

# 2020 IEEE International Conference on **Fuzzy Systems (FUZZ-IEEE)**



-  Welcome Message
-  Table of Contents
-  Technical Papers
-  Authors Index

## **2020** CONFERENCE **PROCEEDINGS**

Please visit website for more information!  
[wcci2020.org](http://wcci2020.org)

ISBN: 978-1-7281-6932-3  
Part Number: CFP20FUZ-ART

© Copyright 2020 IEEE. Personal use of this material is permitted. However, permission to reprint/republish this material for advertising or promotional purposes or for creating new collective works for resale or redistribution to servers or lists, or to use any copyrighted component of this work in other work must be obtained from the IEEE.

Technical Support



Phone: +1352 872 5544  
[cdyer@conferencecatalysts.com](mailto:cdyer@conferencecatalysts.com)

© 2020 IEEE

**2020 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE)**

© 2020 IEEE. Personal use of this material is permitted. However, permission to reprint/republish this material for advertising or promotional purposes or for creating new collective works for resale or redistribution to servers or lists, or to reuse any copyrighted component of this work in other works must be obtained from the IEEE.

Additional copies may be ordered from:

IEEE Service Center

445 Hoes Lane

Piscataway, NJ 08855-1331 USA

+1 800 678 IEEE (+1 800 678 4333)

+1 732 981 1393

+1 732 981 9667 (FAX)

email: [customer-service@ieee.org](mailto:customer-service@ieee.org)

Copyright and Reprint Permission: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923. For reprint or republication permission, email to IEEE Copyrights Manager at [pubs-permissions@ieee.org](mailto:pubs-permissions@ieee.org). All rights reserved. Copyright ©2020 by IEEE

IEEE Catalog Number: CFP20FUZ-ART  
ISBN: 978-1-7281-6932-3

## TABLE OF CONTENTS

WELCOME MESSAGE FROM THE CHAIR .....	4
MONDAY, JULY 20.....	5
TUESDAY, JULY 21 .....	11
WEDNESDAY, JULY 22.....	17
THURSDAY, JULY 23 .....	23
FRIDAY, JULY 24.....	29
AUTHOR INDEX.....	34

## WELCOME MESSAGE FROM THE CHAIR

It is our pleasure to welcome you to the IEEE International Conference on Fuzzy Systems 2020 as part of the 2020 IEEE World Congress on Computational Intelligence (IEEE WCCI 2020). IEEE WCCI 2020 was planned to be held in Glasgow, Scotland, but unfortunately, all presentations will be given online due to the outbreak of Covid-19.

Professor Lotfi Zadeh believed that fuzzy logic, neurocomputing, and evolutionary computation should be collectively viewed as the main constituents of soft computing. His idea was that the combination of fuzzy logic, neural computing, and evolutionary computation will form a foundation for designing systems with high machine intelligence. Currently, IEEE World Congress on Computational Intelligence has become one of the most authoritative conferences on computational intelligence. IEEE International Conferences on Fuzzy Systems has consistently promoted solid theoretical advances, presented a host of successful applications, and nurtured an enormous potential yet to be realized in the future.

The FUZZ-IEEE 2020 conference provides a platform bringing together the researchers all over the world to work in a joint effort to push the research boundary and overcome emerging challenges. The program of FUZZ-IEEE 2020 reflects a rich variety of topics, from the foundations of fuzzy set theory, fuzzy reasoning, fuzzy modeling, fuzzy clustering, fuzzy control, to natural language processing, computational and artificial intelligence, cyber security, web intelligence, machine learning, lattice computing and emerging applications related to autonomous and robotics systems, classification, decision making, health monitoring and smart industry. Several papers are devoted to the state-of-the-art methods of fuzzy systems, neural and evolutionary computation, which is evidence of the importance of the soft computing approaches. The program also reflects the historic interest of the conference in the application of the theory of fuzzy sets and systems to data bases, data science, engineering, finance, and medicine. The number of submissions was 466 from 49 countries. The country assigned to the paper was the country from which its first author came. Of these, 259 were selected, 170 for oral presentations and 89 for poster presentation. The top 10 contributors by country are United Kingdom (12.9%), Spain (11.8%), Poland (11.3%), China (6.6%), Brazil (6.5%), Italy (5.0%), Australia (4.9%), United States (4.9%), France (4.1%), and India (3.9%). The strong number of submissions and world-wide contributions reflect a significant driving force and extensive effort from the fuzzy community to support the development of fuzzy research.

We are most grateful to the authors and plenary speakers for choosing FUZZ-IEEE to present their most recent results and advances, and for sharing their ideas. We want to express our deepest gratitude to the web review chair for supporting the review process, and to the reviewers for refereeing a considerable number of outstanding contributions. We extend our appreciation to the support team for their assistance. Particularly, I am most thankful to Amir, Xin, Marios, Nik, Oscar, Hani, Chin-Teng and to many other colleagues for their immeasurable help.

*Hak-Keung Lam, FUZZ-IEEE Technical Co-Chair*

## MONDAY, JULY 20

### Session F-MM1: Linguistic Summarization and Description of Data-I

Monday, July 20, 3:30PM-5:30PM, Room: FUZZ Room 1, Chair: Anna Wilbik, Daniel Sanchez, Nicolas Marin

**3:30PM TrPM: A Linguistic Petri Nets module to describe the trends of a time series [#22197]**

Juan Moreno-Garcia, Ester del Castillo and Luis Rodriguez-Benitez  
Universidad de Castilla-La Mancha, Spain

**3:50PM Explaining Data Regularities and Anomalies [#22360]**

Amit Shukla, Gregory Smits, Olivier Pivert and Marie-Jeanne Lesot  
Univ Rennes, IRISA, France; LIP6, Sorbonne Universite, France

**4:10PM Fuzzy Analytical Queries: A New Approach to Flexible Fuzzy Queries [#22475]**

Slawomir Zadrozny and Janusz Kacprzyk  
Systems Research Institute Polish Academy of Sciences, Poland

**4:30PM A Preliminary Approach to Referring to Groups of Objects in Images [#22434]**

Nicolas Marin, Gustavo Rivas-Gervilla and Daniel Sanchez  
University of Granada, Spain

**4:50PM Bipolar Queries and Relative Object Qualification in Scope of User-Assisted Database Querying [#22454]**

Mateusz Dziedzic, Guy De Tre, Janusz Kacprzyk and Slawomir Zadrozny  
Dept. of Telecommunication and Information Processing, Ghent University, Ghent, Belgium,  
Belgium; Systems Research Institute, Polish Academy of Sciences, Warsaw, Poland, Poland

**5:10PM Empirical Study of Fuzzy Quantification Models for Linguistic Descriptions of Meteorological Data [#22367]**

Carlos Heble-Lahera, Andrea Cascallar-Fuentes, Alejandro Ramos-Soto and Alberto Bugarin-Diz  
Universidad Internacional Menendez Pelayo, Spain; Universidade de Santiago de Compostela, Spain

### Session F-MM2: Human-in-the-Loop Interactions in Fuzzy Reasoning and Machine Learning

Monday, July 20, 3:30PM-5:30PM, Room: FUZZ Room 2, Chair: Jimmy Cao, CT Lin, Dongrui Wu

**3:30PM Privacy-Preserving Gesture Recognition with Explainable Type-2 Fuzzy Logic Based Systems [#22135]**

Josip Rozman, Hani Hagra, Javier Andreu-Perez, Damien Clarke, Beate Muller and Steve Fitz  
University of Essex, United Kingdom; Plextek Ltd., United Kingdom

**3:50PM Knowledge extraction about patients surviving breast cancer treatment through an autonomous fuzzy neural network [#22074]**

Paulo Vitor Campos Souza, Yu-Kai Wang and Edwin Lughofer  
JKU Linz, Austria; UTS, Australia

- 4:10PM Data Imputation in Related Time Series Using Fuzzy Set-Based Techniques [#22232]**  
 Adam Kiersztyn, Pawel Karczmarek, Rafal Lopucki, Witold Pedrycz, Ebru Al, Ignacy Kitowski and Adam Zbyryt  
 Department of Computer Science Lublin University of Technology, Poland; Centre for Interdisciplinary Research The John Paul II Catholic University of Lublin, Poland; Department of Electrical & Computer Engineering University of Alberta Edmonton, Canada Department of Electrical and Computer Engineering King Abdulaziz University Jeddah, Saudi Arabia Systems Research Institute PAS, Warsaw, Poland, Poland; Ekol Lojistik Inc., Turkey; The State School of Higher Education in Chelm, Poland; The Polish Society for Bird Protection (PTOP), Poland
- 4:30PM Multicriteria Decision Making: Scale, Polarity, Symmetry, Interpretability [#22157]**  
 Wladyslaw Homenda, Agnieszka Jastrzebska, Witold Pedrycz, Fusheng Yu and Yihan Wang  
 the Faculty of Mathematics and Information Science Warsaw University of Technology Warsaw, 00-662, Poland the Faculty of Economics and Informatics in Vilnius University of Bialystok LT-08221 Vilnius, Lithuania, Poland; the Faculty of Mathematics and Information Science Warsaw University of Technology Warsaw, 00-662, Poland, Poland; Systems Research Institute Polish Academy of Sciences Warsaw, 01-447, Poland Department of Electrical & Computer Engineering University of Alberta Edmonton T6R2G7AB, Canada, Canada; School of Mathematical Sciences Beijing Normal University Beijing 100875, China, China
- 4:50PM A Demand-driven Proactive Tasks Management Model at the Edge [#22372]**  
 Anna Karanika, Panagiotis Oikonomou, Kostas Kolomvatsos and Thanasis Loukopoulos  
 University of Thessaly, Greece; University of Thessaly, Greece; University of Athens, Greece
- 5:10PM Novel Data Driven Fuzzy Algorithmic Volatility Forecasting Models with Applications to Algorithmic Trading [#22044]**  
 Aerambamoorthy Thavaneswaran, You Liang, Zimo Zhu and Ruppa K. Thulasiram  
 University of Manitoba, Canada; Ryerson University, Canada

**Plenary Poster Session F-MM3: Software for Soft Computing-I**

*Monday, July 20, 3:30PM-5:30PM, Room: FUZZ Poster Room, Chair: Jesús Alcalá-Fdez, Jose M. Alonso, Jose Manuel Soto-Hidalgo*

- P101 Building Explanations for Fuzzy Decision Trees with the ExpliClas Software [#22204]**  
 Jose M. Alonso, Pietro Ducange, Riccardo Pecori and Raul Vilas  
 University of Santiago de Compostela, Spain; University of Pisa, Italy; University of Sannio, Italy
- P102 Chi-BD-DRF: Design of Scalable Fuzzy Classifiers for Big Data via A Dynamic Rule Filtering Approach [#22137]**  
 Fatemeh Aghaeipoor, Mohammad Masoud Javidi, Isaac Triguero and Alberto Fernandez  
 Shahid Bahonar University of Kerman, Iran; Computational Optimisation and Learning (COL) Lab, School of Computer Science, University of Nottingham, United Kingdom; University of Granada, Spain
- P103 Using SAT/SMT Solvers for Efficiently Tuning Fuzzy Logic Programs [#22465]**  
 Jose A. Rianza and Gines Moreno  
 University of Castilla-La Mancha, Spain
- P104 pyFUME: a Python Package for Fuzzy Model Estimation [#22308]**  
 Caro Fuchs, Simone Spolaor, Marco S. Nobile and Uzay Kaymak  
 Eindhoven University of Technology, Netherlands; University of Milano-Bicocca, Italy
- P105 FuzzyR: An Extended Fuzzy Logic Toolbox for the R Programming Language [#22228]**  
 Chao Chen, Tajul Razak and Jonathan Garibaldi  
 The University of Nottingham, United Kingdom; Universiti Teknologi MARA, Malaysia

**P106 A System implementing Fuzzy Hypothetical Datalog [#22110]**

Pascual Julian-Iranzo and Fernando Saenz-Perez

University of Castilla-La Mancha, Spain; Complutense University of Madrid, Spain

**Session F-MA1: Linguistic Summarization and Description of Data-II**

*Monday, July 20, 5:45PM-7:45PM, Room: FUZZ Room 1, Chair: Anna Wilbik, Daniel Sanchez, Nicolas Marin*

**5:45PM Intentional Linguistic Summaries for Collaborative Business Model Radars [#22168]**

Anna Wilbik, Rick Gilsing, Oktay Turetken, Baris Ozkan and Paul Grefen

Eindhoven University of Technology, Netherlands

**6:05PM On a Paradox of Extended Linguistic Summaries [#22251]**

Anna Wilbik, Timothy Havens and Tim Wilkin

Eindhoven University of Technology, Netherlands; Michigan Technological University, United States; Deakin University, Australia

**6:25PM A new method to measure the knowledge amount of Atanassov's intuitionistic fuzzy sets [#22052]**

Hailin Zhang, Yafei Song, Lei Lei and Zhimin Qi

Academy of Military Sciences, China; Air Force Engineering University, China

**6:45PM Perceptual Computing with Comparative Linguistic Expressions [#22198]**

Taniya Seth and Pranab K. Muhuri

South Asian University, India

**7:05PM XAI-Based Fuzzy SWOT Maps for Analysis of Complex Systems [#22349]**

Zygmantas Meskauskas, Raimundas Jasinevicius, Egidijus Kazanavicius and Vytautas Petrauskas

Kaunas University of Technology, Lithuania

**7:25PM Multilayer Fuzzy Extreme Learning Machine Applied to Active classification and Transport of objects using an Unmanned Aerial Vehicle [#22396]**

Rolando Adonai Hernandez-Hernandez, Uriel Martinez-Hernandez and Adrian Rubio-Solis

Center for Engineering and Industrial Development, CIDESI, Mexico; University of Bath, United Kingdom

**Session F-MA2: Advances on eXplainable Artificial Intelligence-I**

*Monday, July 20, 5:45PM-7:45PM, Room: FUZZ Room 2, Chair: Jose M. Alonso, Ciro Castiello, Corrado Mencar, Luis Magdalena*

**5:45PM Generation and Evaluation of Factual and Counterfactual Explanations for Decision Trees and Fuzzy Rule-based Classifiers [#22359]**

Ilija Stepin, Jose M. Alonso, Alejandro Catala and Martin Pereira

University of Santiago de Compostela, Spain

**6:05PM Interpreting Remaining Useful Life estimations combining Explainable Artificial Intelligence and domain knowledge in industrial machinery [#22207]**

Oscar Serradilla, Ekhi Zugasti, Carlos Cernuda, Andoitz Aranburu, Julian Ramirez de Okariz and Urko Zurutuza

Mondragon Unibertsitatea, Spain; Fagor Arrasate, Spain; Koniker, Spain

**6:25PM HFER: Promoting Explainability in Fuzzy Systems via Hierarchical Fuzzy Exception Rules [#22295]**

Jose Ramon Trillo, Alberto Fernandez and Francisco Herrera

University of Granada, Spain

- 6:45PM** **A Type-2 Fuzzy Logic Approach to Explainable AI for regulatory compliance, fair customer outcomes and market stability in the Global Financial Sector [#22095]**  
Janet Adams and Hani Hagra  
TSB Bank, United Kingdom; University of Essex, United Kingdom
- 7:05PM** **An Interpretable Semi-supervised Classifier using Rough Sets for Amended Self-labeling [#22269]**  
Isel Grau, Dipankar Sengupta, Maria M. Garcia Lorenzo and Nowe Ann  
Vrije Universiteit Brussel, Belgium; Queens University Belfast, United Kingdom; Central University of Las Villas, Cuba
- 7:25PM** **A preliminary study to apply the Quine McCluskey algorithm for fuzzy rule base minimization [#22298]**  
Leonardo Jara, Antonio Gonzalez and Raul Perez  
University of Granada, Spain

