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IEEE CIS Newsletter, Issue 82, November 2019

Enrique H. Ruspini – In Memoriam

On 15 October 2019, the IEEE Computational Intelligence Society (CIS) lost a great volunteer, Dr. Enrique Ruspini, who devoted a large portion of his professional life to the conception, development and growth of CIS. On the same day, our scientific community lost a great scientist, as Enrique was one of the first pioneers in fuzzy clustering and approximate reasoning, providing a similarity-based interpretation of fuzzy logic. Finally, Bernadette and Piero, and many of us, lost Enrique, a great friend, who was always ready to help on a moment notice. It is difficult to describe Enrique in a few words, and it is even more difficult to separate the volunteer from the scientist from the man. Enrique H. Ruspini received his degree of Licenciado en Ciencias Matemáticas from the University of Buenos Aires, Argentina, and his doctoral degree in System Science from the University of California at Los Angeles. He was one the earliest contributors to the development of fuzzy set theory and its applications, having introduced its use to the treatment of numerical classification and clustering problems. He also made significant contributions to the understanding of the foundations of fuzzy logic and approximate-reasoning methods. His recent research focused on the application of fuzzy logic techniques to the development of systems for intelligent control of teams of autonomous robots, information retrieval, qualitative description of complex objects and knowledge discovery and pattern matching in large databases.

Dr. Ruspini was the author of over 100 original research papers, a Life Fellow of the Institute of Electrical and Electronics Engineers, a First Fellow of the International Fuzzy Systems Association, a Fulbright Scholar, and a SRI Institute Fellow. He received the Meritorious Service Award of the IEEE Neural Networks Society for leading the transition of the Neural Networks Council into Society status. He was one of the founding members of the North American Fuzzy Information Processing Society and the recipient of that society's King-Sun Fu

CIS Conferences

⭐ Conference Calendar (2019-2021)

⭐ 2019 IEEE Symposium Series on Computational Intelligence (IEEE SSCI 2019)
Xiamen, China
6-9 Dec. 2019

⭐ 2020 12th International Conference on Agents and Artificial Intelligence (ICAART)
Valletta, Malta
22-24 Feb. 2020

⭐ 4th International Conference on Computational Intelligence and Networks (CINE 2020)
Kolkata, India
27-29 Feb. 2020

⭐ 2020 IEEE Conference on Evolving and Adaptive Intelligent Systems (EAIS)
Bari, Italy
27-29 May 2020

⭐ 2020 IEEE International Conference on Computational Intelligence and Virtual Environments for Measurement Systems and Applications

Award. Dr. Ruspini was also the recipient of the 2009 Fuzzy Systems Pioneer Award of the IEEE Computational Intelligence Society and the 2018 IEEE Frank Rosenblatt Award.

Dr. Ruspini was a member of the IEEE Board of Directors (Division X Director, 2003–2004), the Past-President (President-2001) of the IEEE Neural Networks Council and its past Vice-president of Conferences. Dr. Ruspini, who has led numerous IEEE technical, educational, and organizational activities, was also a member of the Administrative Committee of the IEEE Computational Intelligence Society and of its Awards and Constitution and Bylaws Committee, as well as its Vice-President for Finance from 2013 to 2018.

However, the description of his accomplishments as a volunteer and as a scientist fails to capture Enrique's passion for life, his outgoing personality, and his breadth and depth of scientific and cultural knowledge. We have known Enrique since the late 70's and we have enjoyed his friendship ever since. Needless to say, we have numerous anecdotes on Enrique's character and personality that we would like to share with you. For the sake of brevity, we will each describe one.

Sharing with Enrique a common interest in soccer and wine, Piero can still vividly remember the day when Italy was playing against Argentina in the 1990 World Cup Semifinals. Enrique and Piero were in Paris, attending the 1990 International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems (IPMU), which was organized by Bernadette. We decided to take a break from the conference to watch the game in Piero's room, which had a large screen TV. We were obviously rooting for our respective teams but we also behaved with civility towards each other. After a tied game (1-1) at the end of regulation time, Argentina ended up winning 4-3, on penalty kicks - well Argentina had Maradona and Italy did not… Enrique was torn by two opposing feelings: the joy of witnessing the victory of his team and the sorrow of watching Piero sad and distressed (yes, soccer could be an emotionally moving sport). He called room service and ordered a bottle of Chardonnay, which they consumed together, discussing some of the salient points of the soccer game and of course both complaining about the referee… It was typical vintage Enrique.

