



IEEE CIS Newsletter, Issue 88, May 2020

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## CIS COVID-19 Initiative

Dear IEEE Computational Intelligence Society Members,

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

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## **Call for Nominations for Various Officers' Positions and ADCOM Members at Large**

The IEEE Computational Intelligence Society (CIS) is seeking nominations for the following key leadership positions (terms are in parentheses):

**President-Elect (2021)**

**Vice President for Education (2021-2022)**

**Vice President for Member Activities (2021-2022)**

**Vice President for Publications (2021-2022)**

**Five ADCOM Members-at-Large (2021-2023)**

According to the CIS Bylaws, ARTICLE XI – GOVERNANCE AND ADMINISTRATION,

Section 32 Schedule for ADCOM Elections:

"Five ADCOM Members-at-Large are elected each year, plus any vacated positions."

"The election of President-Elect, Vice President for Education, Vice President for Member Activities, and Vice President for Publications

shall take place in even-numbered years.”

**Eligibility requirements are defined in the CIS Bylaws, ARTICLE XIII – NOMINATIONS, ELECTIONS AND APPOINTMENTS.**

**For more information on eligibility, submission requirements, and deadlines, please visit our website for the [official call for nominations](#).**

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## **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](mailto: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>

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## **Call for Nominations/Applications for the**

## Position of Editor-in-Chief of the IEEE Transactions on Evolutionary Computation

The *IEEE Transactions on Evolutionary Computation* (TEVC) publishes archival-quality original papers in evolutionary computation and related areas including nature-inspired algorithms, population-based methods, and optimization where selection and variation are integral, and hybrid systems where these paradigms are combined. Purely theoretical papers are considered as are application papers that provide general insights into these areas of computation. Details about the current state of this publication can be found at: <https://cis.ieee.org/publications/t-evolutionary-computation>.

The IEEE CIS Executive Committee has formed an Adhoc Search Committee to invite nominations/applications for the position of Editor-in-Chief for TEVC. The Editor-in-Chief appointment is for a 2-year term starting 1 January 2021. Nominees/applicants should be dedicated volunteers with outstanding research profiles and extensive editorial experience. The nomination/application package should include complete CV along with a separate description (max 300 words/topic) on each of the following items:

- Vision Statement
- Editorial Experience
- Summary of publishing experience in IEEE journals/magazines
- IEEE Volunteer Experience
- Institutional Support
- Current service and administrative commitments
- Networking with the Community
- Challenges, if any, faced by the publication, and how to deal with them
- Why does the candidate consider himself/herself fit for this position?

Address any questions, and send the nomination/application package as a single PDF file through email to [kellerj@missouri.edu](mailto:kellerj@missouri.edu) by **31 May 2020**.

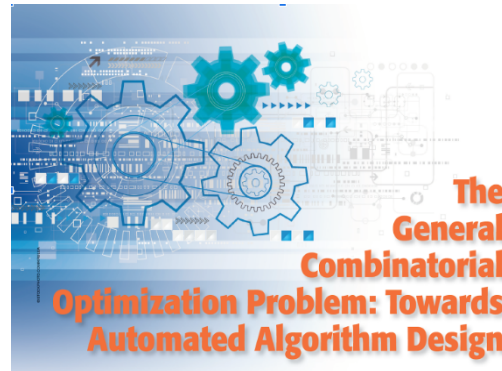
Jim Keller, Chair of the Search Committee

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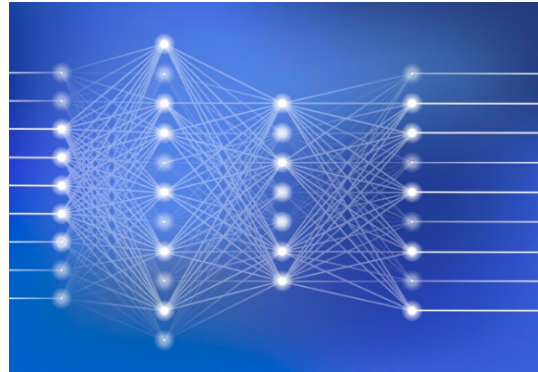
## Research Frontier

### **The General Combinatorial Optimization Problem: Towards Automated Algorithm Design**

This paper defines a new combinatorial optimization problem, namely General Combinatorial Optimization Problem (GCOP), whose decision variables are a set of parametric algorithmic components, i.e., algorithm design decisions. The solutions of GCOP, i.e. compositions of algorithmic components, thus represent different generic search algorithms. The objective of GCOP is to find the optimal algorithmic compositions for solving the given optimization problems. Solving the GCOP is thus equivalent to automatically designing the best algorithms for optimization problems. Despite recent advances, the evolutionary computation and optimization research communities are yet to embrace formal standards that underpin automated algorithm design. In this position paper, we establish GCOP as a new standard to define different search algorithms within one unified model. We demonstrate the new GCOP model to standardize various search algorithms as well as selection hyperheuristics. A taxonomy is defined to distinguish several widely used terminologies in automated algorithm design, namely automated algorithm composition, configuration and selection. We would like to encourage a new line of exciting research directions addressing several challenging research issues including algorithm generality, algorithm reusability, and automated algorithm design. [Read More.](#)