**Plenary Poster Session F-MA3: Software for Soft Computing-II**

*Monday, July 20, 5:45PM-7:45PM, Room: FUZZ Poster Room, Chair: Jesús Alcalá-Fdez, Jose M. Alonso, Jose Manuel Soto-Hidalgo*

- P301** **Juzzy Constrained: Software for Constrained Interval Type-2 Fuzzy Sets and Systems in Java [#22319]**  
Pasquale D'Alterio, Jonathan Garibaldi, Robert John and Christian Wagner  
University of Nottingham, United Kingdom
- P302** **TSSweb: a Web Tool for Training Set Selection [#22421]**  
Giovanni Acampora and Autilia Vitiello  
University of Naples Federico II, Italy
- P303** **MIDA: a Web Tool for Missing Data Imputation based on a Boosted and Incremental Learning Algorithm [#22420]**  
Giovanni Acampora, Roberta Siciliano and Autilia Vitiello  
University of Naples Federico II, Italy
- P304** **Insights from interval-valued ratings of consumer products - a DECSYS appraisal. [#22344]**  
Zack Ellerby, Oliver Miles, Josie McCulloch and Christian Wagner  
University of Nottingham, United Kingdom
- P305** **JKinect: A new Java Software for Designing and Assessing Gross Motor Activities in children with autism based on JFML [#22222]**  
Gamez-Granados Juan Carlos, Rodriguez-Lozano Francisco Javier, Acampora Giovanni, Lee Chang-Shing and Soto-Hidalgo Jose Manuel  
University of Cordoba, Spain; University of Naples Federico II, Italy; National University of Tainan, Taiwan; University of Granada, Spain
- P306** **The Assessment of Importance of Selected Issues of Software Engineering, IT Project Management, and Programming Paradigms Based on Graphical AHP and Fuzzy C-Means [#22066]**  
Pawel Karczmarek, Witold Pedrycz, Dariusz Czerwinski and Adam Kiersztyn  
Department of Computer Science, Lublin University of Technology, Poland; Department of Electrical and Computer Engineering, University of Alberta, Canada

**Session F-ME1: Special Session on Fuzzy and Rough Hybridisation**

*Monday, July 20, 8:00PM-10:00PM, Room: FUZZ Room 1, Chair: Yanpeng Qu, Neil Mac Parthalain, Richard Jensen*



- 8:00PM Variable Precision Fuzzy Rough Set Model with Linguistic Labels [#22380]**  
Alicja Mieszkowicz-Rolka and Leszek Rolka  
Rzeszow University of Technology, Poland
- 8:20PM Fuzzy Rough Total Weighted Tardiness Flow Shop Scheduling Model with Hurwicz Criterion [#22417]**  
Achraf Touil and Abdelwahed Echchtabi  
Labotatory of Engineering, of Industrial Management and Innovation, FST, BP, Settat, Morocco
- 8:40PM Constructing Belief Functions Using the Principle of Minimum Uncertainty [#22048]**  
Yanyan He and Yousuff Hussaini  
University of North Texas, United States; Florida State University, United States
- 9:00PM Modeling User Feedback: Fuzzy Sampling, Portability, and Degree of Annoyance [#22059]**  
Nikita Neveditsin, Ross MacDonald, Trent Hillard and Pawan Lingras  
Saint Mary's University, Canada; Green Power Labs Inc., Canada
- 9:20PM Discovering Fuzzy Periodic-Frequent Patterns in Quantitative Temporal Databases [#22350]**  
Uday kiran Rage, Sai Deep Chennupati, Ravi Kumar Penugonda, Koji Zettsu, Masaru Kitsuregawa and Krishna Reddy Polepalli  
University of Tokyo, Japan; IIIT Hyderabad, India; RGUKT-AP, India; National Institute of Information and Communications Technology, Tokyo, Japan, Japan
- 9:40PM A Regret Theory-based Decision-Making Method with A Reference Set under the Hesitant Fuzzy Environment [#22260]**  
Zhiying Zhang, Huchang Liao and Abdullah Al-Barakati  
Sichuan University, China; King Abdulaziz University, Saudi Arabia

**Session F-ME2: Advances on eXplainable Artificial Intelligence-II**

*Monday, July 20, 8:00PM-10:00PM, Room: FUZZ Room 2, Chair: Jose M. Alonso, Ciro Castiello, Corrado Mencar, Luis Magdalena*

- 8:00PM An Improved Complexity Measure in Hierarchical Fuzzy Systems [#22169]**  
Tajul Rosli Razak, Jonathan M. Garibaldi and Christian Wagner  
Laboratory for Uncertainty in Data and Decision Making (LUCID), School of Computer Science, University of Nottingham, United Kingdom., United Kingdom
- 8:20PM Constrained Interval Type-2 Fuzzy Classification Systems for Explainable AI (XAI) [#22318]**  
Pasquale D'Alterio, Jonathan Garibaldi and Robert John  
University of Nottingham, United Kingdom
- 8:40PM Relevance of Using Interpretability Indexes for the Design of Schedulers in Cloud Computing Systems [#22347]**  
Sebastian Garcia-Galan, Mouad Seddiki, Rocio Perez-Prado, Enrique Munoz-Exposito, Adam Marchewka and Nicolas Ruiz-Reyes  
University of Jaen, Spain; University of Science and Technology, Poland
- 9:00PM Hybrid Deep Learning Type-2 Fuzzy Logic Systems For Explainable AI [#22130]**  
Ravikiran Chimatapu, Hani Hagraas, Mathias Kern and Gilbert Owusu  
University of Essex, United Kingdom; BT plc, United Kingdom
- 9:20PM Interpretability and Explainability of LSP Evaluation Criteria [#22042]**  
Jozo Dujmovic  
San Francisco State University, United States

**9:40PM An Interpretable Fuzzy System in the On-line Signature Scalable Verification [#22283]**

Marcin Zalasinski, Krzysztof Cpałka and Krystian Lapa  
Czestochowa University of Technology, Poland

**Plenary Poster Session F-ME3: AGGREGATION STRUCTURES: NEW TRENDS AND APPLICATIONS**

*Monday, July 20, 8:00PM-10:00PM, Room: FUZZ Poster Room, Chair: Javier Fernandez*

**P501 An Empirical Study on Supervised and Unsupervised Fuzzy Measure Construction Methods in Highly Imbalanced Classification [#22355]**

Mikel Uriz, Daniel Paternain, Humberto Bustince and Mikel Galar  
Public University of Navarre, Spain

**P502 A Proposal of the Notions of Ordered and Strengthened Ordered Directional Monotonicity for Interval-valued Functions Based on Admissible Orders [#22315]**

Mikel Sesma-Sara, Radko Mesiar, Javier Fernandez, Zdenko Takac and Humberto Bustince  
Public University of Navarra, Spain; Slovak University of Technology, Slovakia

**P503 Conditioned Monotonicity for Generalized Pre-Aggregations and Aggregations [#22179]**

Luis Magdalena, Daniel Gomez, Javier Montero, Susana Cubillo and Carmen Torres  
Universidad Politecnica de Madrid, Spain; Complutense University of Madrid, Spain

**P504 Generalizing the GMC-RTOPSIS Method using CT-integral Pre-aggregation Functions [#22226]**

Jonata Cristian Wieczynski, Gracaliz Pereira Dimuro, Eduardo Nunes Borges, Giancarlo Lucca, Helida Salles Santos, Rodolfo Lourenzutti and Humberto Bustince  
Universidade Federal do Rio Grande, Brazil; University of British Columbia, Canada; Universidad Publica de Navarra, Spain

**P505 Extended Linear Order Statistic (ELOS) Aggregation and Regression [#22230]**

Siva Krishna Kakula, Anthony Pinar, Timothy Havens and Derek Anderson  
Michigan Technological University, United States; University of Missouri, United States

**P506 A note on the links between different qualitative integrals [#22216]**

Michal Holcapek and Agnes Rico  
University of Ostrava, Czech Republic; Universite Lyon 1, France

## TUESDAY, JULY 21

### Session F-TM1: Fuzzy Logic in Knowledge Graphs and Factor Space

Tuesday, July 21, 2:30PM-4:30PM, Room: FUZZ Room 1, Chair: Zongmin Ma, Jing He, Pei Ho-Chung, Lihuang Wang

**2:30PM An Innovative Fuzzy Logic-Based Machine Learning Algorithm for Supporting Predictive Analytics on Big Transportation Data [#22483]**

Carson K. Leung, Jonathan D. Elias, Shael M. Minuk, Aldous Roy R. de Jesus and Alfredo Cuzzocrea

University of Manitoba, Canada; University of Calabria, Italy

**2:50PM Querying Fuzzy RDF Knowledge Graphs Data [#22208]**

Li Guanfeng, Li Weijun and Wang Hairong

College of Information Engineering, Ningxia University, China; College of Computer Science & Engineering, North Minzu University, China

**3:10PM Fuzzy Sugeno  $\lambda$ -Measures and Theirs Applications to Community Detection Problems [#22334]**

Inmaculada Gutierrez, Daniel Gomez, Javier Castro and Rosa Espinola  
Complutense University, Spain

**3:30PM Factor space is the adaptive and deepening theory of fuzzy sets [#22254]**

Haitao Liu, Runjun Wan, Shanshan Xue, Tiantian Wang, Sizong Guo and Jing He

Liaoning Technical University, China; University of Maastricht, Netherlands; Swinburne University of Technology, Australia

**3:50PM Retrieving Sparser Fuzzy Cognitive Maps Directly from Large Ordinal Dataset using Lasso Graphical Models and the MAX-threshold Algorithm [#22240]**

Zoumpolia Dikopoulou, Elpiniki Papageorgiou and Koen Vanhoof

Hasselt University, Belgium; University of Thessaly, Greece

**4:10PM A Fuzzy Theory Based Topological Distance Measurement For Undirected Multigraphs [#22266]**

Jing He, Jinjun Chen, Guangyan Huang, Mengjiao Guo, Zhiwang Zhang, Hui Zheng, Yunyao Li, Ruchuan Wang, Weibei Fan, Chi-Huang Chi, Weiping Ding, Paulo A.de Souza, Bin Chen, Runwei Li, Shang Jie and Andre Van Zundert

Swinburne University of Technology, Australia; Deakin University, Australia; Nanjing University of Finance and Economics, China; Nanjing University of Posts and Telecommunications, China; Data 61, CSIRO, Australia; Nantong University, China; Griffith University, Australia; Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences, China; Royal Brisbane & Women's Hospital, Australia

### Session F-TM2: Fuzzy Interpolation

Tuesday, July 21, 2:30PM-4:30PM, Room: FUZZ Room 2, Chair: Qiang Shen, Laszlo T. Koczy, Shyi-Ming Chen

**2:30PM Dynamic TSK Systems Supported by Fuzzy Rule Interpolation: An Initial Investigation [#22132]**

Pu Zhang and Qiang Shen

Faculty of Business and Physical Sciences, Aberystwyth University, United Kingdom

**2:50PM Process of Inversion in Fuzzy Interpolation Model using Fuzzy Geometry [#22391]**

Suman Das, Debjani Chakraborty and Laszlo T. Koczy

Indian Institute of Technology Kharagpur, India; Budapest University of Technology, Hungary

- 3:10PM Fuzzy Rulebase Parameter Determination for Stabilized Koczy-Hirota Interpolation Based Detection of Colorectal Polyps on Colonoscopy Images [#22280]**  
Brigita Sziova, Raneem Ismail, Ferenc Lilik, Laszlo T. Koczy and Szilvia Nagy  
Szechenyi Istvan University, Hungary; Szechenyi Istvan University, Budapest University of Technology and Economics, Hungary
- 3:30PM Image Super Resolution with Sparse Data Using ANFIS Interpolation [#22133]**  
Muhammad Ismail, Yang Jing, Shang Changjing and Shen Qiang  
Dept. of Computer Science, Aberystwyth University, Aberystwyth, Ceredigion, Wales, United Kingdom
- 3:50PM On the Properties of Orderings of Extensional Fuzzy Numbers [#22293]**  
Martin Stepnicka, Nicole Skorupova and Michal Holcapek  
University of Ostrava, Czech Republic
- 4:10PM From arithmetics of extensional fuzzy numbers to their distances [#22310]**  
Martin Stepnicka, Nicole Skorupova and Michal Holcapek  
University of Ostrava, Czech Republic

**Plenary Poster Session F-TM3: Recent Advances in Fuzzy Control System Design and Analysis-I**  
*Tuesday, July 21, 2:30PM-4:30PM, Room: FUZZ Poster Room, Chair: Kevin Guelton, Zsofia Lendek*

- P701 Set-Invariance Based Fuzzy Output Tracking Control for Vehicle Autonomous Driving under Uncertain Lateral Forces and Steering Constraints [#22188]**  
Anh-Tu Nguyen, Marie-Thierry Guerra, Jagat Rath, Hui Zhang and Reinaldo Palhares  
Laboratory LAMIH UMR CNRS 8201, Universite Polytechnique Hauts-de-France, France; Technische Universitat Munchen, Germany; Beihang University, China; Federal University of Minas Gerais, France
- P702 Controller design for time-delay TS fuzzy systems with nonlinear consequents [#22279]**  
Amalia Matyas, Zoltan Nagy and Zsofia Lendek  
Technical University of Cluj-Napoca, Romania
- P703 Switched Control for Local Stabilization of Discrete-time Uncertain Takagi-Sugeno Fuzzy Systems with Relaxed Estimate of the Domain of Attraction [#22363]**  
Gilberto Rodrigues dos Santos, Diogo Ramalho de Oliveira, Marcelo Carvalho Minhoto Teixeira, Edvaldo Assuncao, Rodrigo Cardim and Adalberto Zanatta Neder Lazarini  
Federal University of Mato Grosso do Sul, Campus of Pantanal, Brazil; Federal Institute of Education, Science and Technology of Mato Grosso do Sul, Brazil; Sao Paulo State University, School of Engineering, Department of Electrical Engineering, Brazil
- P704 Framework for Mining Hybrid Automata from a Constrained Machine Learning Architecture [#22134]**  
Matthew Clark and Kuldip Rattan  
Galois Inc, United States; Wright State University, United States
- P705 Event-Triggered Interval Type-2 Fuzzy Control for Uncertain Space Teleoperation Systems with State Constraints [#22425]**  
Ziwei Wang, Hak-Keung Lam, Zhang Chen, Bin Liang and Tao Zhang  
Tsinghua University, China; King's College London, United Kingdom
- P706 Admissibility Analysis and Robust Stabilization via State Feedback for Uncertain T-S Fuzzy Descriptor Systems [#22051]**  
Jiabao He, Feng Xu, Xueqian Wang and Bin Liang  
Tsinghua Shenzhen International Graduate School, China; Tsinghua University, China

### **Session F-TA1: Handling Uncertainties in Big Data By Fuzzy Systems-I**

*Tuesday, July 21, 4:45PM-6:45PM, Room: FUZZ Room 1, Chair: Hua Zuo, Jie Lu, Guangquan Zhang*

