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IEEE Computational Intelligence Society

IEEE

IEEE CIS Newsletter, Issue 89, June 2020

Announcements

Obituary for Professor Robert John

Professor Robert (Bob) John, Senior Member of IEEE and member of CIS, sadly passed away as a result of liver cancer, aged 64, on 17 February 2020. Bob originally studied mathematics at Leicester Polytechnic graduating with a first in 1979. He started training as an actuary, gained an MSc in statistics at the University of Manchester Institute of Science and Technology (UMIST) in 1981, then worked in research at British Gas in Fulham, south-west London. Later in the 1980s, Bob set up his own AI company in the City of London. Looking for an escape from the stresses of living and working in London, in 1989 Bob started lecturing in mathematics at Leicester Polytechnic (later De Montfort University).

> Read Full Obituary Here

Expedite Process for Submissions of Papers Whose Primary Focus is on COVID 19

As I write this message, COVID-19 has affected about 200 countries and territories. The number of infected persons and the death toll are increasing very rapidly. The whole world is passing through a severe crisis due to this pandemic. Scientists and researchers all over the globe are working hard to address various issues related to this crisis such as modelling and analysis of the mechanisms underlying the spread of the virus, along with modelling how various interventions can help control the propagation of the disease, finding useful treatment protocols, potential drugs, and vaccines.

The role of technology, in particular, that of **Computational Intelligence** to deal with the crisis, should not be underestimated. In order to take part in this fight against COVID-19, the IEEE Computational Intelligence Society (IEEE CIS) has set up a program, the **COVID-19 Initiative**. Under this initiative, the CIS Editors-in-Chief will **expedite**, to the extent possible, the processing of all articles submitted to any of the CIS publications, with primary focus (as judged by the Editors-in-Chief) on COVID-19. Please check the S1M submission site of your desired publication for instructions as to how to submit a COVID-19 focused manuscript.

If accepted, all such articles will be published, free-of-charge to authors and readers, as **free access** for one year from the date of the publication to enable the research findings to be disseminated widely and freely to other researchers and the community at large. I note here that any such article will go through the standard review process followed for the publication and the article must be within the scope of the publication.

To conclude I request all of you to follow the advice provided by the World Health Organization, as well as your local administration, to stay safe and healthy. Let's do our part to understand and control this virus that is sweeping across the planet.

Bernadette Bouchon-Meunier
President of the IEEE Computational Intelligence Society

Research Frontier

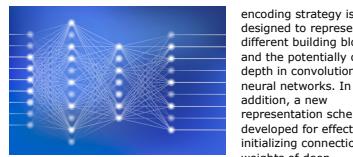### Deep Class-Wise Hashing: Semantics-Preserving Hashing via Class-Wise Loss

Deep supervised hashing has emerged as an effective solution to large-scale semantic image retrieval problems in computer vision. Convolutional neural network-based hashing methods typically seek pairwise or triplet labels to conduct similarity-preserving learning. However, complex semantic concepts of visual contents are hard to capture by similar/dissimilar labels, which limits the retrieval performance. Generally, pairwise or triplet losses not only suffer from expensive training costs but also lack sufficient semantic information. In this paper, we propose a novel deep supervised hashing model to learn more compact class-level similarity-preserving binary codes. Our model is motivated by deep metric learning that directly takes semantic labels as supervised information in training and generates corresponding discriminant hashing code. Specifically, a novel cubic constraint loss function based on Gaussian distribution is proposed, which preserves semantic variations while penalizes the overlapping part of different classes in the embedding space. To address the discrete optimization problem introduced by binary codes, a two-step optimization strategy is proposed to provide efficient training and avoid the problem of gradient vanishing. Extensive experiments on five large-scale benchmark databases show that our model can achieve the state-of-the-art retrieval performance. Read More