## Completely Automated CNN Architecture Design Based on Blocks



The performance of convolutional neural networks (CNNs) highly relies on their architectures. In order to design a CNN with promising performance, extensive expertise in both CNNs and the investigated problem domain is required, which is not

necessarily available to every interested user. To address this problem, we propose to automatically evolve CNN architectures by using a genetic algorithm (GA) based on ResNet and DenseNet blocks. The proposed algorithm is completely automatic in designing CNN architectures. In particular, neither preprocessing before it starts nor postprocessing in terms of CNNs is needed. Furthermore, the proposed algorithm does not require users with domain knowledge on CNNs, the investigated problem, or even GAs. The proposed algorithm is evaluated on the CIFAR10 and CIFAR100 benchmark data sets against 18 state-of-the-art peer competitors. Experimental results show that the proposed algorithm outperforms the state-of-the-art CNNs hand-crafted and the CNNs designed by automatic peer competitors in terms of the classification performance and achieves a competitive classification accuracy against semiautomatic peer competitors. In addition, the proposed algorithm consumes much less computational resource than most peer competitors in finding the best CNN architectures. [Read More](#).

*IEEE Transactions on Neural Networks and Learning Systems, Apr. 2020*

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## Enhancing Decomposition-Based Algorithms by Estimation of Distribution for Constrained Optimal Software Product Selection

This paper integrates an estimation of distribution (EoD)-based update operator into decomposition-based multiobjective evolutionary algorithms for binary optimization. The probabilistic model in the update operator is a probability vector, which is



adaptively learned from historical information of each subproblem. We show that this update operator can significantly enhance decomposition-based algorithms on a number of benchmark problems. Moreover, we apply the enhanced algorithms to the constrained optimal software product selection (OSPS) problem in the field of search-based software engineering. For this real-world problem, we give its formal definition and then develop a new repair operator based on satisfiability solvers. It is demonstrated by the experimental results that the algorithms equipped with the EoD operator are effective in dealing with this practical problem, particularly for large-scale instances. The interdisciplinary studies in this paper provide a new real-world application scenario for constrained multiobjective binary optimizers and also offer valuable techniques for software engineers in handling the OSPS problem. [Read More](#).

*IEEE Transactions on Evolutionary Computation, Apr. 2020*

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## A Novel Classification Method From the Perspective of Fuzzy Social Networks Based on Physical and Implicit

## Style Features of Data

Many practical scenarios have demanded that we should classify unlabeled data more accurately based on both physical features (e.g., color, distance, or similarity) and implicit style features of data. As most extant classification algorithms classify unlabeled data



based only on their physical features, they become weak in achieving expected classification results for many scenarios. To work around this drawback in this paper, a novel classification method (FuCM) from the perspective of fuzzy social network based on both physical and implicit style features of data is proposed. Based on the proposed fuzzy social network and its dynamics about fuzzy influences of nodes, FuCM comprises two stages. In its training stage, after the fuzzy social network has been built, it learns the topological structure, reflecting physical features and implicit style features of data by carrying out fuzzy influence dynamics in the built network. In its prediction stage, both physical and implicit style features of data are effectively integrated to yield the double structure efficiency characterized by fuzzy influences of nodes. FuCM classifies unlabeled data according to the strongest connection measure based on the proposed double structure efficiency. FuCM does not assume that both data distribution and the classification by physical features or by both physical and implicit style features of data must be known in advance. Thus, it is a novel unified classification framework in this sense. In contrast to all the nine comparative methods, FuCM experimentally demonstrates its comparable classification performance on most synthetic, UCI and KEEL datasets, which can be well classified based only on physical features of data. Furthermore, it displays distinctive superiority on five case studies where satisfactory classification certainly depends on both physical and implicit style features. [Read More.](#)

*IEEE Transactions on Fuzzy Systems, Feb. 2020*



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## Procedural Puzzle Generation: A Survey



Procedural content generation (PCG) for games has existed since the 1980s and is becoming increasingly important for creating game worlds, backstory, and characters across many genres, in particular, open-world games, such as Minecraft (2011) and No Man's Sky

(2016). A particular challenge faced by such games is that the content and/or gameplay may become repetitive. Puzzles constitute an effective technique for improving gameplay by offering players interesting problems to solve, but the use of PCG for generating puzzles has been limited compared with its use for other game elements, and efforts have focused mainly on games that are strictly puzzle games, rather than creating puzzles to be incorporated into other genres. Nevertheless, a significant body of work exists, which allows puzzles of different types to be generated algorithmically, and there is scope for much more research into this area. This paper presents a detailed survey of existing work in PCG for puzzles, reviewing 32 methods within 11 categories of puzzles. For the purpose of analysis, this paper identifies a total of seven salient characteristics related to the methods, which are used to show commonalities and differences between techniques and to chart promising areas for future research. [Read More](#).