**4:45PM Wildfire Prediction: Handling Uncertainties Using Integrated Bayesian Networks and Fuzzy Logic [#22237]**

Mohsen Naderpour, Hossein Mojaddadi Rizeei and Fahimeh Ramezani  
University of Technology Sydney (UTS), Australia

**5:05PM An Improved Deep Convolutional Fuzzy System for Classification Problems [#22357]**

Huidong Wang and Jinli Yao  
Shandong University of Finance and Economics, China

**5:25PM A Novel Non-parametric Two-Sample Test on Imprecise Observations [#22448]**

Feng Liu, Guangquan Zhang and Jie Lu  
Centre for Artificial Intelligence, Faculty of Engineering and Information Technology, University of Technology Sydney, Australia

**5:45PM A Fuzzy Drift Correlation Matrix for Multiple Data Stream Regression [#22369]**

Yiliao Song, Guangquan Zhang, Lu Haiyan and Lu Jie  
University of Technology Sydney, CAI, Australia

**6:05PM Acoustic Event Detection Using Fuzzy Integral Ensemble and Oriented Fuzzy Local Binary Pattern Encoded CNN [#22261]**

Achyut Mani Tripathi and Rashmi Dutta Baruah  
Indian Institute of Technology Guwahati, India

**6:25PM A Parabolic Based Fuzzy Data Envelopment Analysis Model with an Application [#22296]**

Mohammad Aqil Sahil, Meenakshi Kaushal and Q.M. Danish Lohani  
South Asian University, India

### **Session F-TA2: Computational Intelligence methods for Natural Language Processing**

*Tuesday, July 21, 4:45PM-6:45PM, Room: FUZZ Room 2, Chair: Joao Paulo Carvalho*

**4:45PM Query Strategies, Assemble! Active Learning with Expert Advice for Low-resource Natural Language Processing [#22352]**

Vania Mendonca, Alberto Sardinha, Luisa Coheur and Ana Lucia Santos  
INESC-ID, Portugal; CLUL, Portugal

**5:05PM Relevance Ranking for Web Search [#22312]**

Joao Lages, Joao Paulo Carvalho and Joao Paulo Carvalho II  
INESC-ID / Instituto Superior Tecnico, Portugal

**5:25PM Interpreting Human Responses in Dialogue Systems using Fuzzy Semantic Similarity Measures [#22121]**

Naeemeh Adel, Keeley Crockett, David Chandran and Joao Carvalho  
Manchester Metropolitan University, United Kingdom; Kings College London, United Kingdom; Universidade de Lisboa, Portugal

**5:45PM Using Fuzzy Set Similarity in Sentence Similarity Measures [#22126]**

Valerie Cross, Valeria Mokrenko, Keeley Crockett and Naeemeh Adel  
Miami University, United States; Manchester Metropolitan University, United Kingdom

**6:05PM An OWA and Aspect-based approach applied to Rating Prediction [#22147]**

Jesus Serrano-Guerrero, Francisco P. Romero and Jose A. Olivas  
University of Castilla-La Mancha, Spain

**6:25PM Summarizer: Fuzzy Rule-Based Classification Systems for Vertical and Horizontal Big Data [#22429]**

Petala Tuy and Tatiane Rios  
Federal University of Bahia, Brazil

**Plenary Poster Session F-TA3: Recent Advances in Fuzzy Control System Design and Analysis-II**  
*Tuesday, July 21, 4:45PM-6:45PM, Room: FUZZ Poster Room, Chair: Kevin Guelton, Zsofia Lendek*

**P901 Adaptive LAMDA applied to identify and regulate a process with variable dead time [#22149]**

Luis Morales, David Pozo, Jose Aguilar and Andres Rosales  
Escuela Politecnica Nacional, Ecuador; Universidad de las Americas, Ecuador; Universidad de Los Andes, Venezuela

**P902 A Design Approach for General Type-2 Fuzzy Logic Controllers with an Online Scheduling Mechanism [#22277]**

Ahmet Sakalli, Tufan Kumbasar and Jerry Mendel  
AVL Research and Engineering, Turkey; Istanbul Technical University, Turkey; University of Southern California, United States

**P903 Reachable Set Boundedness and Fuzzy Sliding Mode Control of MPPT for Nonlinear Photovoltaic Systems [#22144]**

Zhixiong Zhong, Xingyi Wang, Rathinasamy Sakthivel and Chih-Min Lin  
Minjiang University, China; Bharathiar University, India; Yuan Ze University, Taiwan

**P904 Generalized Stochastic Petri-Net Algorithm with Fuzzy Parameters to Evaluate Infrastructure Asset Management Policy [#22122]**

Swati Sachan and Nishant Donchak  
The University of Manchester, United Kingdom; LNG Quest Limited, United Kingdom

**P905 f-HybridMem: A Fuzzy-based Approach for Decision Support in Hybrid Memory Management [#22384]**

Rodrigo Moura, Guilherme Schneider, Lizandro Oliveira, Mauricio Pilla, Adenauer Yamin and Renata Reiser  
Federal University of Pelotas, Brazil

**P906 Computational Intelligence and Automated Methods for Control Fuzzy System Design [#22177]**

Milan Todorovic and Milan Simic  
RMIT University, Australia

**Session F-TE1: Handling Uncertainties in Big Data By Fuzzy Systems-II**

*Tuesday, July 21, 7:00PM-9:00PM, Room: FUZZ Room 1, Chair: Hua Zuo, Jie Lu, Guangquan Zhang*

**7:00PM Monwatch: A fuzzy application to monitorize the user behavior using wearable trackers [#22235]**

Carmen Martinez-Cruz, Javier Medina Quero, Jose Maria Serrano and Sergio Gramajo  
Departamento of Computer Science. University of Jaen. Jaen, Spain, Spain; National Technological University. Resistencia, Argentina, Argentina

**7:20PM Possibilistic Approach for Novelty Detection in Data Streams [#22423]**

Tiago Pinho da Silva and Heloisa Camargo  
Universidade de Sao Paulo, Brazil; Universidade Federal de Sao Carlos, Brazil

- 7:40PM Fuzzy Multivariate Outliers with Application on BACON Algorithm [#22336]**  
Huda Touny, Ahmed Moussa and Ali Hadi  
Faculty of Computers and Artificial Intelligence, Egypt; American University in Cairo, Egypt
- 8:00PM Fuzzy Aggressive Behavior Assessment of Toxic Players in Multiplayer Online Battle Games [#22111]**  
Guilherme Andriqueto and Ernesto Araujo  
Universidade Anhembi-Morumbi, Brazil
- 8:20PM Experiments with Maximin Sampling [#22027]**  
Omar Ibrahim, James Keller, James Bezdek and Mihail Popescu  
Electrical Engineering and Computer Science Department, University of Missouri-Columbia, United States; Health Management and Informatics Department, University of Missouri-Columbia, United States
- 8:40PM Fuzzy c-Means with Improved Particle Swarm Optimization [#22212]**  
Jie Li and Yasunori Endo  
Department of Risk Engineering, University of Tsukuba, Japan; Faculty of Engineering, Information and Systems, University of Tsukuba, Japan

**Session F-TE2: Recent trends in many-valued logic and fuzziness**

*Tuesday, July 21, 7:00PM-9:00PM, Room: FUZZ Room 2, Chair: Pietro Codara, Stefano Aguzzoli, Diego Valota*

- 7:00PM On the representation of (weak) nilpotent minimum algebras [#22401]**  
Umberto Rivieccio, Tommaso Flaminio and Thiago Nascimento da Silva  
Universidade Federal do Rio Grande do Norte, Brazil; Instituto de Investigacion en Inteligencia Artificial, Spain
- 7:20PM Automorphism Groups of Lindenbaum Algebras of Some Propositional Many-Valued Logics with Locally Finite Algebraic Semantics [#22273]**  
Stefano Aguzzoli  
Universita' degli Studi di Milano, Italy
- 7:40PM On k-Lipschitzian (T,N)-implications [#22276]**  
Suene Campos, Jocivania Pinheiro, Benjamin Bedregal and Anderson Cruz  
Universidade Federal Rural do Semi-Arido, Brazil; Universidade Federal do Rio Grande do Norte, Brazil
- 8:00PM Fuzzy Number Value or Defuzzified Value; Which One Does It Better? [#22338]**  
Amir Pourabdollah  
Nottingham Trent University, United Kingdom
- 8:20PM Universal Stone Duality via the Concept of Topological Dualizability and its Applications to Many-Valued Logic [#22463]**  
Yoshihiro Maruyama  
The Australian National University, Australia
- 8:40PM N-ary norm operators and TOPSIS [#22047]**  
Pasi Luukka  
LUT University, Finland

**Plenary Poster Session F-TE3: Interval and Fuzzy-valued Functions and their Applications**  
*Tuesday, July 21, 7:00PM-9:00PM, Room: FUZZ Poster Room, Chair: Manuel Arana-Jimenez, Maria Letizia Guerra, Laerte Sorini, Luciano Stefanini*

- P1101 Midpoint Representation of Fuzzy-Valued Functions and Applications [#22191]**  
Benedetta Amicizia, Mina Shahidi, Laerte Sorini, Luciano Stefanini and Maria Letizia Guerra  
University of Urbino, Italy; University of Bologna, Italy
- P1102 On Frechet and Gateaux derivatives for interval and fuzzy-valued functions in the setting of generalized Hukuhara differentiability [#22194]**  
Luciano Stefanini and Manuel Arana-Jimenez  
University of Urbino, Italy; University of Cadiz, Spain
- P1103 Methods of ranking for aggregated fuzzy numbers from interval-valued data [#22209]**  
Justin Gunn, Hadi Khorshidi and Uwe Aickelin  
The University of Melbourne, Australia
- P1104 Comparing Intervals Using Type Reduction [#22025]**  
Thomas Runkler, Chao Chen, Simon Coupland and Robert John  
Siemens AG, Germany; University of Nottingham, United Kingdom; De Montfort University, United Kingdom
- P1105 Fuzzy Interval Modelling based on Joint Supervision [#22322]**  
Diego Munoz-Carpintero, Sebastian Parra, Oscar Cartagena, Doris Saez, Luis G. Marin and Igor Skrjanc  
Universidad de O'Higgins, Chile; University of Chile, Chile; Universidad de Los Andes, Colombia; University of Ljubljana, Slovenia
- P1106 Interval-Valued Fuzzy c-Means Algorithm and Interval-Valued Density-Based Fuzzy c-Means Algorithm [#22378]**  
Ayush K. Varshney, Priyanka Mehra, Pranab K. Muhuri and Q. M. Danish Lohani  
South Asian University, India



## WEDNESDAY, JULY 22

### Session F-WM1: Type-2 Fuzzy Logic Systems

Wednesday, July 22, 3:30PM-5:30PM, Room: FUZZ Room 1, Chair: Oscar Castillo, Patricia Melin, Pranab Muhuri, Amit Shukla

- 3:30PM On the relationship between the centroid and the footprint of uncertainty of Interval Type-2 fuzzy numbers [#22403]**  
Juan Carlos Figueroa Garcia, Roman Neruda, Yurilev Chalco Cano and Heriberto Roman Flores  
Universidad Distrital Francisco Jose de Caldas, Colombia; Czech Academy of Sciences, Czech Republic; Universidad de Tarapaca, Chile
- 3:50PM Optimal Design of Interval Type-2 Fuzzy Tracking Controllers of Mobile Robots using a Metaheuristic Algorithm [#22480]**  
Felizardo Cuevas, Oscar Castillo and Prometeo Cortes  
Tijuana Institute of Technology, Mexico
- 4:10PM A Type 2 Fuzzy Genetic Approach to Uncertain and Dynamic Resilient Routing within Telecommunications Networks [#22107]**  
Lewis Veryard, Hani Hagrass, Anthony Conway and Gilbert Owusu  
The University of Essex, United Kingdom; British Telecom, United Kingdom
- 4:30PM A Big Bang Big Crunch Type-2 Fuzzy Logic System for Explainable Semantic Segmentation of Trees in Satellite Images using HSV Color Space [#22105]**  
Hugo Leon-Garza, Hani Hagrass, Anasol Pena-Rios, Anthony Conway and Gilbert Owusu  
University of Essex, United Kingdom; British Telecom, United Kingdom
- 4:50PM An Interval Type-2 Fuzzy Dynamic Approach To Replacement of Server Equipment [#22328]**  
Esra Cakir and Ziya Ulukan  
Galatasaray University, Turkey
- 5:10PM Intermediary Fuzzification in Speech Emotion Recognition [#22053]**  
Gustavo Assuncao and Paulo Menezes  
University of Coimbra, Portugal

### Session F-WM2: Distributed/Multiagent Control of Fuzzy and Intelligent Systems

Wednesday, July 22, 3:30PM-5:30PM, Room: FUZZ Room 2, Chair: Mohammad Akbarzadeh, Fahimeh Baghbani

- 3:30PM Combining Consensus and Tracking Errors in Sliding Mode Control of High Order Uncertain Stochastic Multi-Agent Systems [#22067]**  
Pooya Parsa and Mohammad Reza Akbarzadeh-Totonchi  
Department of Electrical Engineering, Center of Excellence on Soft Computing and Intelligent Information Processing, Ferdowsi University of Mashhad, Iran; Ferdowsi University of Mashhad, Iran
- 3:50PM Decentralized Distribution of UAV Fleets Based on Fuzzy Clustering for Demand-driven Aerial Services [#22449]**  
Maria Joao Sousa, Alexandra Moutinho and Miguel Almeida  
IDMEC, Instituto Superior Tecnico, Universidade de Lisboa, Lisboa, Portugal, Portugal; Center for Forest Fire Research, ADAI, University of Coimbra, Coimbra, Portugal, Portugal

- 4:10PM Robust Reference Tracking Control Design for Stochastic Polynomial Fuzzy Control System: A Sum-of-Squares Approach [#22136]**  
 Min-Yen Lee and Bor-Sen Chen  
 National Tsing Hua University, Taiwan
- 4:30PM Autonomous Driving of Truck-Trailer Mobile Robots with Linear-Fuzzy Control for Trajectory Following [#22413]**  
 Antonio Moran and Masao Nagai  
 Pontifical Catholic University of Peru, Peru; Tokyo University of Agriculture and Technology, Japan
- 4:50PM Predictive Control Based on Fuzzy Optimization for Multi-Room HVAC Systems [#22302]**  
 Alvaro Endo, Oscar Cartagena, Doris Saez and Diego Munoz-Carpintero  
 University of Chile, Chile; Universidad de O'Higgins, Chile
- 5:10PM A Competitive Swarm Algorithm for Image Segmentation Guided by Opposite Fuzzy Entropy [#22069]**  
 Mohamed Abd Elaziz, Ahmed A. Ewees, Dalia Yousri, Diego Oliva, Songfeng Lu and Erik Cuevas  
 School of cyber science and Engineering, Huazhong university of Science and Technology, China; Damietta University, Egypt; Fayoum University, Egypt; Universidad de Guadalajara, CUCEI, Mexico

**Plenary Poster Session F-WM3: Fuzziness and New Frontiers of AI Research**

*Wednesday, July 22, 3:30PM-5:30PM, Room: FUZZ Poster Room, Chair: Irina Perfilieva, Marek Reformat*

