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Computational Intelligence Society
Nature-Inspired Problem Solving • cis.ieee.org

◆IEEE

IEEE CIS Newsletter, Issue 77, June 2019

CIS Conferences

⭐ Conference Calendar (2019-2021)

⭐ 2019 IEEE Congress on Evolutionary Computation (IEEE CEC 2019)
Wellington, New Zealand
10-13 June 2019

⭐ 2019 IEEE International Conference on Computational Intelligence and Virtual Environments for Measurement Systems and Applications (CIVEMSA)
Tianjin Shi, China
14-16 June 2019

⭐ 2019 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE 2019)
New Orleans, USA
23-26 June 2019

⭐ 2019 International Conference on Process Mining (ICPM)
Aachen, Germany
24-26 June 2019

⭐ 2019 IEEE Conference on Computational Intelligence in Bioinformatics and Computational Biology (IEEE CIBCB 2019)
Siena, Italy
9-11 July 2019

Research Frontier

A Metahierarchical Rule Decision System to Design Robust Fuzzy Classifiers Based on Data Complexity
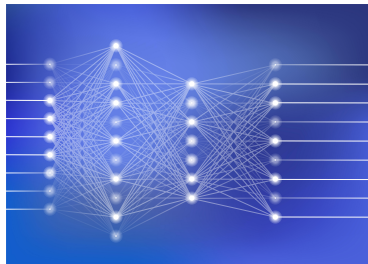
There is a wide variety of studies that propose different classifiers to solve a large amount of problems in distinct classification scenarios. The no free lunch theorem states that if we use a big enough set of varied problems, all classifiers would be equivalent in performance. From another point of view, the performance of the classifiers is dependant of the scope and properties of the datasets. In this sense, new proposals on the topic often focus on a given context, aiming at improving the related state-of-the-art approaches. Data complexity metrics have been traditionally used to determine the inner characteristics of datasets. This way, researchers are able to categorize the problems in different scenarios. Then, this taxonomy can be applied to determine inner characteristics of the datasets in order to determine intervals of good and bad behavior for a given classifier. This paper takes advantage of the data complexity metrics in order to design a fuzzy metaclassifier. The final goal is to create decision rules based on the inner characteristics of the data to apply a different version of the fuzzy classifier for a given problem. To do so, the FARC-HD classifier is used. FARC-HD is an evolutionary fuzzy system that has led to different extensions in the specialized literature. Experimental results show the goodness of this novel approach as it is able to outperform all versions of FARC-HD on a wide set of problems, and obtain competitive results (in terms of performance and interpretability) versus two selected state-of-the-art rule-based classification system, C4.5 and FURIA.

IEEE Transactions on Fuzzy Systems, April 2019

Deep Neural Network Initialization With Decision Trees

This paper presents a novel automated process for constructing and initializing deep feedforward neural networks based on decision trees is presented. The proposed algorithm maps a collection of decision trees trained on the data into a collection of initialized neural networks with the structures of the networks determined by the structures of the trees. The tree-informed initialization acts as a warm-start to the neural network training process, resulting in efficiently trained, accurate networks. These models, referred to as "deep jointly informed neural networks" (DJINN), demonstrate high predictive performance for a variety of regression and classification data sets and display comparable performance to Bayesian hyperparameter optimization at a lower computational cost. By combining the user-friendly features of decision tree models with the flexibility and scalability of deep neural networks, DJINN is an attractive algorithm for training predictive models on a wide range of complex data sets.

IEEE Transactions on Neural Networks and Learning Systems, May 2019

Offline Data-Driven Evolutionary Optimization Using Selective Surrogate Ensembles

In solving many real-world optimization problems, neither mathematical functions nor numerical simulations are available for evaluating the quality of candidate solutions. Instead, surrogate models must be built based on historical data to approximate the objective functions and no new data will be available during the optimization process. Such problems are known as offline data-driven optimization problems. Since the surrogate models solely depend on the given historical data, the optimization algorithm is able to search only in a very limited decision space during offline data-driven optimization. This paper proposes a new offline data-driven evolutionary algorithm to make the full use of the offline data to guide the search. To this end, a surrogate management strategy based on ensemble learning techniques developed in machine learning is adopted, which builds a large number of surrogate models before optimization and adaptively selects a small yet diverse subset of them during the optimization to achieve the best local approximation accuracy and reduce the computational complexity. The experimental results on the benchmark problems and a transonic airfoil design example show that the proposed algorithm is able to handle offline data-driven optimization problems with up to 100 decision variables.

IEEE Transactions on Evolutionary Computation, April 2019

▬▬ Educational Activities

Call for participation -- FML-based Machine Learning Competition for Human and Smart Machine Co-Learning on Game of Go @ FUZZ-IEEE 2019

Website:
https://attend.ieee.org/fuzzieee-2019/competition/
http://oase.nutn.edu.tw/fuzz2019-fmlcompetition/

Come and join us at the following competitions at FUZZ-IEEE 8:00-12:00 on 26 June, at the conference's Ballroom:

1. Go Game Demonstration with Brain-Computer-Interface (BCI): 5P Professional Go player (Black) vs. Facebook Open Source ELF OpenGo (White)
2. Competition Presentation on site or live on Facebook (video demo)
3. Game Demonstration for Human with BCI and Smart Machine Co-Learning on English/ Taiwanese Language
4. Go Game Demonstration with Brain-Computer-Interface (BCI): 5P Professional Go player (White) vs. Facebook Open Source ELF OpenGo (Black)
5. Game Demonstration for Human with BCI and Smart Machine Co-Learning on English/ Taiwanese Language
6. Game Demonstration for Human with BCI and Smart Machine Co-Learning on Robotic Edutainment (Music Demo)

▬▬ Technical Activities

Call for submissions -- Late Breaking Research for FUZZ-IEEE

Got Some "Hot-Off-The-Press" Research Results?
But missed the FUZZ-IEEE 2019 submission deadline?
Want feedback on your ideas/results?

