NAFIPS 2024 Program

Day 1: May 27	
8:30 – 9:00 am Registration	
9:00 – 9:10 am Opening	
9:10 – 10:10 am Plenary 1: Non-monotonic Commonsense Reasoning with Intermediate Quantifiers, *Vilem Novak*, Session chair: Vladik Kreinovich	
10:10 – 10:30 am Coffee Break	
10:30 – 11:30 am Panel: Celebrating Prof. Michio Sugeno's educational and research contributions in Fuzzy Systems. Moderator: *Kelly Cohen*	
11:30 am – 12:30 pm Session 1a Explainable AI: 3, 12, 41 Session chair: Scott Dick 1. From Fuzzy to Clear: Visualizing System through Heatmaps Derived from Approximate Inverse Model Explanations and Membership Function Activity, *Takafumi Nakanishi* 2. DCNFIS Regularization via Rule and Consequent Function Dropout Mechanisms, *Mojtaba Yeganejou, Scott Dick, and Michael Lipsett* 3. Equivalence between TSK Fuzzy Systems with Triangular Membership Functions and Neural Networks with ReLU Activation on the Real Line, *Barnabas Bede, Vladik Kreinovich, and Peter Toth*	11:30 am – 12:30 pm Session 1b Fuzzy Theory: 6, 7, 23 Session Chair: Daniel Schwartz 1. On the fuzzy Ishigami function, *Juan Carlos Figueroa-Garcia, Roman Neruda, and Carlos Franco* 2. Strong Equivalence of Fuzzy Propositions, *Daniel Schwartz* 3. Why Bernstein Polynomials: Yet Another Explanation, *Olga Kosheleva and Vladik Kreinovich*
12:30 – 1:30 pm Lunch	12:30 – 1:30 pm Lunch +NAFIPS board mtg
1:30 – 2:30 pm Plenary 2: Machine learning for cooperative robotics and healthcare, *Anoop Sathyan*, 2023 Early Career Award Recipient, Session chair: Julia Rayz	
2:30 – 2:40 pm Coffee break	

2:40 – 4:00 pm Session 2 a Special session on Large Language Models 10, 14, 48, 45 Session chairs: Geetanjali Bihani and Tatiana Ringenberg 1. "Magic mirror on the wall, who's the fairest of them all": relying on LLM for accurate information, *Yifei Hu, Tatiana Ringenberg, Tianyi Li, and Julia Rayz* 2. Evaluating Language Models on Grooming Risk Estimation Using Fuzzy Theory, *Geetanjali Bihani, Tatiana Ringenberg, and Julia Rayz* 3. Beyond the Noisy Form: Fuzzy Author Role Classification with Intention, *Damin Zhang and Julia Rayz* 4. A Fuzzy Evaluation of Sentence Encoders on Grooming Risk Classification, *Geetanjali Bihani and Julia Taylor Rayz*	2:40 – 4:00 pm Session 2 b Applications of fuzzy systems in Life Sciences: 4, 11, 13, 1 Session chair: Vinicius Wasques 1. Evolutionary Optimization of 1D-CNN for Non-contact Respiration Pattern Classification, *Md Zobaer Islam, Sabit Ekin, John O'Hara, and Gary Yen* 2. Linear Fuzzy Difference Equations via Hamacher t-norm: Application to the Plant Growth Dynamic, *Vinicius Wasques and Jefferson Alves* 3. Fitting interval data through interactive arithmetic: Application in Saccharomyces cerevisiae growth, *Pedro Zanineli, Paola Ferrari, Vinicius Wasques, Joao Netto, and Juliana Smetana* 4. Modified Hargreaves Equation Using Interval Type-2 Fuzzy Logic System for Predication of Reference Evapotranspiration: Case Study for Arid Climate Region of Gujarat, *Himanshukumar Patel*
4:00 – 5:20 pm Session 3 a Genetic Fuzzy Systems: 15, 25, 31, 33 Session chair: Pawan Lingras 1. Optimizing Platoon Time Gap Following on the Highway Using Genetic Fuzzy Systems, *Heath Palmer, Kelly Cohen, and Anoop Sathyan* 2. Improving Redundant Manipulator Control with Genetic Fuzzy Systems, *Sathya Karthikeyan, Anirudh Chhabra and Donghoon Kim* 3. Robust Control of Linear Second-Order System by Genetic Fuzzy Tree, *Waite Wiedeman and Kelly Cohen* 4. Trustworthy AI for landmine detection using Genetic Fuzzy Systems, *Wilhelm Louw and Kelly Cohen*	4:00 – 5:00 pm Session 3 b Fuzzy Numbers and Functions:19,21,35,52 Session chair: Humberto Bustince 1. p-Fuzzy Gradient Descent Method, *Nilmara Pinto, Vinicius Wasques, Washington Oliveira, Laecio C. Barros, and Estevao Esmi* 2. Fuzzy functions for MRI flow analysis, *Geetanjali Bihani, Vitaliy Rayz, and Julia Rayz* 3. From Historically First "Unary" Numbers, Through Egyptian Fractions, Roman Numerals, Leibniz's Binary Numbers and Kepler's Fractions to Modern Ideas Such as Calkin-Wilf Tree: A Unified Approach to Representing Natural Numbers and Fractions, *Olga Kosheleva, Vladik Kreinovich, Christian Servin, and Shahnaz Shahbazova*