- P1301 Additional Feature Layers from Ordered Aggregations for Deep Neural Networks [#22354]**  
 Iris Dominguez, Daniel Paternain and Mikel Galar  
 Public University of Navarre, Spain
- P1302 F-Transform and Convolutional NN: Cross-Fertilization and Step Forward [#22337]**  
 Vojtech Molek and Irina Perfilieva  
 Ostrava University, Czech Republic
- P1303 Interpreting Variational Autoencoders with Fuzzy Logic: A step towards interpretable deep learning based fuzzy classifiers [#22379]**  
 Kutay Bolat and Tufan Kumbasar  
 Istanbul Technical University, Turkey
- P1304 A Situation-aware Learning System based on Fuzzy Cognitive Maps to increase Learner Motivation and Engagement [#22406]**  
 Giuseppe D'Aniello, Massimo De Falco, Matteo Gaeta and Mario Lepore  
 University of Salerno, Italy; CORISA, Italy
- P1305 A New Aggregation Operator for Intuitionistic Fuzzy Sets with Applications in Risk Estimation and Decision Making [#22079]**  
 Hoang Nguyen  
 Gdynia Maritime University, Poland
- P1306 Quantitative Study of Fuzzy Logics [#22030]**  
 Zofia Kostrzycka and Marek Zaionc  
 University of Technology, Opole, Poland; Theoretical Computer Science, Jagiellonian University, Krakow, Poland

### **Plenary Poster Session F-WA1: Human Symbiotic Systems**

*Wednesday, July 22, 5:45PM-7:45PM, Room: FUZZ Room 1, Chair: Tomohiro Yoshikawa, Yoichiro Maeda*

- P1501 Design of the convolution layer using HDL and evaluation of delay time using a camera signal [#22271]**  
Ryoki Kamesaka and Yukinobu Hoshino  
Kochi University of Technology, Japan; Kochi University of technology, Japan
- P1502 Development and validation of the lane-keeping controller using a similarity-type fuzzy reasoning method [#22438]**  
Yuka Nishiyama, Yuki Shinomiya, Toshimi Yamamoto and Yukinobu Hoshino  
Kochi University of Technology, Japan; Kochi University of technology, Japan
- P1503 Ensemble Learning Based on Soft Voting for Detecting Methamphetamine in Urine [#22450]**  
Kurnianingsih Kurnianingsih, Nur Fajri Al Faridi Hadi, Eni Dwi Wardihani, Naoyuki Kubota and Wei Hong Chin  
Department of Electrical Engineering, Politeknik Negeri Semarang, Indonesia; Graduate School of Systems Design, Tokyo Metropolitan University, Japan
- P1504 Development of Smart Device Interlocked Robot Partners for Information Support and Smart Recommendation [#22331]**  
Shion Yamamoto and Naoyuki Kubota  
Tokyo Metropolitan University, Japan
- P1505 A Pythagorean Fuzzy Preference Relation Approach for Group Decision Making [#22141]**  
Zhang Hengshan, Chen Tianhua, Wang Zhongmin, Chen Yanping and Chen Chunru  
Xian University of Posts and Telecommunications, China; University of Huddersfield, United Kingdom
- P1506 An Incremental Algorithm for Granular Counting with Possibility Theory [#22214]**  
Corrado Mencar  
University of Bari "Aldo Moro", Italy

### **Session F-WA2: Fuzzy Logic for Security and Forensics**

*Wednesday, July 22, 5:45PM-7:45PM, Room: FUZZ Room 2, Chair: Nitin Naik*

- 5:45PM A New Approach to Fuzzy Regular Expression Parsers for Cybersecurity Logs [#22464]**  
Trevor Martin, Alex Healing and Ben Azvine  
University of Bristol, United Kingdom; BT, United Kingdom
- 6:05PM Embedding Fuzzy Rules with YARA Rules for Performance Optimisation of Malware Analysis [#22411]**  
Nitin Naik, Paul Jenkins, Nick Savage, Longzhi Yang, Kshirasagar Naik and Jingping Song  
University of Portsmouth, United Kingdom; Northumbria University, United Kingdom; University of Waterloo, Canada; Northeastern University, China
- 6:25PM Fuzzy-Import Hashing: A Malware Analysis Approach [#22477]**  
Nitin Naik, Paul Jenkins, Nick Savage, Longzhi Yang, Tossapon Boongoen and Natthakan Iam-On  
University of Portsmouth, United Kingdom; Northumbria University, United Kingdom; Mae Fah Luang University, Thailand
- 6:45PM Heat-Map Based Occupancy Estimation Using Adaptive Boosting [#22163]**  
Abdallah Naser, Ahmad Lotfi, Junpei Zhong and Jun He  
Nottingham Trent University, United Kingdom

**7:05PM Cooperative Adaptive Fuzzy Control of Uncertain Affine Nonlinear Multi-agent Systems Based on Artificial Potential Functions [#22201]**

Fahimeh Baghbani and Mohammad Reza Akbarzadeh-T.

Department of Electrical Engineering, Center of Excellence on soft computing and intelligent information processing, Ferdowsi University of Mashhad, Iran

**7:25PM The Concept of Detecting and Classifying Anomalies in Large Data Sets on a Basis of Information Granules [#22233]**

Adam Kiersztyn, Pawel Karczmarek, Krystyna Kiersztyn and Witold Pedrycz

Department of Computer Science Lublin University of Technology, Poland; Department of Mathematical Modeling The John Paul II Catholic University of Lublin, Poland; Department of Electrical & Computer Engineering University of Alberta Edmonton, Canada

**Session F-WA3: Advanced Fuzzy Robotic Systems**

*Wednesday, July 22, 5:45PM-7:45PM, Room: FUZZ Poster Room, Chair: Ching-Chih Tsai*

**5:45PM Mixed Gaussian Membership Functions Fuzzy Cerebellar Model Articulation Controller Design for Robotic Manipulators [#22145]**

Tuan-Tu Huynh, Chih-Min Lin, Tien-Loc Le and Zhixiong Zhong

Yuan Ze University, Taiwan; Lac Hong University, Viet Nam; Minjiang University, China

**6:05PM 3D Object Detection and 6D Pose Estimation Using RGB-D Images and Mask R-CNN [#22057]**

Van Luan Tran and Huei-Yung Lin

National Chung Cheng University, Taiwan

**6:25PM Multi-robot exploration using Dynamic Fuzzy Cognitive Maps and Ant Colony Optimization [#22116]**

Marcio Mendonca, Rodrigo H C Palacios, Elpiniki I Papageorgiou and Lucas Botoni de Souza

Universidade Tecnologica Federal do Parana, Brazil; University of Thessaly Larisa, Greece, Greece

**6:45PM Swarm Collective Wisdom: A Fuzzy-Based Consensus Approach for Evaluating Agents Confidence in Global States [#22371]**

Aya Hussein, Sondoss Elsayah and Hussein A. Abbass

UNSW Canberra, Australia

**7:05PM Milk-run Routing and Scheduling Subject to Fuzzy Pickup and Delivery Time Constraints: An Ordered Fuzzy Numbers Approach [#22058]**

Grzegorz Bocewicz, Zbigniew Banaszak, Katarzyna Rudnik, Marcin Witczak, Czeslaw Smutnicki and Jaroslaw Wikarek

Koszalin University of Technology, Poland; Opole University of Technology, Poland; University of Zielona Gora, Poland; Wroclaw University of Science and Technology, Poland; Kielce University of Technology, Poland

**7:25PM Fuzzy Set-Based Isolation Forest [#22065]**

Pawel Karczmarek, Adam Kiersztyn and Witold Pedrycz

Department of Computer Science, Lublin University of Technology, Poland; Department of Electrical and Computer Engineering, University of Alberta, Canada

**Session F-WE1: Intuitionistic Fuzzy Sets in Emerging Domains**

*Wednesday, July 22, 8:00PM-10:00PM, Room: FUZZ Room 1, Chair: Danish Lohani, Pranab K. Muhuri*

**8:00PM Attribute Selection for Sets of Data Expressed by Intuitionistic Fuzzy Sets [#22394]**

Eulalia Szmidt, Janusz Kacprzyk and Pawel Bujnowski

Systems Research Institute Polish Academy of Sciences, Poland

- 8:20PM Interval-valued Intuitionistic Fuzzy TOPSIS method for Supplier Selection Problem [#22469]**  
Ashutosh Tiwari, Q M Danish Lohani and Pranab K. Muhuri  
South Asian University, India
- 8:40PM Improved Probabilistic Intuitionistic Fuzzy c-Means Clustering Algorithm: Improved PIFCM [#22259]**  
Ayush K. Varshney, Q. M. Danish Lohani and Pranab K. Muhuri  
South Asian University, India
- 9:00PM On ordinal sums of t-norms and t-conorms on bounded posets [#22142]**  
Antonin Dvorak, Michal Holcapek and Jan Paseka  
University of Ostrava, Czech Republic; Masaryk University, Czech Republic
- 9:20PM The Use of Concave and Convex Functions to Optimize the Feed-Rate of Numerically Controlled Machine Tools [#22160]**  
Pekala Barbara, Rak Ewa, Kwiatkowski Bogdan, Szczur Adam and Rak Rafal  
University of Rzeszow, Poland
- 9:40PM A new family of Bonferroni mean-type pre-aggregation operators [#22178]**  
Swati Rani Hait, Radko Mesiar, Debashree Guha and Debjani Chakraborty  
Indian Institute of Technology Kharagpur, India; Slovak University of Technology, Slovakia

**Session F-WE2: Fuzzy and Uncertain Intelligent Knowledge Engineering Systems**  
*Wednesday, July 22, 8:00PM-10:00PM, Room: FUZZ Room 2, Chair: Jerry Chun-Wei Lin*

- 8:00PM Mining Multiple Fuzzy Frequent Patterns with Compressed List Structures [#22129]**  
Jerry Chun-Wei Lin, Jimmy Ming-Tai Wu, Youcef Djenouri, Gautam Srivastava and Tzung-Pei Hong  
Western Norway University of Applied Sciences, Norway; Shandong University of Science and Technology, China; SINTEF Digital, Mathematics and Cybernetics, Norway; Brandon University, Canada; National University of Kaohsiung, Taiwan
- 8:20PM One-Phase Temporal Fuzzy Utility Mining [#22248]**  
Hong Tzung-Pei, Lin Cheng-Yu, Huang Wei-Ming, Li Shu-Min, Wang Shyue-Liang and Lin Jerry Chun-Wei  
Department of Computer Science and Information Engineering National University of Kaohsiung, Taiwan; Department of Computer Science and Engineering National Sun Yat-sen University, Taiwan; Department of Computing, Mathematics, and Physics Western Norway University of Applied Science, Norway
- 8:40PM A Novel Meta Learning Framework for Feature Selection using Data Synthesis and Fuzzy Similarity [#22343]**  
Zixiao Shen, Xin Chen and Jonathan Garibaldi  
University of Nottingham, United Kingdom
- 9:00PM Toward the use of Quantile Fuzzy Transforms for the Construction of Fuzzy Association Rules [#22270]**  
Nicolas Madrid  
University of Malaga, Spain
- 9:20PM AI-based Decision-making Model for the Development of a Manufacturing Company in the context of Industry 4.0 [#22162]**  
Justyna Patalas-Maliszewska, Iwona Pajak and Malgorzata Skrzyszewska  
Institute of Mechanical Engineering University of Zielona Gora, Poland

**9:40PM Fuzzy Set Similarity for Feature Selection in Classification [#22054]**

Valerie Cross, Michael Zmuda, Rahul Paul and Lawrence Hall

Miami University, United States; University of South Florida, United States

**Plenary Poster Session F-WE3: Fuzzy systems for robotics**

*Wednesday, July 22, 8:00PM-10:00PM, Room: FUZZ Poster Room, Chair: Ching-Chih Tsai*

**P1701 A Novel Self-Organizing PID Approach for Controlling Mobile Robot Locomotion [#22028]**

Xiaowei Gu, Muhammad Aurangzeb Khan, Plamen Angelov, Bikash Tiwary, Elnaz Shafipour Yourdshah and Zhao-Xu Yang

Lancaster University, United Kingdom; Xi'an Jiaotong University, China

**P1702 A New Fuzzy Logic Based Adaptive Motion Cueing Algorithm Using Parallel Simulation-Based Motion Platform [#22064]**

Mohamad Reza Chalak Qazani, Houshyar Asadi, Tobias Bellmann, Siamak Pedrammehr, Shady Mohamed and Saeid Nahavandi

Institute for Intelligent System Research and Innovation, Deakin University, Australia, Australia; Institute of System Dynamics and Control, Space Systems Dynamics, Deutsches Zentrum für Luft- und Raumfahrt (DLR) German Aerospace Center, Germany, Germany; Institute for Intelligent Systems Research and Innovation (IISRI), Deakin University, Australia; Institute for Intelligent Systems Research and Innovation (IISRI), Deakin University, Austria

**P1703 Design of Low-Cost Fuzzy Controllers with Reduced Parametric Sensitivity Based on Whale Optimization Algorithm [#22183]**

Radu-Codrut David, Radu-Emil Precup, Stefan Preitl, Alexandra-Iulia Szedlak-Stinean, Raul-Cristian Roman and Emil M. Petriu

Politehnica University of Timisoara, Romania; School of Electrical Engineering and Computer Science, Canada

**P1704 An Evolutionary General Type-2 Fuzzy Neural Network applied to Trajectory Planning in Remotely Operated Underwater Vehicles [#22184]**

Adrian Rubio-Solis, Tomas Salgado-Jimenez, Luis Govinda Garcia-Valdovinos, Luciano Nava-Balanzar, Uriel Martinez-Hernandez and Rolando Adonai Hernandez-Hernandez

Center for Engineering and Industrial Development, CIDESI, Mexico; University of Bath, United Kingdom

**P1705 Staircase Traversal via Reinforcement Learning for Active Reconfiguration of Assistive Robots [#22272]**

Andrei Mitriakov, Panagiotis Papadakis, Sao Mai Nguyen and Serge Garlatti

Lab-STICC, UMR 6285 F-29238, team RAMBO, IMT Atlantique, Brest, France, France

**P1706 A Virtual Fuzzy Actuator for the Fault-tolerant Control of a Rescue Vehicle [#22102]**

Ralf Stetter

Ravensburg-Weingarten University (RWU), Germany

## THURSDAY, JULY 23

### Session F-THM1: Fuzzy Systems for Brain Sciences

Thursday, July 23, 3:30PM-5:30PM, Room: FUZZ Room 1, Chair: CT Lin, Javier Perez, Amit Konar, Mukesh Prasad

**3:30PM P200 and N400 Induced Aesthetic Quality Assessment of an Actor Using Type-2 Fuzzy Reasoning [#22281]**

Mousumi Laha, Amit Konar, Madhuparna Das, Chandrima Debnath, Nandita Sengupta and Atulya K. Nagar

Jadavpur University, India; University College of Bahrain, Bahrain; Liverpool Hope University, Liverpool, United Kingdom

**3:50PM A Neuro-Fuzzy Based Approach for Resting-state Detection Using A Consumer-grade EEG [#22383]**

Angelo Ciaramella and Salma Pasquale Junior

Universita' degli Studi di Napoli Parthenope, Italy; Universita' degli Studi di Napoli Parthenope; Universita' degli Studi di Napoli Parthenope, Italy

**4:10PM A type-2 Fuzzy Logic Based Explainable Artificial Intelligence System for Developmental Neuroscience [#22340]**

Mehrin Kiani, Javier Andreu-Perez, Hani Hagra, Maria Laura Filippetti and Silvia Rigato  
University of Essex, United Kingdom

