



IEEE CIS Newsletter, Issue 92, August 2020

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2020 IEEE Frank Rosenblatt Award



Prof. Xin Yao is the recipient of the prestigious 2020 IEEE Frank Rosenblatt Award.

Impacting both the foundational and practical aspects of computational intelligence, Xin Yao's accomplishments in advancing evolutionary computation and machine learning are making it easier to solve complex optimization problems. His approaches to fast evolutionary programming, in which he proposed a widely known mutation operator and an entirely new methodology for theoretical analysis of evolutionary operators/algorithms, have been applied to neural network structure learning, optimal routing, digital filter design, and design of new materials. His work on stochastic ranking, where he introduced a novel approach to deal with constraints in evolutionary optimization by balancing objectives and penalty functions based on a new ranking method, has had a major impact on solving constraint optimization problems in the areas of electrical, chemical, mechanical, and aeronautical engineering; biology; and economics.

An IEEE Fellow, Yao is a Chair Professor of Computer Science at the Southern University of Science and Technology, Shenzhen, China, and a part-time Chair of Computer Science at the University of Birmingham, UK.

Research Frontier

Incremental Fuzzy C-Regression Clustering From Streaming Data for Local-Model-Network Identification

In this paper, a new approach to evolving fuzzy model identification from streaming data is given. The structure of the model is given as a local model network in Takagi-Sugeno form, and the partitioning of the input-output space is based on metrics in which these local models are defined as prototypes of the clusters. This means that the clusters and the local models share the same parameters; therefore, the number of parameters of the evolving system is much lower in comparison to similar systems of comparable complexity, and the problems of parameter identifiability are not a particular issue. The algorithm adds the local models in an incremental fashion and recursively adapts the local model parameters. The proposed algorithm is tested on three examples to demonstrate the main features. The first example is a simple simulated example with intersecting clusters; the second is a very well-known benchmark that treats the Mackey-Glass time series; the third is an example that shows the classification of the data from a laser rangefinder. These examples show the great potential of the proposed approach in certain applications. [Read More](#)



IEEE Transactions on Fuzzy Systems, April 2020

Survey on Multi-Output Learning



The aim of multi-output learning is to simultaneously predict multiple outputs given an input. It is an important learning problem for decision-making since making decisions in the real

world often involves multiple complex factors and criteria. In recent times, an increasing number of research studies have focused on ways to predict multiple outputs at once. Such efforts have transpired in different forms according to the particular multi-output learning problem under study. Classic cases of multi-output learning include multi-label learning, multi-dimensional learning, multi-target regression, and others. From our survey of the topic, we were struck by a lack in studies that generalize the different forms of multi-output learning into a common framework. This article fills that gap with a comprehensive review and analysis of the multi-output learning paradigm. In particular, we characterize the four Vs of multi-output learning, i.e., volume, velocity, variety, and veracity, and the ways in which the four Vs both benefit and bring challenges to multi-output learning by taking inspiration from big data. We analyze the life cycle of output labeling, present the main mathematical definitions of multi-output learning, and examine the field's key challenges and corresponding solutions as found in the literature. Several model evaluation metrics and popular data repositories are also discussed. Last but not least, we highlight some emerging challenges with multi-output learning from the perspective of the four Vs as potential research directions worthy of further studies. [Read More](#)

IEEE Transactions on Neural Networks and Learning Systems, July 2020

Offline Data-Driven Multiobjective Optimization: Knowledge Transfer Between Surrogates and Generation of Final Solutions

In offline data-driven optimization, only historical data is available for

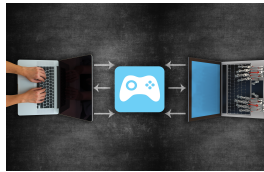
optimization, making it impossible to validate the obtained solutions during the optimization. To address these difficulties, this paper proposes an evolutionary algorithm assisted



by two surrogates, one coarse model and one fine model. The coarse surrogate (CS) aims to guide the algorithm to quickly find a promising subregion in the search space, whereas the fine one focuses on leveraging good solutions according to the knowledge transferred from the CS. Since the obtained Pareto optimal solutions have not been validated using the real fitness function, a technique for generating the final optimal solutions is suggested. All achieved solutions during the whole optimization process are grouped into a number of clusters according to a set of reference vectors. Then, the solutions in each cluster are averaged and outputted as the final solution of that cluster. The proposed algorithm is compared with its three variants and two state-of-the-art offline data-driven multiobjective algorithms on eight benchmark problems to demonstrate its effectiveness. Finally, the proposed algorithm is successfully applied to an operational indices optimization problem in beneficence processes. [Read More](#)