IEEE Transactions on Neural Networks and Learning Systems, May 2020

Evolving Deep Convolutional Neural Networks for Image Classification

Evolutionary paradigms have been successfully applied to neural network designs for two decades. Unfortunately, these methods cannot scale well to the modern deep neural networks due to the complicated architectures and large quantities of connection weights. In this paper, we propose a new method using genetic algorithms for evolving the architectures and connection weight initialization values of a deep convolutional neural network to address image classification problems. In the proposed algorithm, an efficient variable-length gene

encoding strategy is designed to represent the different building blocks and the potentially optimal depth in convolutional neural networks. In addition, a new representation scheme is developed for effectively initializing connection weights of deep convolutional neural networks, which is expected to avoid networks getting stuck into local minimum that is typically a major issue in the backward gradient-based optimization. Furthermore, a novel fitness evaluation method is proposed to speed up the heuristic search with substantially less computational resource. The proposed algorithm is examined and compared with 22 existing algorithms on nine widely used image classification tasks, including the state-of-the-art methods. The experimental results demonstrate the remarkable superiority of the proposed algorithm over the state-of-the-art designs in terms of classification error rate and the number of parameters (weights). Read More

IEEE Transactions on Evolutionary Computation, Apr. 2020

Optimal Rule-Based Granular Systems From Data Streams

We introduce an incremental learning method for the optimal construction of rule-based granular systems from numerical data streams. The method is developed within a multiobjective optimization framework considering the specificity of information, model compactness, and variability and granular coverage of the data. We use α-level sets over Gaussian membership functions to set model granularity and operate with hyperrectangular forms of granules in nonstationary environments. The resulting rule-based systems are formed in a formal and systematic fashion. They can be useful in time series modeling, dynamic system identification, predictive analytics, and adaptive control. Precise estimates and enclosures are given by linear piecewise and inclusion functions related to optimal granular mappings. Read More

IEEE Transactions on Fuzzy Systems, Mar. 2020

Deep Learning for Video Game Playing

In this paper, we review recent deep learning advances in the context of how they have been applied to play different types of video games such as first-person shooters, arcade games, and real-time strategy games. We analyze the unique requirements that different game genres pose to a deep learning system and highlight important open challenges in the context of applying these machine learning methods to video games, such as general game playing, dealing with extremely large decision spaces and sparse rewards. Read More

IEEE Transactions on Games, Mar. 2020

Educational Activities

WCCI and COG Call for Competition Participation

The CIS competition subcommittee is glad to promote the many interesting competitions hosted at this year's IEEE conferences. Check out the competitions below and submit your entry to the competitions at the WCCI and CoG 2020. Many of these competitions are funded by the CIS and offer a first prize of US$500.

IEEE World Congress on Computational Intelligence (WCCI) 2020:

- Real-World Single Objective Constrained Optimization
- Single Objective Bound Constrained Optimization
- Clinical Brain Computer Interfaces Challenge
- Evolutionary Computation in the Energy Domain: Smart Grid Applications
- Robust Optimization Competition
- EvoMan: General Game-playing Agent Competition
- Multimodal Multiobjective Optimization Competition
- Strategy Card Game AI Competition
- Offline Data-Driven Evolutionary Optimization
- Evolutionary Multi-task Optimization
- Niching Methods for Multimodal Optimization
- Electric Vehicle Routing Problem
- Constrained Multiobjective Optimization
- Smart Grid and Sustainable Energy Systems
- Learning to run a power network (L2RPN)
- Vision-based Human Fall Classification Competition
- End-To-End Visible Spectrum Ocular Biometric Matching
- FUZZ-C1 FML-based Machine Learning Competition for Human and Smart Machine Co-Learning on Game of Go / AIoT Applications

More information on the competitions and their respective submission deadlines can be found at https://wcci2020.org/competitions

IEEE Conference on Games (COG) 2020 competitions:

- 5th Angry Birds Level Generation
- AI Snakes 2020
- Bot Bowl II
- ColorShapeLinks AI competition
- Fighting Game AI Competition
- General Video Game AI: Single-Player Learning Competition
- Geometry Friends AI Competition
- Hearthstone AI Competition
- Ludii AI Competition
- Short Video Competition
- StarCraft AI Competition

- Strategy Card Game AI competition
- uRTS

More information on the competitions and their respective submission deadlines can be found at http://ieee-cog.org/2020/competitions_conference

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WCCI 2020: FUZZ-IEEE Competition

With the success of AlphaGo, there has been a lot of interest among students and professionals to apply machine learning to gaming and in particular to the game of Go. Several conferences have held competitions for human players vs. computer programs or computer programs against each other. While computer programs are already better than human players (even high-level professionals), machine learning still offers interesting prospects, both from the fundamental point of view 1) to even further know the limits of game playing (having programs playing against each other), 2) to better understand machine intelligence and compare it to human intelligence, and from the practical point of view 3) to enhance the human playing experience by coaching professionals to play better or training beginners. The latter prospect also raises interesting questions of the explainability of machine game play. This competition will evaluate the potential of learning machines to teach human players.