**4:30PM Fuzzy Neural Networks to Detect Parkinson Disease [#22402]**

Lerina Aversano, Mario Luca Bernardi, Marta Cimitile and Riccardo Pecori

University of Sannio, Italy; Unitelma Sapienza University, Italy

**4:50PM Fuzzy Divergence Based Analysis For EEG Drowsiness Detection Brain Computer Interfaces [#22341]**

Tharun Kumar Reddy, Vipul Arora, Laxmidhar Behera, Yukai Wang and Chin Teng Lin

PhD student, EE department, iit kanpur, India; Assistant Professor, EE department, iit kanpur, India; Professor, EE department, iit kanpur, India; Lecturer, UTS, Australia, Australia; Distinguished Professor, UTS, Australia, Australia

**5:10PM Manipulating Focal Sets on the Unit Simplex: Application to Plastic Sorting [#22229]**

Lucie Jacquin, Abdelhak Imoussaten, Sebastien Destercke, Francois Troussat, Jacky Montmain and Didier Perrin

EuroMov Digital Health in Motion IMT Mines Ales, Univ Montpellier, France; Sorbonne universites, UTC CNRS, Heudiasyc, France; Laboratoire des Science des Risque (LSR) IMT Mines Ales, France; Polymers Composites and Hybrids (PCH) IMT Mines Ales, France

### Session F-THM2: SenseAgents: Soft Approaches in Multi-sensing Cooperative Environments

Thursday, July 23, 3:30PM-5:30PM, Room: FUZZ Room 2, Chair: Sabrina Senatore, Mario Cimino, Wen Dong

**3:30PM A Fuzzy Logic Based System for Cloud based Building Information Modelling Rendering Optimization in Augmented Reality [#22106]**

Hugo Leon-Garza, Hani Hagra, Anasol Pena-Rios, Gilbert Owusu and Anthony Conway

University of Essex, United Kingdom; British Telecom, United Kingdom

**3:50PM Towards a Layered Agent-modeling of IoT Devices to Precision Agriculture [#22342]**

Danilo Cavaliere, Vincenzo Loia and Sabrina Senatore

University of Salerno, Italy

- 4:10PM Exploring Brazilian Photovoltaic Solar Energy Development Scenarios using the Fuzzy Cognitive Map Wizard Tool [#22306]**  
Konstantinos Papageorgiou, Gustavo Carvalho, Elpiniki Papageorgiou, Nikolaos Papandrianos, Marcio Mendonca and George Stamoulis  
Department of Computer Science and Telecommunications, University of Thessaly, Lamia, Greece; Faculty of Economics, Business Administration and Accounting University of Sao Paulo (USP), Brazil; Department of Energy Systems, Faculty of Technology University of Thessaly, Geopolis Campus, Greece; Electrical Engineering Academic Dept (DAELE) Universidade Tecnológica Federal do Paraná, Brazil; Dept. of Electrical and Computer Engineering, University of Thessaly, Greece
- 4:30PM Asset Operation Detection Based on Fuzzy Logic and Phase Portrait [#22405]**  
Cody Xiaozhan Yang, Faiyaz Doctor, Mohammad Hossein Anisi, Mohammadreza Khosravi, Ian Parry and Patryk Wegrzyn  
The University of Essex, Cloudfm Group Ltd and Mindsett Ltd, United Kingdom; The University of Essex, United Kingdom; Cloudfm Group Ltd and Mindsett Ltd, United Kingdom
- 4:50PM Detection of Road Artefacts Using Fuzzy Adaptive Thresholding [#22124]**  
Marcin Badurowicz, Jerzy Montusiewicz and Pawel Karczmarek  
Lublin University of Technology, Department of Computer Science, Poland
- 5:10PM AI-FML Agent for Robotic Game of Go and AIoT Real-World Co-Learning Applications [#22193]**  
Chang-Shing Lee, Yi-Lin Tsai, Mei-Hui Wang, Wen-Kai Kuan, Zong-Han Ciou and Naoyuki Kubota  
National University of Tainan, Taiwan; Tokyo Metropolitan University, Japan

**Plenary Poster Session F-THM3: Fuzzy Engineering Applications-I**

*Thursday, July 23, 3:30PM-5:30PM, Room: FUZZ Poster Room, Chair: Krzysztof Dyczkowski*

- P1901 The ordering methods of interval-valued fuzzy cardinal numbers with application in an uncertain decision making [#22182]**  
Krzysztof Dyczkowski, Barbara Pekala, Michal Baczynski, Jaroslaw Szkoła and Tomasz Pilka  
Adam Mickiewicz University, Poland; University of Rzeszow, Poland; University of Silesia, Poland
- P1902 Robust actuator and sensor fault estimation for Takagi-Sugeno fuzzy systems under ellipsoidal bounding [#22268]**  
Marcin Witczak, Marcin Pazera, Norbert Kukurowski, Teodulo Ivan Bravo Cruz and Theilliol Didier  
University of Zielona Gora, Poland; National Technological Institute of Mexico, Mexico; Universite de Lorraine, France
- P1903 Accelerometer-based Human Fall Detection Using Fuzzy Entropy [#22117]**  
Aadel Howedi, Ahmad Lotfi and Amir Pourabdollah  
Nottingham Trent University, United Kingdom
- P1904 Effective Diagnosis of Heart Disease Imposed by Incomplete Data Based on Fuzzy Random Forest [#22267]**  
Elzhan Zeinulla, Karina Bekbayeva and Adnan Yazici  
Nazarbayev University, Kazakhstan
- P1905 Using Dempster-Shafer Theory for RSS-based Indoor Localization [#22387]**  
Achour Achroufene, Abdelghani Chibani and Yacine Amirat  
LISSI and LIMED, France; LISSI, France



**P1906 Measuring the Quality of Data in Electronic Health Records Aggregators [#22395]**

Carlos Molina and Belen Prados-Suarez  
University of Jaen, Spain; University of Granada, Spain

**Session F-THA1: Fuzzy System for Renewable Energy and Control**

*Thursday, July 23, 5:45PM-7:45PM, Room: FUZZ Room 1, Chair: Marco Mussetta, Faa Lin, Francesco Grimaccia, Horst Schulte*

**5:45PM Distributed Generator with Virtual Inertia Using Intelligent Controller for Grid-Connected Microgrid [#22063]**

Faa-Jeng Lin, Kuang-Hsiung Tan and Cheng-Ming Shih  
National Central University, Taiwan; Chung Cheng Institute of Technology, National Defense University, Taiwan

**6:05PM Situational Awareness of Power System Stabilizers Performance in Energy Control Centers [#22440]**

Paranietharan Arunagirinathan and Ganesh Venayagamoorthy  
Clemson University, United States

**6:25PM Model-based Nonlinear Filter Design for Tower Load Reduction of Wind Power Plants with Active Power Control Capability [#22300]**

Florian Poeschke and Horst Schulte  
University of Applied Sciences Berlin (HTW), Germany

**6:45PM Time Series Prediction Using Random Weights Fuzzy Neural Networks [#22422]**

Antonello Rosato and Massimo Panella  
University of Rome "La Sapienza", Italy

**7:05PM Hierarchical Fuzzy Controllers for Explicit MPC Control Laws: Adaptive Cruise Control Example [#22285]**

Andres Gersnoviez, Maria Brox and Iluminada Baturone  
Department of Electronic and Computer Engineering, Universidad de Cordoba, Spain; Instituto de Microelectronica de Sevilla (IMSE-CNM), Universidad de Sevilla, CSIC, Spain

**7:25PM Simulation of Autonomous UAV Navigation with Collision Avoidance and Space Awareness [#22486]**

Jian Li, Hongmei He and Ashutosh Tiwari  
Cranfield University, United Kingdom; University of Sheffield, United Kingdom

**Session F-THA2: Fuzzy logic and fuzzy set theory-I**

*Thursday, July 23, 5:45PM-7:45PM, Room: FUZZ Room 2, Chair: Humberto Bustince*

**5:45PM New Entropy and Distance Measures of Intuitionistic Fuzzy Sets [#22154]**

Jin Fang Huang, Xin Jin, Dianwu Fang, Shin-Jye Lee, Qian Jiang and Shaowen Yao  
School of Software, Yunnan University, China; Institute of Technology Management, National Chiao Tung University, Taiwan

**6:05PM Predictability of Off-line to On-line Recommender Measures via Scaled Fuzzy Implicators [#22217]**

Ladislav Peska and Peter Vojtas  
Dept. Software Engineering, Charles University Prague, Czech Republic; Dept. Software Engineering, Charles University Prague, Czech Republic

- 6:25PM I Can Get Some Satisfaction: Fuzzy Ontologies for Partial Agreements in Blockchain Smart Contracts [#22282]**  
 Ignacio Huitzil, Alvaro Fuentesmilla and Fernando Bobillo  
 University of Zaragoza, Spain; Aragon Institute of Engineering Research (I3A), University of Zaragoza, Spain
- 6:45PM Convergence of Generalized Probability Mixtures That Describe Adaptive Fuzzy Rule-based Systems [#22309]**  
 Bart Kosko  
 University of Southern California, United States
- 7:05PM Connections Between Fuzzy Inference Systems and Kernel Machines [#22205]**  
 Jorge Guevara, Jerry Mendel and Roberto Hirata  
 IBM Research, Brazil; University of Southern California, United States; University of Sao Paulo, Brazil
- 7:25PM Fuzzy Modeling Using LSTM Cells for Nonlinear Systems [#22353]**  
 Vega Francisco and Yu Wen  
 CINVESTAV-IPN, Mexico

**Plenary Poster Session F-THA3: Fuzzy Engineering Applications-II**

*Thursday, July 23, 5:45PM-7:45PM, Room: FUZZ Poster Room, Chair: Krzysztof Dyczkowski*

- P2101 Spatial Data Types for Heterogeneously Structured Fuzzy Spatial Collections and Compositions [#22430]**  
 Anderson Chaves Carniel and Markus Schneider  
 Federal University of Technology - Parana, Brazil; University of Florida, United States
- P2102 Fuzzy modelling and robust fault-tolerant scheduling of cooperating forklifts [#22094]**  
 Witczak Marcin, Lipiec Bogdan, Mrugalski Marcin, Seybold Lothar and Banaszak Zbigniew  
 University of Zielona Gora, Poland; RAFI GmbH Co. KG., Germany; Koszalin University of Technology, Poland
- P2103 New Fuzzy Local Contrast Measures: Definitions, Evaluation and Comparison [#22305]**  
 Urszula Bentkowska, Michal Kepski, Marcin Mrukowicz and Barbara Pekala  
 University of Rzeszow, Poland
- P2104 Application of Uncertainty-Aware Similarity Measure to Classification in Medical Diagnosis [#22333]**  
 Patryk Zywica  
 Adam Mickiewicz University in Poznan, Poland
- P2105 DroTrack: High-speed Drone-based Object Tracking Under Uncertainty [#22246]**  
 Ali Hamdi, Flora Salim and Du Yong Kim  
 RMIT University, Australia
- P2106 The distributivity law as a tool of k-NN classifiers' aggregation: mining a cyber-attack data set [#22158]**  
 Ewa Rak, Jan G. Bazan, Adam Szczur and Wojciech Rzasa  
 University of Rzeszow, Poland

## **Session F-THE1: Fuzzy Clustering**

*Thursday, July 23, 8:00PM-10:00PM, Room: FUZZ Room 1, Chair: Jim Keller*

### **8:00PM Sequential Possibilistic Local Information One-Means Clustering For Image Segmentation [#22068]**

Wenlong Wu and James Keller

Electrical Engineering and Computer Science Department, University of Missouri-Columbia, United States

### **8:20PM A Noise Rejection Mechanism for pLSA-induced Fuzzy Co-clustering [#22128]**

Katsuhiro Honda, Keita Hoshii, Seiki Ubukata and Akira Notsu

Osaka Prefecture University, Japan

### **8:40PM Possibilistic Clustering Enabled Neuro Fuzzy Logic [#22239]**

Blake Ruprecht, Wenlong Wu, Muhammad Islam, Derek Anderson, James Keller, Grant Scott, Curt Davis, Fred Petry, Paul Elmore, Kristen Nock and Elizabeth Gilmour

University of Missouri, United States; U.S. Naval Research Laboratory, United States; Johns Hopkins, United States

### **9:00PM FDBSCAN-APT: A Fuzzy Density-based Clustering Algorithm with Automatic Parameter Tuning [#22386]**

Alessio Bechini, Martina Criscione, Pietro Ducange, Francesco Marcelloni and Alessandro Renda

University of Pisa, Italy; University of Florence, Italy

### **9:20PM Hybrid System Identification by Incremental Fuzzy C-regression Clustering [#22393]**

Saso Blazic and Igor Skrjanc

University of Ljubljana, Slovenia

### **9:40PM Subspace Clustering and Feature Typicality Degrees: a Prospective Study [#22455]**

Marie-Jeanne Lesot and Adrien Revault d'Allonnes

LIP6, Sorbonne Universite, France; Universite Paris VIII, CUBI, France

## **Session F-THE2: Fuzzy logic and fuzzy set theory-II**

*Thursday, July 23, 8:00PM-10:00PM, Room: FUZZ Room 2, Chair: Marcin Korytkowski*

### **8:00PM Information Granules and Granular Models: Selected Design Investigations [#22156]**

Witold Pedrycz, Wladyslaw Homenda, Agnieszka Jastrzebska and Fusheng Yu

Systems Research Institute Polish Academy of Sciences Warsaw, 01-447, Poland and Department of Electrical & Computer Engineering University of Alberta, Edmonton T6R2G7AB, Canada, Canada; the Faculty of Mathematics and Information Science Warsaw University of Technology Warsaw, 00-662, Poland and the Faculty of Economics and Informatics in Vilnius University of Bialystok LT-08221 Vilnius, Lithuania, Poland; the Faculty of Mathematics and Information Science Warsaw University of Technology Warsaw, 00-662, Poland, Poland; School of Mathematical Sciences Beijing Normal University Beijing 100875, China, China

### **8:20PM Efficient Visual Classification by Fuzzy Rules [#22418]**

Marcin Korytkowski, Rafal Scherer, Dominik Szajerman, Dawid Polap and Marcin Wozniak

Czestochowa University of Technology, Poland; Lodz University of Technology, Poland; Silesian University of Technology, Poland

### **8:40PM Human-Inspired---Zadeh---Sets and Logic [#22120]**

Jerry Mendel

University of Southern California, United States

### **9:00PM General Interval-Valued Grouping Functions [#22165]**

Tiago Asmus, Gracaliz Dimuro, Humberto Bustince, Benjamin Bedregal, Helida Santos and Jose Antonio Sanz

Universidad Publica de Navarra, Spain; Universidade Federal do Rio Grande, Brazil;  
Universidade Federal do Rio Grande do Norte, Brazil

**9:20PM Influence of New Interval-valued Pre-aggregation Function on Medical Decision Making [#22199]**

Pawel Drygas, Barbara Pekala, Krzysztof Balicki and Dawid Kosior  
College of Natural Sciences, University of Rzeszow, Poland

**9:40PM General local properties of fuzzy relations and fuzzy multisets used to an algorithm for group decision making [#22200]**

Barbara Pekala, Urszula Bentkowska, Jaroslaw Szkola, Wojciech Rzasa, Dawid Kosior, Javier Fernandez, Laura De Miguel and Humberto Bustince  
University of Rzeszow, Poland; Universidad Publica de Navarra, Spain

**Plenary Poster Session F-THE3: Fuzzy Engineering Applications-III**

*Thursday, July 23, 8:00PM-10:00PM, Room: FUZZ Poster Room, Chair: Francisco Herrera*