Try out Late Breaking Research for FUZZ-IEEE! For FUZZ-IEEE 2019, we are inviting you to submit an abstract about your newest research. After it is checked out by the program committee, you can then participate in the conference and present your research in the poster session. The feedback during the poster session and conversations at the conference should help you clarify your ideas. The abstract will be made available to all participants in Whova, but

there will be no publication in the Proceedings. You can talk to people about your research, get some feedback, and then work on a publication for FUZZ-IEEE 2020 or the Transactions on Fuzzy Systems.

Submit your abstract as soon as possible! Send them to the program chairs at programfuzzieee2019@gmail.com. Register and bring your poster to FUZZ-IEEE 2019. More details at: https://attend.ieee.org/fuzzieee-2019/late-breaking-research/

on Computational Intelligence (IEEE WCCI 2020)
Glasgow, UK
19-24 July 2020

⭐ 2020 IEEE Symposium Series on Computational Intelligence (IEEE SSCI 2020)
Canberra, Australia
1-4 December 2020

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Member Activities

Upcoming Webinar

"Bio-Inspired Intelligence in Coping with Complexity of Distributed Software Systems"
Dr. Vesna Šešum-Čavić
Date and Time: 6 June 11am – 12pm (BST), Vienna Time 12 .00 – 13.00pm.
Registration URL: https://register.gotowebinar.com/register/161451585850494722

CI plays an important role in designing self-organizing software for distributed systems, which are typically characterized by a huge problem size concerning number of computing devices, clients, requests and size of queries, autonomy and heterogeneity of participating organizations, and dynamic changes of the environment. In such settings, the common approach of one central coordinator reaches its technical and conceptual limits - it represents a single point of failure with the risk of becoming a performance and availability bottleneck. To cope with unforeseen dynamics, autonomously acting components whose behaviours implement bio-inspired algorithms are a promising approach. These types of algorithms are particularly important and inevitable for the optimization and robustness of highly dynamic distributed systems. Depending on the problem area, application of bio-inspired algorithms enables different kinds of self-organization. This presentation focuses on swarm-inspired algorithms and their remarkable power that lies in coordination of all individuals and communication of "knowledge" without supervision, Swarm-inspired intelligence could help highly dynamic systems to cope with environmental changes. Specific use-cases discussed are load balancing in heterogeneous distributed systems and information retrieval in the Internet as well as how swarm intelligence can be mapped/adapted to these problems.

Biography: Vesna Šešum-Čavić is a senior scientist and university lecturer in computational intelligence, Institute of Information Systems Engineering, Compilers and Languages Group, Vienna University of Technology, Austria. Her research interests cover swarm intelligence, network optimization, p2p systems, theory and design of algorithms, combinatorial optimization, complex systems, self-organization, multi-agent systems. She was a conference chair and program committee member of international conferences. She is a member of the IEEE Computational Intelligence Society and currently Chair of Women in Computational Intelligence.

Call for Webinars

Would you like to give an IEEE CIS Webinar?

We are looking for speakers who engage in both fundamental research, applications and emerging topics in computational intelligence to give a webinar. Typically a webinar lasts for I hour (45 minute presentation and time for questions). Speakers can opt to have their webinar recorded and published on IEEE TV. It is a great opportunity to publish your research and to inform and educate all members of the society. We are looking for speakers from july onwards and we typically need 1 to advertise at least three weeks in advance. If you are interested then please contact Dr Keeley Crockett for further information.

Women in Computer Science

Our member, Daniela López De Luise is in charge for organizing an event @Historical Museum Sarniento regarding STEAM (Science, Technology, Engineering, Art and Mathematics), where she will lecture on how metrics for STEAM is designed by using Computational Intelligence.

The event STEAM NEXUM will take place on July, 17, 2019 at [Museo Histórico Sarmiento Cuba 2070.](#)

Organizers: Museo Histórico Sarmiento, IEEE CIS Argentina, Sociedad Científica Argentina

We look forward to hearing your comments and suggestions for future activities of WCI. Please email them to [Vesna Šešum-Čavić](#), Chair, IEEE Computational Intelligence Society Women in Computational Intelligence Sub-committee 2019.

Call for Papers (Journal)

- [IEEE TFS Special Issue on Nature-inspired Optimization Methods in Fuzzy Systems (1 Jul)](#)
- [IEEE CIM Special Issue on Evolutionary Machine Learning (15 Jul)](#)
- [IEEE TFS Special Issue on Fuzzy Based AI: Emerging Techniques and their Applications (1 Aug)](#)
- [IEEE TFS Special Issue on Smart Fuzzy Optimization in Operational Research and Renewable Energy: Modelling, Simulation and Application (1 Nov)](#)

Call for Papers (Conference)

- [The 15th International Conference on Predictive Models and Data Analytics in Software Engineering (17 Jun)](#)
- [IEEE Symposium on Cooperative Metaheuristics (10 Jul)](#)