Bernadette still remembers his energy and dynamism when participating in the first meetings gathering the emerging fuzzy community. The most surprising for her was probably to see him in Acapulco, where they were participating in the International Congress on Applied Systems Research and Cybernetics in December 1980. After the sessions, a small group went to the beach and Enrique disappeared at some point, to suddenly appear again, but in the sky, doing some sort of parasailing. They could not believe what they saw!

He was a strong supporter of brand new fuzzy conferences. Bernadette cannot forget that he actively participated in the first issue of the IPMU conference in Paris and he continued to attend it regularly during many years. He was also a plenary lecturer at the first edition of the French annual fuzzy conference, Rencontres Francophones sur la Logique Floue et ses Applications, held in Paris in 1995, which he attended in spite of a general strike in France that eliminated all means of transportation.

Enrique loved computers, travel, astronomy, photography, history, music, opera, and sports. He loved science and people. He was the corporate memory for IEEE CIS, he was a mentor and a friend. We will miss him.

Bernadette Bouchon-Meunier
Paris, France

Piero P. Bonissone
San Diego, CA, USA

Research Frontier

QoE-Driven Content-Centric Caching With Deep Reinforcement Learning in Edge-Enabled IoT

When humans learn several skills to solve multiple tasks, they exhibit an extraordinary capacity to transfer knowledge between them. The authors present here the last enhanced version of a bioinspired reinforcement-learning (RL) modular architecture able to perform skill-to-skill knowledge transfer and called transfer expert RL (TERL) model. TERL architecture is based on a RL actor-critic model where both actor and critic have a hierarchical structure, inspired by the mixture-of-experts model, formed by a gating network that selects experts specializing in learning the policies or value functions of different tasks. A key feature of TERL is the capacity of its gating networks to accumulate, in parallel, evidence on the capacity of experts to solve the new tasks so as to increase the responsibility for action of the best ones. A second key feature is the use of two different responsibility signals for the experts' functioning and learning: this allows the training of multiple experts for each task so that some of them can be later recruited to solve new tasks and avoid catastrophic interference. The utility of TERL mechanisms is shown with tests involving two simulated dynamic robot arms engaged in solving reaching tasks, in particular a planar 2-DoF arm, and a 3-D 4-DoF arm.

IEEE Computational Intelligence Magazine, Nov. 2019

A Multistage Game in Smart Grid Security: A Reinforcement Learning Solution

Existing smart grid security research investigates different attack techniques and cascading failures from the attackers' viewpoints, while the defenders' or the operators' protection strategies are somehow neglected. Game theoretic methods are applied for the attacker-defender games in the smart grid security area. Yet, most of the existing works only use the one-shot game and do not consider the dynamic process of the electric power grid. In this paper, we propose a new solution for a multistage game (also called a dynamic game) between the attacker and the defender based on reinforcement learning to identify the optimal attack sequences given certain objectives (e.g., transmission line outages or generation loss). Different from a one-shot game, the attacker here learns a sequence of attack actions applying for the transmission lines and the defender protects a set of selected lines. After each time step, the cascading failure will be measured, and the line outage (and/or generation loss) will be used as the feedback for the attacker to generate the next action. The performance is evaluated on W&W 6-bus and IEEE 39-bus systems. A comparison between a multistage attack and a one-shot attack is conducted to show the significance of the multistage attack. Furthermore, different protection strategies are evaluated in simulation, which shows that the proposed reinforcement learning solution can identify optimal attack sequences under several attack objectives. It also indicates that attacker's learned information helps the defender to enhance the security of the system.

IEEE Transactions on Neural Networks and Learning Systems, Sept. 2019

Editor

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Structural Risk Minimization-Driven Genetic Programming for Enhancing Generalization in Symbolic Regression

Generalization ability, which reflects the prediction ability of a learned model, is an important property in genetic programming (GP) for symbolic regression. Structural risk minimization (SRM) is a framework providing a reliable estimation of the generalization performance of prediction models. Introducing the framework into GP has the potential to drive the evolutionary process toward models with good generalization performance. However, this is tough due to the difficulty in obtaining the Vapnik-Che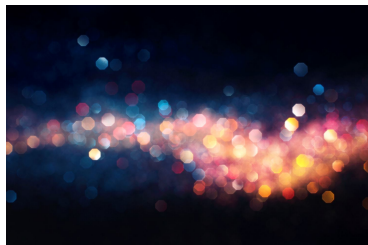rvonenkis (VC) dimension of nonlinear models. To address this difficulty, this paper proposes an SRM-driven GP approach, which uses an experimental method (instead of theoretical estimation) to measure the VC dimension of a mixture of linear and nonlinear regression models for the first time. The experimental method has been conducted using uniform and nonuniform settings. The results show that our method has impressive generalization gains over standard GP and GP with the 0.632 bootstrap, and that the proposed method using the nonuniform setting has further improvement than its counterpart using the uniform setting. Further analyzes reveal that the proposed method can evolve more compact models, and that the behavioral difference between these compact models and the target models is much smaller than their counterparts evolved by the other GP methods.