**P2301 Multi-Class Classification Problems for the k-NN Algorithm in the Case of Missing Values [#22231]**

Urszula Bentkowska, Jan Bazan, Marcin Mrukowicz, Lech Zareba and Piotr Molenda  
University of Rzeszow, Poland

**P2302 A new method of building a more effective ensemble classifiers [#22289]**

Jan Bazan, Pawel Drygas, Lech Zareba and Piotr Molenda  
University of Rzeszow, Poland

**P2303 Uncertain random dependent-chance programming for flow-shop scheduling problem [#22416]**

Achraf Touil and Abdelwahed Echchtabi  
Laboratory of Engineering, of Industrial Management and Innovation, FST, BP, Settlat, Morocco

**P2304 Permutation K-sample Goodness-of-Fit Test for Fuzzy Data [#22241]**

Przemyslaw Grzegorzewski  
Warsaw University of Technology, Poland

**P2305 2-Tuple Fuzzy Linguistic Perceptions and Probabilistic Awareness-based Heuristics for Modeling Consumer Purchase Behaviors [#22187]**

Jesus Giraldez-Cru, Manuel Chica, Oscar Cordon and Francisco Herrera  
University of Granada, Spain

**P2306 Application of similarity measures with uncertainty in classification methods [#22150]**

Barbara Pekala, Ewa Rak, Dawid Kosior, Marcin Mrukowicz and Jan G. Bazan  
University of Rzeszow, Poland

## FRIDAY, JULY 24

### Session F-FM1: Fuzzy Decision Making

Friday, July 24, 2:45PM-4:45PM, Room: FUZZ Room 1, Chair: Luis Martinez

**2:45PM Decision Making over Multiple Criteria to Assess News Credibility in Microblogging Sites [#22304]**

Gabriella Pasi, Marco De Grandis and Marco Viviani  
University of Milano-Bicocca, Italy

**3:05PM Multi-Criteria Decision Making using Fuzzy Logic and ATOVIC with Application to Manufacturing [#22324]**

Hesham Yusuf and George Panoutsos  
University of Sheffield, United Kingdom

**3:25PM Intuitionistic Fuzzy PROMETHEE II Technique for Multi-criteria Decision Making Problems Based on Distance and Similarity measures [#22390]**

Fatma Dammak, Leila Baccour and Adel M. Alimi  
ENIS, Tunisia

**3:45PM Model Checking for Decision Making System of Long Endurance Unmanned Surface Vehicle [#22473]**

Hanlin Niu, Ze Ji, Joaquin Carrasco, Al Savvaris and Antonios Tsourdos  
The University of Manchester, United Kingdom; Cardiff University, United Kingdom; Cranfield University, United Kingdom

**4:05PM From Undirected Structures to Directed Graphical Lasso Fuzzy Cognitive Maps using Ranking-based Approaches [#22424]**

Zoumpolia Dikopoulou, Elpiniki Papageorgiou and Koen Vanhoof  
Hasselt University, Belgium; University of Thessaly, Greece

**4:25PM The Challenges and Opportunities of Artificial Intelligence in Implementing Trustworthy Robotics and Autonomous Systems [#22484]**

Hongmei He, John Gray, Angelo Cangelos, Qinggang Meng, Martin Mcginnity and Jorn Mehnen  
Cranfield University, United Kingdom; University of Manchester, United Kingdom; Loughborough University, United Kingdom; Nittingham Trent University, Ulster University, United Kingdom; University of Strathclyde, United Kingdom

### Competition F-COMP: FUZZ-IEEE Competitions

Friday, July 24, 2:45PM-4:45PM, Room: FUZZ Room 2

### Plenary Poster Session F-FM3: Fuzzy Time Series and Optimisation

Friday, July 24, 2:45PM-4:45PM, Room: FUZZ Poster Room, Chair: Frederico Guimaraes, Muhammad Lee, Hossein Sadaei, Petronio Silva

**P2501 EGFC: Evolving Gaussian Fuzzy Classifier from Never-Ending Semi-Supervised Data Streams - With Application to Power Quality Disturbance Detection and Classification [#22388]**

Daniel Leite, Leticia Decker, Marcio Santana and Paulo Souza  
Federal University of Lavras, Brazil; University of Bologna, Italy; Federal Center for Technological Education, Brazil

- P2502 Real-Time Anomaly Detection in Data Centers for Log-based Predictive Maintenance using an Evolving Fuzzy-Rule-Based Approach [#22364]**  
Leticia Decker, Daniel Leite, Luca Giommi and Daniele Bonacorsi  
University of Bologna, Italy; Federal University of Lavras, Brazil
- P2503 Solar Energy Forecasting with Fuzzy Time Series using High-Order Fuzzy Cognitive Maps [#22427]**  
Omid Orang, Rodrigo Silva, Petronio Candido de Lima e Silva and Frederico Gadelha Guimaraes  
UFMG, Brazil; UFOP, Brazil; IFNMG, Brazil
- P2504 Genetic Learning of fuzzy Rule Bases for Multi-label Classification Using an Iterative Approach [#22243]**  
Edward Hinojosa, Edgar Sarmiento and Heloisa Camargo  
Universidad Nacional de San Agustin de Arequipa, Peru; Federal University of Sao Carlos, Brazil
- P2505 A Preliminary Approach to Allocate Categories of Buildings into Lands based on Generative Design [#22351]**  
Perez-Martinez Ignacio, Martinez-Rojas Maria and Soto-Hidalgo Jose Manuel  
University of Cordoba, Spain; University of Malaga, Spain; University of Granada, Spain
- P2506 Convolutional Neural Network Classifier with Fuzzy Feature Representation for Human Activity Modelling [#22175]**  
Gadelhag Mohmed, Ahmad Lotfi and Amir Pourabdollah  
Nottingham Trent University, United Kingdom

#### **Session F-FA1: Fuzzy Hybrid Systems**

*Friday, July 24, 5:00PM-7:00PM, Room: FUZZ Room 1, Chair: Oscar Cordon*

- 5:00PM An Improved Version of the Fuzzy Set Based Evolving Modeling with Multitask Learning [#22223]**  
Amanda O. C. Ayres and Fernando J. Von Zuben  
University of Campinas (Unicamp), Brazil
- 5:20PM A Combined Fuzzy C-Means and Level Set Method for Automatic DCE-MRI Kidney Segmentation Using Both Population-Based and Patient-Specific Shape Statistics [#22446]**  
Moumen T. El-Melegy, Rasha M. Abd El-Karim, Ayman S. El-Baz and Mohamed Abou El-Ghar  
Assiut University, Egypt; University of Louisville, United States; Mansoura University, Egypt
- 5:40PM Multiobjective Fuzzy Genetics-Based Machine Learning for Multi-Label Classification [#22451]**  
Yuichi Omozaki, Naoki Masuyama, Yusuke Nojima and Hisao Ishibuchi  
Osaka Prefecture University, Japan; Southern University of Science and Technology, China
- 6:00PM Classification of Relative Object Size from Parieto-occipital Hemodynamics Using Type-2 Fuzzy Sets [#22381]**  
Amiyangshu De, Mousumi Laha, Amit Konar and Atulya K Nagar  
Indian Institute of Technology Jodhpur, India; Jadavpur University, India; Liverpool Hope University, United Kingdom
- 6:20PM Studying Heuristics Adaptation to a Specific Degree of Fuzziness [#22373]**  
Gloria Cerasela Crisan, Camelia-M. Pintea and Petrica C. Pop  
Faculty of Sciences, Vasile Alecsandri University, Bacau, Romania; Faculty of Sciences, Technical University Cluj-Napoca, Baia-Mare, Romania

**6:40PM A Fuzzy Approach for Texture-based Segmentation [#22415]**

Pedro Manuel Martinez-Jimenez, Jesus Chamorro-Martinez and Belen Prados-Suarez  
University of Cadiz, Spain; University of Granada, Spain

**Session F-FA2: Fuzzy Theory-I**

*Friday, July 24, 5:00PM-7:00PM, Room: FUZZ Room 2, Chair: Humberto Bustince*

**5:00PM Categorical fuzzy entropy c-means [#22206]**

Abdoul Jalil Djiberou Mahamadou, Violaine Antoine, Engelbert Mephu Nguifo and Sylvain Moreno

LIMOS, UCA, France, France; Digital Health Hub, SFU, Canada, Canada

**5:20PM Choquet Integral Ridge Regression [#22220]**

Siva Krishna Kakula, Anthony Pinar, Timothy Havens and Derek Anderson

Michigan Technological University, United States; University of Missouri, United States

**5:40PM Optimization for Large-Scale Fuzzy Joins Using Fuzzy Filters in MapReduce [#22301]**

Thi-To-Quyen Tran, Thuong-Cang Phan, Anne Laurent and Laurent D'Orazio

Univ Rennes, CNRS, IRISA, France; Can Tho University, Viet Nam; Univ Montpellier, LIRMM, CNRS, France

**6:00PM Integral Transforms on Spaces of Complete Residuated Lattice Valued Vunctions [#22313]**

Michal Holcapek and Viec Bui

University of Ostrava, Czech Republic

**6:20PM On the dominance relation between ordinal sums of quasi-overlap functions [#22362]**

Ivan Mezzomo, Heloisa Frazao, Benjamin Bedregal and Matheus Menezes

Universidade Federal Rural de Semi-Arido, Brazil; Universidade Federal Rural do Semi-Arido, Brazil; Universidade Federal do Rio Grande do Norte, Brazil

**6:40PM Atanassov's intuitionistic fuzzy measure based on the Sugeno integral induced by  $(\alpha, \beta)$ -cut [#22370]**

Mohd Shoaib Khan and Q.M. Danish Lohani

South Asian University, New Delhi, India

**Plenary Poster Session F-FA3: Fuzzy Applications-I**

*Friday, July 24, 5:00PM-7:00PM, Room: FUZZ Poster Room, Chair: Christian Wagner*

**P2701 Robust Possibilistic Production Planning Under Budgeted Demand Uncertainty [#22091]**

Romain Guillaume, Adam Kasperski and Pawel Zielinski

Universite de Toulouse-IRIT, France; Wroclaw University of Science and Technology, Poland

**P2702 Querying Fuzzy Spatiotemporal RDF Data Using R2RML Mappings [#22101]**

Luyi Bai, Jiajia Lu and Shuangdi Wang

Northeastern University, China

**P2703 Fuzzy aggregation for multimodal remote sensing classification [#22125]**

Kristen Nock and Elizabeth Gilmour

US Naval Research Laboratory, United States

**P2704 Automobile Insurance Fraud Detection using the Evidential Reasoning Approach and Data-Driven Inferential Modelling [#22218]**

Xi Liu, Jian Bo Yang, Dong Ling Xu, Karim Derrick, Chris Stubbs and Martin Stockdale

The University of Manchester, United Kingdom; Kennedys Law LLP, United Kingdom

**P2705 An Application of Fuzzy C-Means, Fuzzy Cognitive Maps, and Fuzzy Rules to Forecasting First Arrival Date of Avian Spring Migrants [#22284]**

Dariusz Czerwinski, Pawel Karczmarek, Adam Kiersztyn, Ignacy Kitowski, Rafal Lopucki and Adam Zbyryt

Lublin University of Technology, Poland; The State School of Higher Education in Chelm, Poland; Centre for Interdisciplinary Research The John Paul II Catholic University of Lublin, Poland; The Polish Society for Bird Protection (PTOP), Poland

**P2706 Disambiguation of Features for Improving Target Class Detection from Social Media Text [#22297]**

Fatima Chiroma and Ella Haig  
University of Portsmouth, United Kingdom

**Session F-FE1: Fuzzy Theory-II**

*Friday, July 24, 7:15PM-9:15PM, Room: FUZZ Room 1, Chair: Josie McCulloch*

**7:15PM Choosing Sample Sizes for Statistical Measures on Interval-Valued Data [#22323]**

Josie McCulloch, Zack Ellerby and Christian Wagner  
University of Leeds, United Kingdom; University of Nottingham, United Kingdom

**7:35PM Introducing the Difficulty of Implementing Alternatives in the Multiple Criteria Decision Problems [#22345]**

Abdelhak Imoussaten, Pierre Couturier and Jacky Montmain  
IMT Mines Ales, France

**7:55PM Aggregation of Fuzzy Equivalences in Data Exploration by kNN Classifier [#22377]**

Anna Krol, Wojciech Rzasa and Piotr Grochowalski  
University of Rzeszow, Poland

**8:15PM A Weighted Matrix Visualization for Fuzzy Measures and Integrals [#22412]**

Andrew Buck, Derek Anderson, James Keller, Timothy Wilkin and Muhammad Islam  
University of Missouri, United States; Deakin University, Australia

**8:35PM Developing Idea of Ordinal Sum of Fuzzy Implications [#22443]**

Michal Baczynski, Pawel Drygas, Anna Krol and Piotr Pusz  
University of Silesia in Katowice, Poland; University of Rzeszow, Poland

**8:55PM First-Order Typed Fuzzy Logics and their Categorical Semantics: Linear Completeness and Baaz Translation via Lawvere Hyperdoctrine Theory [#22452]**

Yoshihiro Maruyama  
The Australian National University, Australia

**Session F-FE2: Fuzzy Systems**

*Friday, July 24, 7:15PM-9:15PM, Room: FUZZ Room 2, Chair: Jesus Chamaro*

**7:15PM Experimental Study on Generating Multi-modal Explanations of Black-box Classifiers in terms of Gray-box Classifiers [#22348]**

Jose M. Alonso, Javier Toja-Alamancos and Alberto Bugarin  
Universidade de Santiago de Compostela, Spain

**7:35PM A Three-way Classification with Game-theoretic N-Soft Sets for Handling Missing Ratings in Context-aware Recommender Systems [#22346]**

Syed Manzar Abbas, Khubaib Amjad Alam and Kwang-Man Ko  
Department of Computer Science, National University of Computer and Emerging Sciences, Pakistan, Pakistan; Department of Computer Engineering, Sangji University, Republic of South Korea, Korea, Republic of



**7:55PM Development of a robot partner system to support the elderly based on sensor data [#22404]**

Kohei Yamamoto, Shuai Shao and Naoyuki Kubota  
Tokyo metropolitan University, Japan; Tokyo Metropolitan University, Japan

**8:15PM The Serializable and Incremental Semantic Reasoner fuzzyDL [#22375]**

Ignacio Huitzil, Umberto Straccia, Carlos Bobed, Eduardo Mena and Fernando Bobillo  
University of Zaragoza, Spain; ISTI-CNR, Italy; everis / NTT Data, Spain; I3A, University of Zaragoza, Spain

**8:35PM On a Granular Approach for Fuzzy Color Modelling [#22419]**

Jesus Chamorro-Martinez, Miriam Mengibar-Rodriguez and James M. Keller  
University of Granada, Spain; University of Missouri, United States

### **Plenary Poster Session F-FE3: Fuzzy Logic Applications-II**

*Friday, July 24, 7:15PM-9:15PM, Room: FUZZ Poster Room, Chair: Tufan Kumbasar*

**P2901 Multi-dimensional Data Aggregation Utilizing Extended Partitioned Bonferroni Mean Operator [#22098]**

Debasmita Banerjee, Debashree Guha and Radko Mesiar  
Indian Institute of Technology Patna, India; Indian Institute of Technology Kharagpur, India; Slovak University of Technology, Slovakia