IEEE Transactions on Evolutionary Computation, June 2020

Winning Is Not Everything: Enhancing Game Development With Intelligent Agents



Recently, there have been several high-profile achievements of agents learning to play games against humans and beat them. In this article, we study the problem of training intelligent agents

in service of game development. Unlike the agents built to "beat the game," our agents aim to produce human-like behavior to help with game evaluation and balancing. We discuss two fundamental metrics based on which we measure the human-likeness of agents, namely skill and style, which are multifaceted concepts with practical implications outlined in this article. We report four case studies in which the style and skill requirements inform the choice of algorithms and metrics used to train agents; ranging from A* search to state-of-the-art deep reinforcement learning (RL). Furthermore, we show that the learning potential of state-of-the-art deep RL models does not seamlessly transfer from the benchmark environments to target ones without heavily tuning their hyperparameters, leading to linear scaling of the engineering efforts, and computational cost with the number of target domains. [Read More](#)

IEEE Transactions on Games, June 2020

Members Activities

5 minutes With Fahmida N. Chowdhury



What is your title, full name, and place of work?

Fahmida Nilufar Chowdhury, Program Director, Office of International Science and Engineering, National Science Foundation, U.S.A.

What grade of member in CIS are you?

IEEE Senior Member.

How long have you been a member of CIS?

Seems like forever. Do not know exactly.

One reason why you are a member of CIS?

This is one of my research fields/interests (neural networks). It is my natural home within IEEE.

What is your ideal weekend?

Going for day trips, hikes, listening to music, gathering with friends, cooking, eating.

Give one interesting fact about yourself:

As a young girl, I originally wanted to be a writer, painter, artist --- it seemed I had some talent in those directions. But I chose to become an electrical engineer because (i) it would give me a decent, stable source of income: financial independence was important to me; and (ii) everyone I knew said girls could not be successful in engineering, and EE would be too difficult for a girl, etc. I, and my entire extended family did not know a single woman who was an engineer of any type; there was no role model. So, I decided to become one, and I wanted to prove all these people wrong. Once I made up my mind, my family and friends supported me; they said they were happy to be proven wrong.

What are you reading, watching or listening to at the moment?

Currently, I am reading a book by my favorite author Bertrand Russell: "Nightmares of Eminent Persons and Other Stories." It is an old book (1954), but still relevant, seems to me.

What is your favorite place?

I have many favorite places, and "favorite" is not static, it keeps changing. Today, I feel that I would like to be in the mountains and hike up to a high point, then look at the distant view. Sometimes my favorite place is the sofa in my family room.

What items would you take on a desert island and why?

Books!! And maybe a sketchbook and pencils, to see if I still have some of my childhood knack for drawing.

Educational Activities

Call for 2020 CI High School Education

This "Call for 2020 CI High School Education" is to encourage the organization of education programs on Computational Intelligence techniques, including the theory and related applications for high school students. Any CIS Member or Student Member can apply for the partly support from CIS for organizing education activities for high school students. An accepted application will be supported about US\$2K for organizing the activity. For application details, please refer to the High School Outreach Education website:

<https://cis.ieee.org/professional-development/high-school-outreach-subcommittee>

Publications

IEEE Transactions on AI -- Call for Papers and Special Issues

IEEE Transactions on Artificial Intelligence (IEEE TAI) invites impactful Artificial Intelligence research, survey articles, and applications.

Submit your manuscript at the IEEE TAI Manuscript Central website at <https://mc.manuscriptcentral.com/tai-ieee>. Potential authors should consult the Information to Authors Document at <https://cis.ieee.org/publications/ieee-transactions-on-artificial-intelligence/information-for-authors-tai>. Further questions can be directed to the Founding Editor-in-Chief at ieee.tai.ec@gmail.com

IEEE TAI is also currently accepting proposals for special issues on contemporary and hot topics in AI. Instructions on how to prepare a proposal for a special issue could be found at

<https://cis.ieee.org/publications/ieee-transactions-on-artificial-intelligence/special-issues>

Webpage: <https://cis.ieee.org/publications/ieee-transactions-on-artificial-intelligence/>

Submission: <https://mc.manuscriptcentral.com/tai-ieee>

CIS Conferences

Due to the outbreak of the COVID-19 pandemic, dates and details of CIS sponsored conferences should be monitored closely.