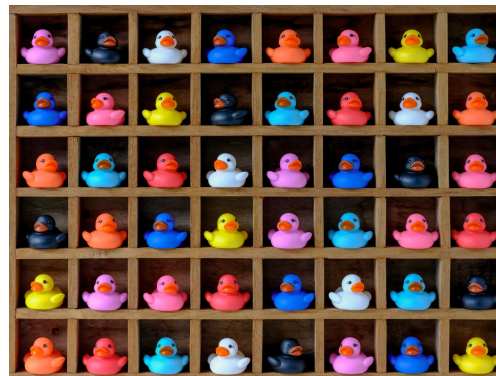
*IEEE Transactions on Games, Mar. 2020*

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## The ASC-Inclusion Perceptual Serious Gaming Platform

## for Autistic Children

“Serious games” are becoming extremely relevant to individuals who have specific needs, such as children with an autism spectrum condition (ASC). Often, individuals with an ASC have difficulties in interpreting verbal and nonverbal communication cues during social



interactions. The ASC-Inclusion EU-FP7 funded project aims to provide children who have an ASC with a platform to learn emotion expression and recognition, through play in the virtual world. In particular, the ASC-Inclusion platform focuses on the expression of emotion via facial, vocal, and bodily gestures. The platform combines multiple analysis tools, using onboard microphone and webcam capabilities. The platform utilizes these capabilities via training games, text-based communication, animations, video, and audio clips. This paper introduces current findings and evaluations of the ASC-Inclusion platform and provides detailed description for the different modalities. [Read more.](#)

*IEEE Transactions on Games, Dec. 2019*

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## Member Activities

### **Data Science Conference: IEEE DSAA'2020 to be held on 6-9 October 2020 Sydney Australia**

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 DSAA conference 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 tracks: Research, Application and Special Sessions. Further highlights will include an Industry Poster session, a Student Poster session, a Data Science School, and a full-day industry day. We expect to see exciting special sessions spotlighting important emerging topics and traditional/hands-on tutorials. The IEEE DSAA Next-generation Data Scientist Award (NGDS Award) calls for the nominations of data science role models.

Sydney is a global centre of data science and artificial intelligence and an incredible place for travel, vacations and research collaborations. IEEE DSAA'2020 will enjoy the annual IEEE spotlight of data science in Sydney.

More information about IEEE DSAA'2020 is available at [dsaa2020.dsaa.co](https://dsaa2020.dsaa.co), and [paper submissions](#) are due on 24 May 2020.

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### **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>

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## 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.



**[2020 IEEE Conference on Evolving and Adaptive Intelligent Systems \(EAIS\)](#)**

**Bari, Italy  
27-29 May, 2020**

**[2020 International Symposium on Autonomous Systems \(ISAS\)](#)**

**Guangzhou, China  
28-30 May, 2020**

**[18th International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems \(IPMU\)](#)**

**Lisbon, Portugal  
25-27 Jun 2020**

**[2020 Joint IEEE 10th International Conference on Development and Learning and Epigenetic Robotics \(ICDL-EpiRob\)](#)**

**Valparaíso, Chile  
7-10 Sep 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 \(SEEDA CECNSM\)](#)**

**Corfu, Greece**

**25-27 Sep 2020**

**(Submission extended to: 4 May 2020)**

**[2020 International Conference on Process Mining \(ICPM\)](#)**

**Padua, Italy**

**5-8 Oct 2020**

**(Submission: 24 June 2020)**

**[2020 IEEE International Conference on Computational Intelligence in Bioinformatics and Computational Biology \(CIBCB\)](#)**

**Viña del Mar, Chile**

**27-29 Oct 2020**

**(Submission: 15 May 2020)**

**[2020 IEEE Latin American Conference on Computational Intelligence \(LA-CCI\)](#)**

**Temuco, Chile**

**4-6 Nov 2020**

**(Submission: 29 May 2020)**

**[7<sup>th</sup> International Conference on Soft Computing and Machine Intelligence \(ISCMI\)](#)**

**Stockholm, Sweden**

**14-15 Nov, 2020**

**(Submission: 25 Jun 2020)**

**[2020 IEEE 7th International Conference on Data Science and Advanced Analytics \(DSAA\)](#)**

**Sydney, Australia**

**6-9 Oct 2020**

**(Submission: 24 May 2020)**

**[2020 Fourth International Conference on Intelligent Computing in Data Sciences \(ICDS\)](#)**

**Fez, Morocco**

**October 21-23, 2020**

**(Submission: 30 May 2020)**

**[2nd International Conference on Industrial Artificial Intelligence \(IAI\)](#)****Shenyang ,China****23-25 Oct, 2020****(Submission: 20 June 2020)****[2020 IEEE Symposium Series on Computational Intelligence \(IEEE SSCI\)](#)****Canberra, Australia****1-4 Dec 2020****(Submission: 7 Aug 2020 -- strict deadline)****2021 Smart World Village****Atlanta, Georgia****18-21 Oct 2020**

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

[View Full Schedule](#)

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## Announcements

### 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 \(Job Ref 2000024\) \(31 July\)](#).

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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.

✓ Editor

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