Day 2: May 28

8:30 – 9:00 am Registration

9:00 – 10:00 am Plenary 3: Feedforward Neural Networks: Interpretability in the Hands of Mathematics, *Irina Perfilieva,* Session chair: Barnabas Bede

10:00 – 10:20 am Coffee Break

10:20 – 11:30 am Special session on the Explainable Fuzzy Competition (XFC 2024). Moderator: *Tim Arnett*

11:30 am – 12:30 pm Session 4a Special Session: Fuzzy Education 8,18,37 Session Chair: Christian Servin 1. How Difficult Is It to Comprehend a Program That Has Significant Repetitions: Fuzzy-Related Explanations of Empirical Results*, Christian Servin, Olga Kosheleva, and Vladik Kreinovich* 2. Fuzzy Education: The potential for an Agentic AI System to Advance Precision Medical Education using Large Language Models, Fuzzy Logic and Shapley Values, *Laurah Turner, Matthew Kelleher, Andrew Zahn, Eric Warm, David Furniss, Anoop Sathyan, Weibing Zheng, Seth Overla, and Kelly Cohen* 3. A Generative Model for Assessing Computing Education: The Fuzzy Bloom's Taxonomy Approach, *Christian Servin, Dan Padilla, Olga Kosheleva, and Vladik Kreinovich*	**11:30 am – 12:30 pm Session 4b** Engineering applications on fuzzy systems: 9, 16, 47 Session Chair: Maxim Serezhin 1. Prediction Interval Fuzzy Model for Bath Temperature Estimation in an Electric Arc Furnace, *Aljaz Blazic, Igor Skrjanc and Vito Logar* 2. Genetic Fuzzy Route Interception of Known Evader's Path, *Daniel Heitmeyer, Justin Ouwerkerk, and Kelly Cohen* 3. Fuzzy Logic System for Optimal Control of Power Grid Demand Response Using Bitcoin Mining, *Maxim Serezhin, Kelly Cohen, Adam Phillips and Ivan Serezhin*
12:30 – 1:30 pm Lunch	12:30 – 1:30 pm Lunch +NAFIPS board mtg if needed

1:30 – 2:30 pm Plenary 4: The Need for Responsible AI and Opportunities for our NAFIPS Community, *Kelly Cohen,* Session chair: Irina Perfilieva

2:30 – 2:40 pm Coffee break

2:40 – 4:00 pm Session 5 a Interval and Fuzzy Uncertainty: 22, 26, 27, 29 Session Chair: Vladik Kreinovich 1. McFadden's Discrete Choice and Softmax under Interval (and Other) Uncertainty: Revisited	**2:40 – 4:20 pm Session 5 b** Online session: 2, 21, 28, 34, 46 Session Chair: Nick Ernest 1. Linear Equations in the Ring of S(A)-Linearly Correlated Fuzzy Numbers, *Beatriz Laiate and Peter Sussner*