**P2902 Fuzzy-as-a-Service for Real-Time Human Activity Recognition Using IEEE 1855-2016 Standard [#22311]**

Bhavesh Pandya, Amir Pourabdollah and Ahmad Lotfi  
Nottingham Trent University, United Kingdom

**P2903 Periodic Route Planning of Perishables addressed as a Team Orienteering Problem with fuzzy time windows [#22398]**

Airam Exposito-Marquez, Julio Brito-Santana and Jose A. Moreno-Perez  
Universidad de La Laguna, Spain

**P2904 The Natural Transformations with the Multi-Fuzzy Commutativity Condition [#22435]**

Krystian Jobczyk and Antoni Ligeza  
AGH University, Poland

**P2905 Generating Quality IF-THEN Rules for Diabetes using Linguistic Summarization [#22470]**

Priyanka Mehra, Taniya Seth and Pranab K. Muhuri  
South Asian University, India

## AUTHOR INDEX

A. Ewees, Ahmed.....	18	Baghbani, Fahimeh.....	17, 20
Abbas, Syed Manzar.....	32	Bai, Luyi.....	31
Abbass, Hussein A.....	20	Balicki, Krzysztof.....	28
Abd Elaziz, Mohamed.....	18	Banaszak, Zbigniew.....	20
Abou El-Ghar, Mohamed.....	30	Banerjee, Debasmita.....	33
Acampora, Giovanni.....	8	Barbara, Pekala.....	21
Achroufene, Achour.....	24	Baturone, Iluminada.....	25
Adam, Szczur.....	21	Bazan, Jan.....	28
Adams, Janet.....	8	Bazan, Jan G.....	26, 28
Adel, Naeemeh.....	13	Bechini, Alessio.....	27
Aghaeipoor, Fatemeh.....	6	Bedregal, Benjamin.....	15, 27, 31
Aguiar, Jose.....	14	Behera, Laxmidhar.....	23
Aguzzoli, Stefano.....	15	Bekbayeva, Karina.....	24
Aickelin, Uwe.....	16	Bellmann, Tobias.....	22
Akbarzadeh-T., Mohammad Reza.....	20	Bentkowska, Urszula.....	26, 28
Akbarzadeh-Totonchi, Mohammad Reza.....	17	Bernardi, Mario Luca.....	23
Al, Ebru.....	6	Bezdek, James.....	15
Alam, Khubaib Amjad.....	32	Blazic, Saso.....	27
Al-Barakati, Abdullah.....	9	Bobed, Carlos.....	33
Alimi, Adel M.....	29	Bobillo, Fernando.....	26, 33
Almeida, Miguel.....	17	Bocewicz, Grzegorz.....	20
Alonso, Jose M.....	6, 7, 8, 9, 32	Bogdan, Kwiatkowski.....	21
Amicizia, Benedetta.....	16	Bogdan, Lipiec.....	26
Amirat, Yacine.....	24	Bolat, Kutay.....	18
Anderson, Derek.....	10, 27, 31, 32	Bonacorsi, Daniele.....	30
Andreu-Perez, Javier.....	5, 23	Boongoen, Tossapon.....	19
Andrigueto, Guilherme.....	15	Botoni de Souza, Lucas.....	20
Angelov, Plamen.....	22	Bravo Cruz, Teodulo Ivan.....	24
Anisi, Mohammad Hossein.....	24	Brito-Santana, Julio.....	33
Ann, Nowe.....	8	Brox, Maria.....	25
Antoine, Violaine.....	31	Buck, Andrew.....	32
Aqil Sahil, Mohammad.....	13	Bugarin, Alberto.....	5, 32
Arana-Jimenez, Manuel.....	16	Bugarin-Diz, Alberto.....	5
Aranburu, Andoitz.....	7	Bui, Viac.....	31
Araujo, Ernesto.....	15	Bujnowski, Pawel.....	20
Arora, Vipul.....	23	Bustince, Humberto.....	10, 25, 27, 28, 31
Arunagirinathan, Paranietharan.....	25	Cakir, Esra.....	17
Asadi, Houshyar.....	22	Camargo, Heloisa.....	14, 30
Asmus, Tiago.....	27	Campos Souza, Paulo Vitor.....	5
Assuncao, Edvaldo.....	12	Campos, Suene.....	15
Assuncao, Gustavo.....	17	Cangelos, Angelo.....	29
Aurangzeb Khan, Muhammad.....	22	Cardim, Rodrigo.....	12
Aversano, Lerina.....	23	Carrasco, Joaquin.....	29
Ayres, Amanda O. C.....	30	Cartagena, Oscar.....	16, 18
Azvine, Ben.....	19	Carvalho II, Joao Paulo.....	13
Baccour, Leila.....	29	Carvalho, Gustavo.....	24
Baczynski, Michal.....	24, 32	Carvalho, Joao.....	13
Badurowicz, Marcin.....	24	Carvalho, Joao Paulo.....	13

Cascallar-Fuentes, Andrea .....	5	D'Alterio, Pasquale .....	8, 9
Castillo, Ester del .....	5	Dammak, Fatma .....	29
Castillo, Oscar .....	17	D'Aniello, Giuseppe .....	18
Castro, Javier .....	11	Das, Madhuparna .....	23
Catala, Alejandro .....	7	Das, Suman .....	11
Cavaliere, Danilo .....	23	David, Radu-Codrut .....	22
Cernuda, Carlos .....	7	Davis, Curt .....	27
Chakraborty, Debjani .....	11, 21	De Falco, Massimo .....	18
Chalak Qazani, Mohamad Reza .....	22	De Grandis, Marco .....	29
Chalco Cano, Yurilev .....	17	de Jesus, Alldous Roy R. ....	11
Chamorro-Martinez, Jesus .....	31, 33	De Miguel, Laura .....	28
Chandran, David .....	13	de Oliveira, Diogo Ramalho .....	12
Changjing, Shang .....	12	De Tre, Guy .....	5
Chang-Shing, Lee .....	8	De, Amiyangshu .....	30
Chaves Carniel, Anderson .....	26	Debnath, Chandrima .....	23
Chen, Bin .....	11	Decker, Leticia .....	29, 30
Chen, Bor-Sen .....	18	Derrick, Karim .....	31
Chen, Chao .....	6, 16	Destercke, Sebastien .....	23
Chen, Jinjun .....	11	Didier, Theilliol .....	24
Chen, Xin .....	21	Dikopoulou, Zoumpolia .....	11, 29
Chen, Zhang .....	12	Dimuro, Gracaliz .....	27
Cheng-Yu, Lin .....	21	Ding, Weiping .....	11
Chennupati, Sai Deep .....	9	Djenouri, Youcef .....	21
Chi, Chi-Huang .....	11	Djiberou Mahamadou, Abdoul Jalil .....	31
Chibani, Abdelghani .....	24	Doctor, Faiyaz .....	24
Chica, Manuel .....	28	Dominguez, Iris .....	18
Chimatapu, Ravikiran .....	9	Donchak, Nishant .....	14
Chin, Wei Hong .....	19	DORazio, Laurent .....	31
Chiroma, Fatima .....	32	dos Santos, Gilberto Rodrigues .....	12
Chunru, Chen .....	19	Drygas, Pawel .....	28, 32
Ciaramella, Angelo .....	23	Ducange, Pietro .....	6, 27
Cimitile, Marta .....	23	Dujmovic, Jozo .....	9
Ciou, Zong-Han .....	24	Dutta Baruah, Rashmi .....	13
Clark, Matthew .....	12	Dvorak, Antonin .....	21
Clarke, Damien .....	5	Dyczkowski, Krzysztof .....	24, 26
Coheur, Luisa .....	13	Dziedzic, Mateusz .....	5
Conway, Anthony .....	17, 23	e Silva, Petronio Candido de Lima .....	30
Cordon, Oscar .....	28, 30	Echchtabi, Abdelwahed .....	9, 28
Cortes, Prometeo .....	17	Elias, Jonathan D. ....	11
Coupland, Simon .....	16	Ellerby, Zack .....	8, 32
Couturier, Pierre .....	32	Elmore, Paul .....	27
Cpalka, Krzysztof .....	10	Elsawah, Sondoss .....	20
Crisan, Gloria Cerasela .....	30	Endo, Alvaro .....	18
Criscione, Martina .....	27	Endo, Yasunori .....	15
Crockett, Keeley .....	13	Espinola, Rosa .....	11
Cross, Valerie .....	13, 22	Ewa, Rak .....	21
Cruz, Anderson .....	15	Exposito-Marquez, Airam .....	33
Cubillo, Susana .....	10	Fan, Weibei .....	11
Cuevas, Erik .....	18	Fang, Dianwu .....	25
Cuevas, Felizardo .....	17	Fernandez, Alberto .....	6, 7
Cuzzocrea, Alfredo .....	11	Fernandez, Javier .....	10, 28
Czerwinski, Dariusz .....	8, 32	Figuerola Garcia, Juan Carlos .....	17

Filippetti, Maria Laura.....	23	Hamdi, Ali.....	26
Fitz, Steve .....	5	Havens, Timothy .....	7, 10, 31
Flaminio, Tommaso.....	15	He, Hongmei .....	25, 29
Francisco Javier, Rodriguez-Lozano .....	8	He, Jiabao.....	12
Francisco, Vega .....	26	He, Jing.....	11
Frazao, Heloisa .....	31	He, Jun.....	19
Fuchs, Caro.....	6	He, Yanyan .....	9
Fuentemilla, Alvaro .....	26	Healing, Alex.....	19
Gaeta, Matteo .....	18	Heble-Lahera, Carlos.....	5
Galar, Mikel .....	10, 18	Hengshan, Zhang .....	19
Garcia Lorenzo, Maria M.....	8	Hernandez-Hernandez, Rolando Adonai.....	7, 22
Garcia-Galan, Sebastian.....	9	Herrera, Francisco .....	7, 28
Garibaldi, Jonathan .....	6, 8, 9, 21	Hillard, Trent .....	9
Garibaldi, Jonathan M. ....	9	Hinojosa, Edward.....	30
Garlatti, Serge .....	22	Hirata, Roberto.....	26
Gersnoviez, Andres.....	25	Holcapek, Michal.....	10, 12, 21, 31
Gilmour, Elizabeth.....	27, 31	Homenda, Wladyslaw .....	6, 27
Gilsing, Rick .....	7	Honda, Katsuhiko .....	27
Giommi, Luca .....	30	Hong, Tzung-Pei .....	21
Giovanni, Acampora.....	8	Hoshii, Keita.....	27
Giraldez-Cru, Jesus .....	28	Hoshino, Yukinobu.....	19
Gomez, Daniel .....	10, 11	Howedi, Aadel.....	24
Gonzalez, Antonio.....	8	Huang, Guangyan.....	11
Govinda Garcia-Valdovinos, Luis.....	22	Huang, Jinfang.....	25
Gramajo, Sergio .....	14	Huitzil, Ignacio.....	26, 33
Grau, Isel.....	8	Hussaini, Yousuff .....	9
Gray, John.....	29	Hussein, Aya .....	20
Grefen, Paul .....	7	Huynh, Tuan-Tu .....	20
Grimaccia, Francesco .....	25	Iam-On, Natthakan.....	19
Grochowalski, Piotr .....	32	Ibrahim, Omar .....	15
Grzegorzewski, Przemyslaw .....	28	Ignacio, Perez-Martinez .....	30
Gu, Xiaowei.....	22	Imoussaten, Abdelhak .....	23, 32
Guanfeng, Li.....	11	Ishibuchi, Hisao.....	30
Guelton, Kevin.....	12, 14	Islam, Muhammad .....	27, 32
Guerra, Maria Letizia.....	16	Ismail, Muhammad.....	12
Guerra, Marie-Thierry.....	12	Ismail, Raneem .....	12
Guevara, Jorge .....	26	Jacquín, Lucie .....	23
Guha, Debashree .....	21, 33	Jara, Leonardo.....	8
Guillaume, Romain.....	31	Jasinevicius, Raimundas .....	7
Guimaraes, Frederico Gadelha.....	30	Jastrzebska, Agnieszka .....	6, 27
Gunn, Justin .....	16	Javidi, Mohammad Masoud.....	6
Guo, Mengjiao.....	11	Jenkins, Paul.....	19
Guo, Sizong .....	11	Jerry Chun-Wei, Lin .....	21
Gutierrez, Inmaculada.....	11	Ji, Ze .....	29
Hadi, Ali .....	15	Jiang, Qian.....	25
Hadi, Nur Fajri Al Faridi.....	19	Jie, Lu .....	13
Hagras, Hani .....	5, 8, 9, 17, 23	Jie, Shang .....	11
Haig, Ella .....	32	Jin, Xin .....	25
Hairong, Wang .....	11	Jing, Yang .....	12
Hait, Swati Rani.....	21	Jobczyk, Krystian .....	33
Haiyan, Lu .....	13	John, Robert .....	8, 9, 16
Hall, Lawrence .....	22	Jose Manuel, Soto-Hidalgo.....	8, 30

Juan Carlos, Gamez-Granados .....	8	Lepore, Mario.....	18
Julian-Iranzo, Pascual.....	7	Lesot, Marie-Jeanne .....	5, 27
Kacprzyk, Janusz .....	5, 20	Leung, Carson K.....	11
Kakula, Siva Krishna .....	10, 31	Li, Jian.....	25
Kamesaka, Ryoki .....	19	Li, Jie.....	15
Karanika, Anna.....	6	Li, Runwei .....	11
Karczmarek, Pawel .....	6, 8, 20, 24, 32	Li, Yunyao .....	11
Kasperski, Adam .....	31	Liang, Bin .....	12
Kaushal, Meenakshi.....	13	Liang, You.....	6
Kaymak, Uzay .....	6	Liao, Huchang.....	9
Kazanavicius, Egidijus .....	7	Ligeza, Antoni .....	33
Keller, James .....	15, 27, 32	Lilik, Ferenc.....	12
Keller, James M. ....	33	Lin, Chih-Min.....	14, 20
Kepski, Michal .....	26	Lin, Chin Teng.....	23
Kern, Mathias .....	9	Lin, Faa-Jeng.....	25
Khan, Mohd Shoab.....	31	Lin, Hwei-Yung .....	20
Khorshidi, Hadi.....	16	Lin, Jerry Chun-Wei .....	21
Khosravi, Mohammadreza .....	24	Lingras, Pawan .....	9
Kiani, Mehrin .....	23	Liu, Feng .....	13
Kiersztyn, Adam .....	6, 8, 20, 32	Liu, Haitao.....	11
Kiersztyn, Krystyna .....	20	Liu, Xi .....	31
Kim, Du Yong .....	26	Lohani, Q M Danish .....	21
Kitowski, Ignacy .....	6, 32	Lohani, Q. M. Danish .....	16, 21
Kitsuregawa, Masaru .....	9	Lohani, Q.M. Danish .....	13, 31
Ko, Kwang-Man.....	32	Loia, Vincenzo .....	23
Koczy, Laszlo T.....	11, 12	Lopucki, Rafal .....	6, 32
Kolomvatsos, Kostas.....	6	Lotfi, Ahmad.....	19, 24, 30, 33
Konar, Amit.....	23, 30	Lothar, Seybold.....	26
Korytkowski, Marcin .....	27	Loukopoulos, Thanasis .....	6
Kosior, Dawid .....	28	Lourenzutti, Rodolfo.....	10
Kosko, Bart.....	26	Lu, Jiajia .....	31
Kostrzycka, Zofia.....	18	Lu, Jie .....	13, 14
Krol, Anna.....	32	Lu, Songfeng.....	18
Kuan, Wen-Kai .....	24	Lucca, Giancarlo .....	10
Kubota, Naoyuki.....	19, 24, 33	Lughofer, Edwin .....	5
Kukurowski, Norbert.....	24	Luukka, Pasi .....	15
Kumbasar, Tufan.....	14, 18, 33	M. Abd El-Karim, Rasha .....	30
Kurnianingsih, Kurnianingsih.....	19	Ma, Zongmin .....	11
Lages, Joao.....	13	MacDonald, Ross.....	9
Laha, Mousumi.....	23, 30	Madrid, Nicolas .....	21
Lam, Hak-Keung .....	4, 12	Maeda, Yoichiro .....	19
Lapa, Krystian .....	10	Magdalena, Luis.....	7, 9, 10
Laurent, Anne.....	31	Mani Tripathi, Achyut .....	13
Lazarini, Adalberto Zanatta Neder .....	12	Marcelloni, Francesco.....	27
Le, Tien-Loc .....	20	Marchewka, Adam .....	9
Lee, Chang-Shing .....	24	Marcin, Mrugalski.....	26
Lee, Min-Yen .....	18	Marcin, Witczak.....	26
Lee, Shin-Jye .....	25	Maria, Martinez-Rojas.....	30
Lei, Lei.....	7	Marin, Luis G.....	16
Leite, Daniel .....	29, 30	Marin, Nicolas .....	5, 7
Lendek, Zsofia.....	12, 14	Martin, Trevor.....	19
Leon-Garza, Hugo.....	17, 23	Martinez-Cruz, Carmen .....	14