The situation is changing very quickly. Please consult the conference web pages frequently to obtain the latest information.

You can find the most recent announcements and updates from all of our Society's conferences and events at <https://cis.ieee.org/volunteer-resources/covid-19-notice> as our organizers make decisions.

IEEE Colombian Conference on Applications of Computational Intelligence (CoCACI 2020)

Cali, Colombia - virtual
7-8 Aug. 2020

2020 IEEE Conference on Games (CoG)

Higashiosaka, Japan
24-27 Aug. 2020

2020 Joint IEEE 10th International Conference on Development and Learning and Epigenetic Robotics (ICDL-EpiRob)

Valparaiso, Chile
7-10 Sep. 2020

5th South-East Europe Design Automation, Computer Engineering, Computer Networks and Social Media Conference (SEEDA CECNSM 2020)

Corfu, Greece
25-27 Sep. 2020

2020 International Conference on Process Mining (ICPM 2020)

Padua, Italy
5-8 Oct. 2020

2020 IEEE 7th International Conference on Data Science and Advanced Analytics (DSAA)

Sydney, Australia
6-9 Oct. 2020

2020 Fourth International Conference on Intelligent Computing in Data Sciences (ICDS)

Fez, Morocco
21-23 Oct. 2020

2nd International Conference on Industrial Artificial Intelligence (IAI)

Shenyang, China
23-25 Oct. 2020

2020 IEEE International Conference on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB)

Viña del Mar, Chile
27-29 Oct. 2020

7th International Conference on Behavioural and Social Computing (BESC)

Bournemouth, UK
5-7 Nov. 2020

7th International Conference on Soft Computing and Machine Intelligence (ISCM)

Stockholm, Sweden
14-15 Nov. 2020

2020 IEEE Symposium Series on Computational Intelligence (IEEE SSCI 2020)

Canberra, Australia
1-4 Dec. 2020

(Submission: 7 Aug. 2020 -- strict deadline)

2020 IEEE Smart World Conference (IEEE SWC 2020)

Melbourne, Australia
8-10 Dec. 2020

2021 IEEE Smart World Conference

Atlanta, USA

18-21 Oct. 2021

2020 IEEE Latin American Conference on Computational Intelligence (LACC)Temuco, Chile
2-4 Nov. 2021**2022 IEEE World Congress on Computational Intelligence (IEEE WCCI 2022)**Padua, Italy
18-23 July 2022

CIS sponsors and co-sponsors a number of conferences across the globe.

[View Full Schedule](#)

Call For Papers

IEEE Journal Special Issues

- IEEE TCDS Special Issue on Artificial Intelligence and Edge Computing for Trustworthy Robots and Autonomous Systems (1 Sept)
- IEEE TEVC Special Issue on Evolutionary Computation Meets Deep Learning (1 Sept)
- IEEE TNLS Special Issue on New Frontiers in Extremely Efficient Reservoir Computing (15 Sept)
- IEEE TNLS Special Issue on Biologically Learned/Inspired Methods for Sensing, Control and Decision Making (31 Oct)
- IEEE TFS Special Issue on Fuzzy Systems Toward Human-Explainable Artificial Intelligence and Their Applications (31 Oct)
- IEEE TEVC Special Issue on Multi-task Evolutionary Computation (1 Nov)
- IEEE TCDS Special Issue on Emerging Topics on Development and Learning (15 Jan 2021)

Non-IEEE Conferences

- Second International Conference on Artificial Intelligence and Computational Intelligence (AICI'2021) (15 Aug), <https://aic2021.leit.ac.uk>
- BNAIC/BeneLearn 2020 (28 Aug), www.bnaic.eu
- 2020 International Conference on Soft Computing and Machine Learning (SCML 2020) (30 Aug) www.icscml.org

Non-IEEE Conferences (Call for Participation)