Goals of this competition include:

- Understand the basic concepts of an FML-based fuzzy inference system.
- Use the FML intelligent decision tool to establish the knowledge base and rule base of the fuzzy inference system.
- Use the data predicted by Facebook AI Research (FAIR) Open Source Darkforest AI Bot as the training data.
- Use the data predicted by Facebook AI Research (FAIR) Open Source ELF OpenGo AI Bot as the desired output of the training data.
- Optimize the FML knowledge base and rule base through the methodologies of evolutionary computation and machine learning in order to develop a regression model based on FML-based fuzzy inference system.

The submission deadline is **30 June** 2020, 23:59 (GMT).

Find out more at:

- https://wcci2020.org/competitions/
- http://oase.nutn.edu.tw/wcci2020-fmlcompetition/

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. For application details, please refer to the High School Outreach Education website.

2020 Graduate Student Research Grants

The CIS Graduate Student Research Grants subcommittee are delighted to announce that 5 scholarships have been awarded to support research visits for collaborations in fields related to Computational Intelligence.

Congratulations to the following successful applicants:

- Zhentao Tang for the project "Safe multi-agent deep reinforcement learning from simulation to real-world application"
- Mengliang Zhu for the project "EEG-Based Driver Drowsiness Estimation Using Deep Network Adaptation for Regression Based on Domain Generalization"
- Chao Pan for the project "Neural Architecture Search Based on Evolutionary Algorithm"
- Cristiana Pacheco for the project "Game Design for Player Believability Assessment Proposal"
- Ines Abdennaji for the project "Novel Consensus Method based on Discrete Fuzzy Numbers"

Technical Activities

The IEEE Data Science Conference: IEEE DSAA'2020 to be held on 6-9 Oct. 2020 in Sydney

The 2020 IEEE International Conference on Data Science and Advanced Analytics (IEEE DSAA'2020) will be held on 6-9 Oct. 2020 in Sydney, the first time in the Oceanian region.

The IEEE data science conference DSAA features strong interdisciplinary synergy between computing, information/intelligence sciences (financially sponsored by IEEE CIS and technically sponsored by ACM) and statistics (technically sponsored by ASA), and cross-domain interactions between academia and business/government for data science and analytics. IEEE DSAA sets a high standard for its organizing committees, keynote speeches, submissions to the main and special session tracks, and a competitive paper acceptance rate.

IEEE DSAA'2020 will feature three main tracks: Research, Application and Special Sessions. Further highlights will include an Industry Poster session, a Student Poster session, a Journal Track on Data Science and AI in FinTech. We expect to see exciting special sessions spotlighting important emerging topics on cyber-physics systems, fake news and security and trust, and traditional/hands-on tutorials. DSAA has a reputation of prestigious keynote speeches delivered by high-profile statisticians, data/computing scientists, AI and industry leaders. DSAA'2020 will feature five keynote talks by top-ranked scientists and leaders.

The IEEE DSAA Next-generation Data Scientist Award (NGDS Award) calls for the nominations of data science role models, which is the only international award for outstanding data scientist stars.

Due to the COVID-19 impact, DSAA'2020 will go online with highly discounted registration rates. More information about IEEE DSAA'2020 is available at dsaa2020.dsaa.co, and paper submissions are due on 1 June 2020.

IEEE CIS Call for Papers: Fast Special Issue on Computational Intelligence for Combating COVID-19 (20 June)

This "Fast-Track Special Issue", aims at soliciting high-quality articles to share the latest developments and insights in applying computational intelligence approaches into practical applications for fighting against COVID-19. The covered topics include all important dimensions like diagnosis and prognosis, treatments and cures, tracking and prediction, data dashboards, early warnings and alerts, social analysis and control, public health policy, etc. The overall goal of this special issue is to offer a venue for researchers and practitioners from academia and industry to present the latest technologies and developments in dealing with the challenges brought by COVID-19, with the hope to enlighten new and compelling solutions for combating COVID-19. Submission deadline: 20 June 2020.