Martinez-Hernandez, Uriel .....	7, 22	Naderpour, Mohsen .....	13
Martinez-Jimenez, Pedro Manuel .....	31	Nagai, Masao .....	18
Maruyama, Yoshihiro .....	15, 32	Nagar, Atulya K.....	30
Masuyama, Naoki .....	30	Nagar, Atulya K.....	23
Matyas, Amalia.....	12	Nagy, Szilvia .....	12
McCulloch, Josie .....	8, 32	Nagy, Zoltan.....	12
McGinnity, Martin .....	29	Nahavandi, Saeid.....	22
Medina Quero, Javier.....	14	Naik, Kshirasagar.....	19
Mehnen, Jorn .....	29	Naik, Nitin.....	19
Mehra, Priyanka .....	16, 33	Nascimento da Silva, Thiago .....	15
Mena, Eduardo.....	33	Nascimento, Thiago .....	15
Mencar, Corrado .....	7, 9, 19	Naser, Abdallah .....	19
Mendel, Jerry .....	14, 26, 27	Nava-Balanzar, Luciano .....	22
Mendonca, Marcio.....	20, 24	Neruda, Roman.....	17
Mendonca, Vania .....	13	Neveditsin, Nikita .....	9
Menezes, Matheus .....	31	Nguyen, Anh-Tu.....	12
Menezes, Paulo .....	17	Nguyen, Hoang .....	18
Meng, Qinggang.....	29	Nguyen, Sao Mai .....	22
Mengibar-Rodriguez, Miriam.....	33	Nishiyama, Yuka .....	19
Mephu Nguifo, Engelbert .....	31	Niu, Hanlin .....	29
Mesiar, Radko .....	10, 21, 33	Nobile, Marco S. ....	6
Meskauskas, Zygimantas.....	7	Nock, Kristen.....	27, 31
Mezzomo, Ivan .....	31	Nojima, Yusuke .....	30
Mieszkowicz-Rolka, Alicja .....	9	Notsu, Akira .....	27
Miles, Oliver.....	8	Nunes Borges, Eduardo .....	10
Minuk, Shael M. ....	11	Oikonomou, Panagiotis.....	6
Mitriakov, Andrei .....	22	Oliva, Diego .....	18
Mohamed, Shady .....	22	Olivas, Jose A. ....	13
Mohmed, Gadelhag.....	30	Oliveira, Lizandro .....	14
Mojaddadi Rizeei, Hossein.....	13	Omozaki, Yuichi .....	30
Mokrenko, Valeria .....	13	Orang, Omid .....	30
Molek, Vojtech.....	18	Owusu, Gilbert .....	9, 17, 23
Molenda, Piotr .....	28	Ozkan, Baris .....	7
Molina, Carlos .....	25	Pajak, Iwona .....	21
Montero, Javier .....	10	Palacios, Rodrigo H C .....	20
Montmain, Jacky .....	23, 32	Palhares, Reinaldo.....	12
Montusiewicz, Jerzy.....	24	Pandya, Bhavesh.....	33
Morales, Luis.....	14	Panella, Massimo.....	25
Moran, Antonio .....	18	Panoutsos, George .....	29
Moreno, Gines.....	6	Papadakis, Panagiotis .....	22
Moreno, Sylvain .....	31	Papageorgiou, Elpiniki .....	11, 24, 29
Moreno-Garcia, Juan .....	5	Papageorgiou, Elpiniki I .....	20
Moreno-Perez, Jose A. ....	33	Papageorgiou, Konstantinos.....	24
Moura, Rodrigo .....	14	Papandrianos, Nikolaos .....	24
Moussa, Ahmed .....	15	Parra, Sebastian .....	16
Moutinho, Alexandra .....	17	Parry, Ian .....	24
Mrukowicz, Marcin .....	26, 28	Parsa, Pooya .....	17
Muhuri, Pranab K. ....	7, 16, 20, 21, 33	Paseka, Jan .....	21
Muller, Beate .....	5	Pasi, Gabriella.....	29
Munoz-Carpintero, Diego .....	16, 18	Pasquale Junior, Salma .....	23
Munoz-Exposito, Enrique .....	9	Patalas-Maliszewska, Justyna.....	21
Mussetta, Marco.....	25	Paternain, Daniel .....	10, 18

Paul, Rahul.....	22	Revault d'Allonnes, Adrien.....	27
Pazera, Marcin .....	24	Riaza, Jose A.....	6
Pecori, Riccardo.....	6, 23	Rico, Agnes.....	10
Pedrammehr, Siamak .....	22	Rigato, Silvia.....	23
Pedrycz, Witold .....	6, 8, 20, 27	Rios, Tatiane.....	14
Pekala, Barbara .....	24, 26, 28	Rivas-Gervilla, Gustavo .....	5
Pena-Rios, Anasol .....	17, 23	Rivieccio, Umberto.....	15
Penugonda, Ravi Kumar .....	9	Rodriguez-Benitez, Luis.....	5
Pereira Dimuro, Gracaliz.....	10	Rolka, Leszek .....	9
Pereira, Martin.....	7	Roman Flores, Heriberto .....	17
Perez, Raul.....	8	Roman, Raul-Cristian .....	22
Perez-Prado, Rocio.....	9	Romero, Francisco P. ....	13
Perfilieva, Irina .....	18	Rosales, Andres.....	14
Perrin, Didier .....	23	Rosato, Antonello.....	25
Peska, Ladislav .....	25	Rozman, Josip .....	5
Petrauskas, Vytautas .....	7	Rubio-Solis, Adrian .....	7, 22
Petriu, Emil M.....	22	Rudnik, Katarzyna.....	20
Petry, Fred.....	27	Ruiz-Reyes, Nicolas.....	9
Phan, Thuong-Cang.....	31	Runkler, Thomas.....	16
Pilka, Tomasz.....	24	Ruprecht, Blake .....	27
Pilla, Mauricio .....	14	Rzasa, Wojciech .....	26, 28, 32
Pinar, Anthony.....	10, 31	S. El-Baz, Ayman.....	30
Pinheiro, Jocivania .....	15	Sachan, Swati.....	14
Pinho da Silva, Tiago .....	14	Saenz-Perez, Fernando.....	7
Pintea, Camelia-M.....	30	Saez, Doris .....	16, 18
Pivert, Olivier.....	5	Sakalli, Ahmet .....	14
Poeschke, Florian .....	25	Sakthivel, Rathinasamy .....	14
Polap, Dawid.....	27	Salgado-Jimenez, Tomas .....	22
Polepalli, Krishna Reddy .....	9	Salim, Flora.....	26
Pop, Petrica C. ....	30	Salles Santos, Helida.....	10
Popescu, Mihail.....	15	Sanchez, Daniel.....	5, 7
Pourabdollah, Amir.....	15, 24, 30, 33	Santana, Marcio.....	29
Pozo, David .....	14	Santos, Ana Lucia.....	13
Prados-Suarez, Belen .....	25, 31	Santos, Helida.....	27
Precup, Radu-Emil .....	22	Sanz, Jose Antonio.....	27
Preitl, Stefan.....	22	Sardinha, Alberto .....	13
Pusz, Piotr .....	32	Sarmiento, Edgar .....	30
Qi, Zhimin .....	7	Savage, Nick.....	19
Qiang, Shen .....	12	Savvaris, Al .....	29
Rafal, Rak.....	21	Scherer, Rafal .....	27
Rage, Uday kiran .....	9	Schneider, Guilherme .....	14
Rak, Ewa .....	26, 28	Schneider, Markus.....	26
Ramezani, Fahimeh.....	13	Schulte, Horst .....	25
Ramirez de Okariz, Julian .....	7	Scott, Grant.....	27
Ramos-Soto, Alejandro .....	5	Seddiki, Mouad .....	9
Rath, Jagat.....	12	Senatore, Sabrina .....	23
Rattan, Kuldip.....	12	Sengupta, Dipankar .....	8
Razak, Tajul .....	6	Sengupta, Nandita .....	23
Razak, Tajul Rosli .....	9	Serradilla, Oscar .....	7
Reddy, Tharun Kumar.....	23	Serrano, Jose Maria.....	14
Reiser, Renata .....	14	Serrano-Guerrero, Jesus .....	13
Renda, Alessandro.....	27	Sesma-Sara, Mikel.....	10

Seth, Taniya .....	7, 33	Todorovic, Milan.....	14
Shafipour Yourdshah, Elnaz .....	22	Toja-Alamancos, Javier .....	32
Shahidi, Mina .....	16	Torres, Carmen.....	10
Shao, Shuai.....	33	Touil, Achraf.....	9, 28
Shen, Qiang .....	11	Touny, Huda .....	15
Shen, Zixiao .....	21	Tran, Thi-To-Quyen .....	31
Shih, Cheng-Ming .....	25	Tran, Van Luan .....	20
Shinomiya, Yuki .....	19	Triguero, Isaac .....	6
Shukla, Amit .....	5, 17	Trillo, Jose Ramon .....	7
Shu-Min, Li .....	21	Trousset, Francois .....	23
Shyue-Liang, Wang.....	21	Tsai, Yi-Lin .....	24
Siciliano, Roberta .....	8	Tsourdos, Antonios .....	29
Silva, Petronio .....	29	Turetken, Oktay .....	7
Silva, Rodrigo.....	30	Tuy, Petala.....	14
Simic, Milan.....	14	Tzung-Pei, Hong.....	21
Skorupova, Nicole .....	12	Ubukata, Seiki.....	27
Skrjanc, Igor .....	16, 27	Ulukan, Ziya .....	17
Skrzeszewska, Malgorzata .....	21	Uriz, Mikel .....	10
Smits, Gregory .....	5	Vanhoof, Koen .....	11, 29
Smutnicki, Czeslaw .....	20	Varshney, Ayush K. ....	16, 21
Song, Jingping .....	19	Venayagamoorthy, Ganesh .....	25
Song, Yafei.....	7	Veryard, Lewis .....	17
Song, Yiliao .....	13	Vilas, Raul.....	6
Sorini, Laerte .....	16	Vitiello, Autilia.....	8
Sousa, Maria Joao .....	17	Viviani, Marco .....	29
Souza, Paulo.....	29	Vojtas, Peter .....	25
Souza, Paulo A.de .....	11	Von Zuben, Fernando J. ....	30
Spolaor, Simone.....	6	Wagner, Christian .....	8, 9, 31, 32
Srivastava, Gautam.....	21	Wan, Runjun .....	11
Stamoulis, George .....	24	Wang, Huidong .....	13
Stefanini, Luciano.....	16	Wang, Mei-Hui .....	24
Stepin, Ilia.....	7	Wang, Ruchuan .....	11
Stepnicka, Martin .....	12	Wang, Shuangdi .....	31
Stetter, Ralf .....	22	Wang, Tiantian.....	11
Stockdale, Martin .....	31	Wang, Xingyi.....	14
Straccia, Umberto .....	33	Wang, Xueqian .....	12
Stubbs, Chris.....	31	Wang, Yihan .....	6
Szajerman, Dominik .....	27	Wang, Yukai.....	23
Szczur, Adam.....	26	Wang, Yu-Kai.....	5
Szedlak-Stinean, Alexandra-Iulia .....	22	Wang, Ziwei .....	12
Sziova, Brigita .....	12	Wardihani, Eni Dwi.....	19
Szkola, Jaroslaw .....	24, 28	Wegrzyn, Patryk.....	24
Szmidt, Eulalia .....	20	Weijun, Li .....	11
T. El-Melegy, Moumen .....	30	Wei-Ming, Huang .....	21
Takac, Zdenko .....	10	Wen, Yu .....	26
Tan, Kuang-Hsiung .....	25	Wieczynski, Jonata Cristian .....	10
Teixeira, Marcelo Carvalho Minhoto .....	12	Wikarek, Jaroslaw .....	20
Thavaneswaran, Aerambamoorthy.....	6	Wilbik, Anna .....	5, 7
Thulasiram, Ruppa K. ....	6	Wilkin, Tim .....	7
Tianhua, Chen.....	19	Wilkin, Timothy.....	32
Tiwari, Ashutosh.....	21, 25	Witczak, Marcin.....	20, 24
Tiwary, Bikash.....	22	Wozniak, Marcin .....	27



Wu, Jimmy Ming-Tai .....	21	Zareba, Lech.....	28
Wu, Wenlong.....	27	Zbigniew, Banaszak.....	26
Xu, Dong Ling .....	31	Zbyryt, Adam.....	6, 32
Xu, Feng.....	12	Zeinulla, Elzhan .....	24
Xue, Shanshan.....	11	Zettsu, Koji .....	9
Yamamoto, Kohei.....	33	Zhang, Guangquan .....	13, 14
Yamamoto, Shion.....	19	Zhang, Hailin.....	7
Yamamoto, Toshimi .....	19	Zhang, Hui .....	12
Yamin, Adenauer .....	14	Zhang, Pu .....	11
Yang, Cody Xiaozhan .....	24	Zhang, Tao.....	12
Yang, Jian Bo.....	31	Zhang, Zhiwang .....	11
Yang, Longzhi .....	19	Zhang, Zhiying .....	9
Yang, Zhao-Xu .....	22	Zheng, Hui .....	11
Yanping, Chen .....	19	Zhong, Junpei .....	19
Yao, Jinli.....	13	Zhong, Zhixiong .....	14, 20
Yao, Shaowen.....	25	Zhongmin, Wang.....	19
Yazici, Adnan .....	24	Zhu, Zimo.....	6
Yousri, Dalia.....	18	Zielinski, Pawel .....	31
Yu, Fusheng.....	6, 27	Zmuda, Michael .....	22
Yusuf, Hesham.....	29	Zugasti, Ekhi .....	7
Zadrozny, Slawomir .....	5	Zundert, Andre Van.....	11
Zaionc, Marek .....	18	Zurutuza, Urko .....	7
Zalasincki, Marcin .....	10	Zywica, Patryk.....	26