- 1st International Conference on Deep Learning Theory and Applications (DeLTA 2020), 8-10 July 2020, Lieusaint - Paris, France, <http://www.delta.scitevents.org>
- Annual Conference of the North American Fuzzy Information Processing Society NAFIPS'2020, Redmond, August 20-22, 2020, <https://nafips2020.digipen.edu/>
- International Conference on INnovations in Intelligent Systems and Applications (INISTA 2020), 24-26 August 2020, Novi Sad, Serbia, <http://inista.org/index.html>
- 14th International Conference on Applications of Fuzzy Systems, Soft Computing and Artificial Intelligence Tools (ICAFS 2020), 27-28 August 2020, Budva, Montenegro, <https://icafs2020.com/Registration.htm>
- IntellANG - Intelligent Information Processing and Natural Language Generation, 7 September 2020, Santiago de Compostela, Spain, <https://intellang.github.io/>
- 1st TAILOR Workshop (TAILOR- Foundations of Trustworthy AI - Integrating Learning, Optimization and Reasoning), 4-5 September 2020, Santiago de Compostela, Spain, <https://liu.se/en/research/tailor/workshop>
- European Conference on Artificial Intelligence - ECAI 2020, August 29 - September 8, Santiago de Compostela, Spain, <http://ecai2020.eu/>
- 15th Conference on Computer Science and Information Systems (FedCSIS 2020), 6-9 September 2020, Sofia, Bulgaria, <https://fedcsis.org/>
- International Student Conference on Applied Mathematics and Informatics (ISCAMI 2020), 8-11 September 2020, Malenovice, Czech Republic, <https://irafm.osu.cz/iscami/>
- The Workshop on Natural Computing (WNC), 20-22 September 2020, Oravská Lesná, Slovakia, <https://it.at.ics.upjs.sk/index.php?id=ws/WNC>
- The 14th International FLINS Conference on Robotics and Artificial Intelligence (FLINS 2020), September 30-October 3, 2020, Cologne, Germany, <https://www.hrm-bildung.de/flins2020/>
- The 10th International Conference on the Internet of Things (IoT 2020), 6-9 October 2020, Malmö University, Malmö (Sweden), <https://iot-conference.org/iot2020>
- International Symposium on Bioinformatics and Biomedicine (ISBB), 8-10 October 2020, Burgas, Bulgaria, <http://bioinfomed.org/>
- 24th International Conference on Intuitionistic Fuzzy Sets (ICIFS-2020), October 8-9, 2020, Burgas, Bulgaria, <http://ifigenia.org/wiki/ICIFS-2020>
- 19th Mexican International Conference on Artificial Intelligence, 12-17 October 2020, Mexico City, Mexico <http://www.micai.org/2020/>
- 11th World Conference on Intelligent Systems for Industrial Automation (WCIS-2020), 27-28 October 2020, Tashkent, Uzbekistan, <http://wcis2020.uz/>
- Joint 30th European Safety and Reliability Conference ESREL2020 and the 15th Probabilistic Safety Assessment and Management Conference (PSAM), 1-6 November 2020, <http://www.esrel2020-psam15.org/>
- 12th International Joint Conference on Computational Intelligence, 2-4 November 2020, online conference, <http://www.ijcci.org/>
- The International Symposium on Integrated Uncertainty in Knowledge Modelling and Decision Making (IUKM), 11 - 13 November 2020, Phuket, Thailand, <http://www.jaist.ac.jp/IUKM/IUKM2020/>
- 7th International Conference on Soft Computing & Machine Intelligence (SCSMI 2020), 14-15 November 2020, Stockholm, Sweden, <http://scsmi.us/index.html>
- The 16th International Conference on Predictive Models and Data Analytics in Software Engineering (PROMISE 2020), 8th November 2020, <https://promiseconf.github.io/2020>
- Joint 11th International Conference on Soft Computing and Intelligent Systems and 21st International Symposium on Advanced Intelligent Systems (SCIS&ISIS2020), 5-8 December 2020, <http://scis-j-soft.org/2020/>
- Thirty-fourth Conference on Neural Information Processing Systems, NeurIPS 2020, 5-12 December 2020, Online Event, <https://nips.cc/Conferences/2020/>
- 9th International Conference on the Theory and Practice of Natural Computing (TPNC 2020), 7-9 December 2020, Taoyuan, Taiwan, <https://irdta.eu/tpnc2020/>

Editor

Leandro L. Minku
University of Birmingham, UK
Email: l.l.minku@cs.bham.ac.uk



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