For more information, visit: https://sites.google.com/view/cim-si-covid-19

Questionnaire on Real-World Optimization Problems

In order to align research in Evolutionary Computation more closely to the needs arising from the real world, the questionnaire collects information on properties of real-world optimization problems. To get a thorough understanding of the wide variety of real-world problems, participation from anyone working on such problems will be very greatly appreciated. Results and analysis of the questionnaire will be made publicly available on the accompanying website. The questionnaire was prepared by the participants of the Lorentz Center workshop on Many Criteria Optimization and Decision Analysis held in September 2019 in Leiden, the Netherlands.

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. Potential authors should consult the Information to Authors Document. Further questions can be directed to the Founding Editor-in-Chief at ieee.tai.eic@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.

18th International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems (IPMU 2020)
Lisbon, Portugal
15-19 Jun. 2020

IEEE International Conference on Computational Intelligence and Virtual Environments for Measurement Systems and Applications (IEEE CIVEMSA 2020)
Tunis, Tunisia
22-24 Jun. 2020

15th International Workshop on Semantic and Social Media Adaptation & Personalization (SMAP)
Zakinthos, Greece
1-2 Jul. 2020

2020 Joint IEEE 10th International Conference on Development and Learning and Epigenetic Robotics (ICDL-EpiRob)
Valparaíso, Chile
28-30 Oct. 2020

2020 IEEE Conference on Games (CoG)
Higashiosaka, Japan
24-27 Aug. 2020

5th South-East Europe Design Automation, Computer Engineering, Computer Networks and Social Media Conference (SEEDA CECNSM 2020)
Corfu, Greece
29-30 Oct. 2020

2020 International Conference on Process Mining (ICPM 2020)
Padua, Italy
5-8 Oct. 2020
(Submission: 24 June 2020)

2020 IEEE 7th International Conference on Data Science and Advanced Analytics (DSAA)
Sydney, Australia
6-9 Oct. 2020
(Submission: 1 June 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 (IAS)
Shenyang, Liaoning, China
23-25 Oct. 2020
(Submission: 20 June 2020)

2nd International Conference on Industrial Artificial Intelligence (IAI)
Shenyang ,China
23-25 Oct. 2020
(Submission: 20 June 2020)

2020 IEEE International Conference on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB)
Viña del Mar, Chile
27-29 Oct. 2020

2020 IEEE Latin American Conference on Computational Intelligence (LA-CCI)
Temuco, Chile
Postponed to 2021

7th International Conference on Behavioural and Social Computing (BESC)
Bournemouth, UK
5-7 Nov. 2020
(Submission: 31 July 2020)

7th International Conference on Soft Computing and Machine Intelligence (ISCMI)
Stockholm, Sweden
14-15 Nov. 2020
(Submission: 25 Jun 2020)

2020 IEEE Symposium Series on Computational Intelligence (IEEE SSCI 2020)
Canberra, Australia

1-4 Dec. 2020
(Submission: 7 Aug. 2020 -- strict deadline)

2021 IEEE Smart World Conference
Atlanta, USA
18-21 Oct. 2021

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

[View Full Schedule]

Call For Papers

Call for Papers (Journal)

- IEEE CIM Fast Track Special Issue on Computational Intelligence for Combating COVID-19 (20 Jun)
- IEEE TNNLS Special Issue on Adaptive Learning and Control for Autonomous Vehicles (30 Jul)
- 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 TNNLS Special Issue on New Frontiers in Extremely Efficient Reservoir Computing (15 Sept)
- IEEE TNNLS 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)

Call for Papers (Conference)

- The 16th International Conference on Predictive Models and Data Analytics in Software Engineering (PROMISE 2020) (30 Jun)

Career Opportunities

- Assistant professor, Associate Professor, or professor-level positions in the Department of Computer Science at CINVESTAV-IPN of Mexico (26 June) We give Higher priority to candidates in Data Science or Machine Learning field, although applicants from all areas of Computer Science are welcome.

- 7 Postdoctoral Fellow in Artificial Intelligence at Victoria University of Wellington (Job Ref 2000024) (31 July)

This global health crisis is a unique challenge that has impacted many members of the IEEE family. These are difficult times, but we will get through them by working together. Thank you for your support of our shared mission to advance technology for humanity.

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