Bartlomiej Kubica, Olga Kosheleva, and Vladik Kreinovich 2. Somewhat Surprisingly, (Subjective) Fuzzy Technique Can Help to Better Combine Measurement Results and Expert Estimates into a Model with Guaranteed Accuracy: Digital Twins and Beyond, *Niklas Winnewisser, Michael Beer, Olga Kosheleva, and Vladik Kreinovich* 3. How to Gauge Inequality and Fairness: A Complete Description of All Decomposable Versions of Theil Index, *Saeid Tizpaz Niari, Olga Kosheleva and Vladik Kreinovich* 4. From Aristotle to Newton, from Sets to Fuzzy Sets, and from Sigmoid to ReLU: What Do All These Transitions Have in Common?, *Christian Servin, Olga Kosheleva and Vladik Kreinovich*	2. Front-propagation Algorithm: Explainable AI Technique for Extracting Linear Function Approximations from Neural Networks, *Javier Viana* 3. On Covering Properties in Intuitionistic Fuzzy Topological Spaces: A survey, *Francisco Gallego Lupianez* 4. Comparative Analysis: LSTM Deep Network vs. Fuzzy Inference System for Time Series Data Prediction Accuracy, *Sai Venkatesh Bhavanam and Devinder Kaur* 5. On Fuzzy Ideals and Fuzzy Filters of an ADFL, *Bekalu Tarekegn Bitew and Berhanu Assaye Alaba*
4:00 – 5:20 pm Session 6 Explainable AI: 5, 24, 44, 53 Session chair: Fernando Gomide 1. High-Performance Stochastic Simulations of Parental Vaccine Acceptance and Disease Spread Over a Bilayer of Household Networks, *Andras Balogh* 2. Adaptive Level Set Fuzzy Modeling, *Leandro Maciel, Rosangela Ballini, and Fernando Gomide* 3. Explainable Fuzzy AI for Physics Simulation, *Michael Riches, Erik Mohrmann and Barnabas Bede* 4. Outlier Removal in Classification Datasets via Extracted Rules of a Deep Neuro-Fuzzy System, *Mojtaba Yeganejou, Scott Dick, and Michael Lipsett*	
Break (walk to Courtyard Marriott)	
6:30 – 9:00 Awards Dinner (Courtyard Marriott)	

Day 3: May 29
9:00 – 10:30 am Panel: Responsible AI & the Potential of Fuzzy Systems. Moderator: *Kelly Cohen*
10:30 – 10:50 am Coffee Break
10:50 – 11:30 pm Expo: Demo AI wingman/HoloLens fuzzy systems. Moderator: *Nick Ernest*
11:30 – 12:30 pm NAFIPS general meeting
12:30 – 1:30 pm Lunch
1:30 – 2:30 pm Session 7 Aggregation operators and special session on Education: 38, 51 Session chair: Vladik Kreinovich 1. A new family of Choquet-inspired aggregation functions, *Humberto Bustince* 2. Enhancing Understanding of Responsible AI in Artificial Intelligence Course through Video Assignment, *Palak Shah and Kelly Cohen,* 3. Shall We Place More Advanced Students in a Separate Class? *Shahnaz Shahbazova, Olga Kosheleva and Vladik Kreinovich*
2:30- 2:40 pm Coffee Break
2:40 – 4:20 pm Session 8 Aerospace Engineering Applications: 20, 30, 39, 42, 43 Session Chair: Tim Arnett 1. Genetic Fuzzy Tree-based Routing for Sail Plane in Atmospheric Waves, *Timothy Arnett, Zachariah Phillips, and Nicholas Ernest* 2. Implementation of a Genetic Algorithm into F-4 Phantom Autopilot, *Isabella Allen and Kelly Cohen* 3. A model agnostic eXplainable AI based fuzzy framework for sensor constrained Aerospace maintenance applications, *Bharadwaj Dogga, Anoop Sathyan, and Kelly Cohen* 4. Enhancing Spacecraft Relative Motion Control through Fuzzy Inference System Interpretability, *Daegyun Choi and Donghoon Kim* 5. Fuzzy Logic Based Risk Assessment for Multi-Rotor Precision Landing, *Rebecca Gilligan, Justin Ouwerkerk, and Kelly Cohen*
5:00 – 5:10 Closing