IEEE Transactions on Evolutionary Computation, Aug. 2019

Semisupervised Fuzzy Clustering With Partition Information of Subsets

Pairwise constraint is a type of side information that is widely considered in existing semisupervised clustering approaches. In this paper, we explore a new form of supervision for clustering. We consider the partition results of a number of subsets as additional information to assist clustering. Compared to the pairwise constraint, which only involves the "must-link" or "cannot-link" relationship of two objects, the partition of a subset of objects provides information about the group structure of more objects and hence can possibly serve as a more effective form of supervision for clustering. In this paper, we instantiate the idea of clustering with subset partitions under the fuzzy clustering framework for document categorization. The proposed fuzzy clustering approach is formulated to learn from the partition of subsets and has the ability to handle high-dimensional document data. Specifically, the partition results of subsets are collectively transformed into pairwise relationships, based on which a penalty term is constructed and incorporated into a cosine-distance-based fuzzy c-means approach. The experimental results on benchmark data sets demonstrate the effectiveness of the proposed approach for a semisupervised document clustering.

IEEE Transactions on Fuzzy Systems, Sept. 2019

Educational Activities

Call for Applications: Global Scientist Interdisciplinary Forum 2020

The Global Scientist Interdisciplinary Forum at Southern University of Science and Technology (SUSTech) is an important conference for talent recruitment. It aims to provide a platform for young scholars at home and abroad to network and exchange their research ideas, and to find out the ambitious goals of SUSTech becoming a world-class research university. It also provides a unique forum for the participants to interact with existing faculty members of SUSTech in Shenzhen, China.

Forum Schedule
Application Deadline: 15 December 2019
Registration Date: 3 January 2020
Date of the Forum: 4-5 January 2020

An introduction to SUSTech, research presentations, and tours inside SUSTech and Shenzhen City will be arranged during the Forum.

For more information on how to apply to join the forum, visit http://bme.sustech.edu.cn/en/gsif_2020/. The application will close on 15 December, 2019. Successful applicants will receive the invitation before 20 December 2019.

Call for Submissions: 3-Minute Thesis and Elevator Pitch Webinar Competitions

IEEE Computational Intelligence Society are pleased to announce two exciting competitions.

Competition 1: Three Minute Thesis (3MT®) is a competition that challenges doctoral students to describe their research to a non-specialist audience in just three minutes. For this competition, you will be allowed to only use a maximum of 4 slides in your webinar and no other resources or props. Competition is open to students only.

Competition 2: Two minute Elevator Pitch – It in this competition you need to summarize your Computational Intelligence based research, by telling people in simple English, what you do, what is your solution, and why does it matter. Competition is open to all.

Prizes for each competition
1st prize - US$300, 2nd prize - US$200, 3rd prize - US$100

Important Dates
Opening Date: 21 October 2019
Closing Date: 29 November 2019
Announcement of Winners: December 2019

Competition Submission
You will be required to submit a Webinar Title, Abstract, a URL to webinar (maximum 3 minutes). The webinar can be submitted as a URL to *any* repository e.g. (YouTube, Youku, BiliBili, Dropbox, Github, Google Drive, etc...). The webinar must be narrated in English.

How your submission will be judged ?
Submissions will be judged by a panel of CI Experts based on the novelty of the computational intelligence approach, soundness, relevance to emerging topics in CI, presentation and clarity. The popularity of your webinar (number of "likes" vs "dislikes" and comments in YouTube) will be taken into consideration.

For more information contact: cis-webinar-competition@ieee.org.

The IEEE Computational Intelligence Society has the right to declare any prize void.

CIS Student Research supported by CIS grants

Work has been completed on two CIS student research projects, each supported by a 2019 CIS Graduate Student Research Grant, as detailed below:

- Jinli Yao for the project "An Area-based Similarity Measure for Interval Type-2 Fuzzy Set and Its Application to Multi-attribute Decision Making"
- Xue Jiang for the project "Active Learning and Deep Learning for Adversarial Attacks in EEG-Based Brain-Computer Interfaces"

Research papers reporting results can now be seen on the CIS Graduate Student Research Grants webpage.

