Serrano-Guerrero **(Spain)**
20. Abdul Ella Hassanien **(Egypt)**
21. Zdzisław Hippe **(Poland)**
22. Jan Komorowski **(Sweden)**
23. Janusz Konrad **(USA)**
24. Marzena Kryszkiewicz **(Poland)**
25. Maria Kwaśnik **(Poland)**
26. Gabriela Lindemann **(Germany)**

# Collaborating Partners – Global & Domestic Networks (L–S)

1. Pawan Lingras **(Canada)**
2. Marek Matczak **(Poland)**
3. Tamás Mihálydeák **(Hungary)**
4. Fan Min **(China)**
5. Mikhail Moshkov **(Saudi Arabia)**
6. Oleksandr Nakonechny **(Ukraine)**
7. Mariusz Nycz **(Poland)**
8. Oksana Olar **(Ukraine)**
9. Sankar K. Pal **(India)**
10. Marek Pałasiński **(Poland)**
11. Witold Pedrycz **(Canada)**
12. Lucjan Pelc **(Poland)**
13. Wojciech Penczek **(Poland)**
14. James F. Peters **(Canada)**
15. Monika Piróg-Mazur **(Poland)**
16. Michał Piętal **(Poland)**
17. Lech Polkowski **(Poland)**
18. Aleksandr Provotar **(Ukraine)**
19. Leszek Pyziak **(Poland)**
20. Sheela Ramanna **(Canada)**
21. Leszek Rolka **(Poland)**
22. Henryk Rybiński **(Poland)**
23. Bohdan Rytsar **(Ukraine)**
24. Holger Schlingloff **(Germany)**
25. Andrzej Salwicki **(Poland)**
26. Andrzej Skowron **(Poland)**
27. Roman Słowiński **(Poland)**

# Collaborating Partners – Global & Domestic Networks (S–Z)

1. Marta Sochacka-Piętal **(Poland)**
2. Jan Stankiewicz **(Poland)**
3. Marcin Szczuka **(Poland)**
4. Jarosław Szkoła **(Poland)**
5. Tomasz Szmuc **(Poland)**
6. Marcin Szpyrka **(Poland)**
7. Dominik Ślęzak **(Poland)**
8. Roman Świniarski **(USA)**
9. Jerzy Tocki **(Poland)**
10. Igor Tralle **(Poland)**
11. Petro Venherskyi **(Ukraine)**
12. Alicja Wakulicz-Deja **(Poland)**
13. Guoyin Wang **(China)**
14. Józef Winkowski **(Poland)**
15. Piotr Witkowski **(Poland)**
16. Konrad Wojciechowski **(Poland)**
17. JingTao Yao **(Canada)**
18. Józef Zając **(Poland)**
19. Beata Zielosko **(Poland)**
20. Paweł Zięba **(Poland)**