2020 Graduate Student Research Grants: Upcoming Call for Applications (15 Mar)

The IEEE Computational Intelligence Society (CIS) funds scholarships for deserving undergraduate, graduate and PhD students who need financial support to carry out their research during an academic break period. The primary intent of these scholarships is to cover the expenses related to a visit to another university, institute or research agency for collaboration with an identified researcher in the field of interest of the applicant. Funds can be used to cover travel expenses as well as certain living expenses (such as housing).The field of interest of applicants is open, but should be connected with identifiable component of the CIS (neural networks, fuzzy systems, or evolutionary computation). The call for the next round of applications will have a deadline for submission of 15 March 2020. More information on the scheme can be found on the CIS Graduate Student Research Grants webpage.

Technical Activities

Call for Applications: Become the Editor-in-Chief of Connection Science

Connection Science is an international interdisciplinary peer reviewed journal exploring the convergence of the analytic and synthetic sciences of mind including psychology, neuroscience, philosophy, linguistics, cognitive science, computational modelling, artificial intelligence, analog/parallel computing, and robotics. It is indexed and abstracted in multiple places and has an Impact Factor of 0.673. The journal is endorsed by The Society for the Study of Artificial Intelligence and the Simulation of Behavior.

Interested to apply? Please submit your CV by email to Ishtiaque Shams.

Deadline for submission: 15 November 2019.

For more information about the journal visit: https://tandfonline.com/action/journalInformation?show=aimsScope&journalCode=ccos20
For more information about the application visit:
https://think.taylorandfrancis.com/connectionscience-call-for-editor/?pd=true
For more information about the role of an Editor-in-Chief visit:
https://editorresources.taylorandfrancis.com/the-editors-role/

Member Activities

Upcoming Webinar

Classification in Action: Neural Networks and Differential Evolution Classifier applied to
Intrusion Detection and Cancer Data
Prof. Simone Ludwig
Date and time: 11 November at 10 AM (CDT), 3pm in the UK (GMT)
Registration URL: https://attendee.gotowebinar.com/register/1284036469210039820
Webinar id: 358-222-843

Abstract: This presentation will talk about two research projects. The first investigates an Intrusion Detection data set applying a neural network ensemble classifier, and the second looks at different cancer data sets applying a differential evolution classifier. The presentation will start with an introduction to neural networks and will then describe the deep neural network ensemble that was applied to Intrusion detection data. The classification task is to differentiate between normal and intrusive behavior in a network. The second project proposes a cost-sensitive version of the centroid-based classification algorithm using differential evolution. Four imbalanced cancer data sets (Breast, Lung, Uterus, and Stomach) are investigated. The experiments investigate the survivability of cancer patients compared to the performance of the current variants. Moreover, the performance of the proposed version is compared with the performance of five cost-sensitive machine-learning algorithms. Biography: Dr. Simone Ludwig is a Professor of Computer Science at North Dakota State University (NDSU, US) since 2010. Prior to joining NDSU she worked at the University of Saskatchewan (Canada), Concordia University (Canada), Cardiff University (UK) and Brunel University (UK). Dr. Ludwig received her PhD degree and MSc degree with distinction from Brunel University (UK), in 2004 and 2000, respectively. Before starting her academic career she worked several years in the software industry. Her research interests lie in the area of computational intelligence including swarm intelligence, evolutionary computation, neural networks, and fuzzy reasoning. Examples of application areas where computational intelligence methods are applied to are data mining (including big data), image processing, intrusion detection, cryptography, and cloud computing.

Call for Papers (Journal)

- IEEE TFS Special Issue on Smart Fuzzy Optimization in Operational Research and Renewable Energy: Modelling, Simulation and Application (1 Nov)
- IEEE TETC Special Section on Scalable Computing for Blockchain Systems (1 Dec)
- IEEE TETC Joint Special Section on Secure and Emerging Collaborative Computing and Intelligent Systems (10 Dec)
- IEEE TFS Special Issue on Type-2 Fuzzy Model Based Control and its Applications (1 Feb)
- IEEE TFS Special Issue on Applications of Fuzzy Systems in Data Science and Big Data (1 Mar)

Call for Papers (Conference)

- The 12th International Conference on Advanced Computational Intelligence (ICACI2020) (1 Dec)