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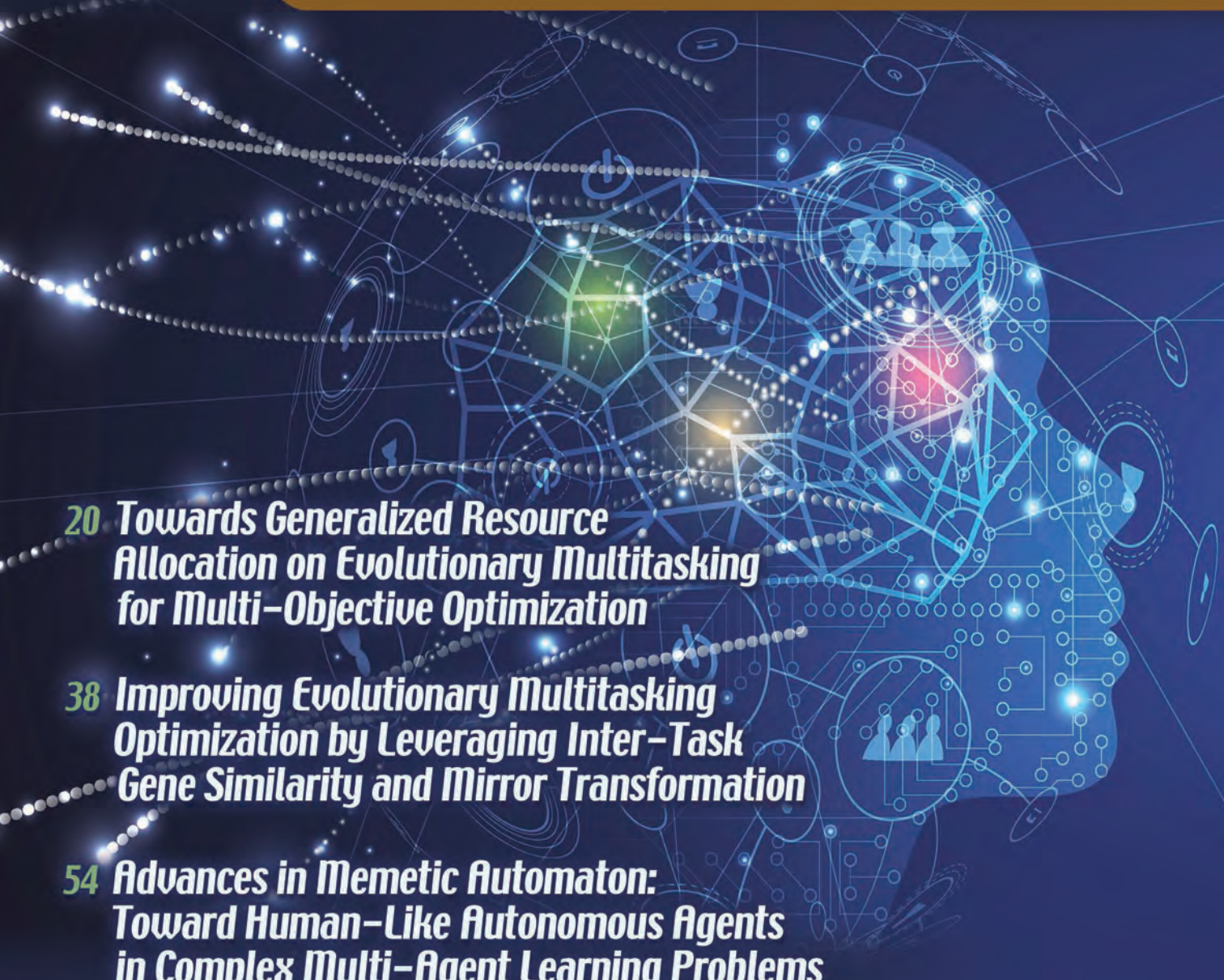

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IEEE Computational Intelligence Society

IEEE

Cesare Alippi
IEEE CIS 2020 Awards Committee Chair Politecnico di Milano, ITALY, and Università della Svizzera italiana, SWITZERLAND

2021 IEEE CIS Awards

Neural Networks Pioneer Award

Sepp Hochreiter, Johannes Kepler University Linz, AUSTRIA

For contributions to the development of the long short-term memory architecture.

Sepp Hochreiter is heading the Institute for Machine Learning, the LIT AI Lab and the AUDI.JKU deep learning center at the Johannes Kepler University of Linz, Austria and is director of the Institute of Advanced Research in Artificial Intelligence (IARAI). Sepp Hochreiter is a pioneer of Deep Learning. His contributions the Long Short-Term Memory (LSTM) and the analysis of the vanishing gradient are viewed as milestones and key-moments of the history of both machine learning and Deep Learning. Sepp Hochreiter laid the foundations for Deep Learning in two ways. Dr. Hochreiter's seminal works on the vanishing gradient and the Long Short-Term Memory (LSTM) were the starting points for what became later known as Deep Learning. LSTM has been overwhelmingly successful in handwriting recognition, generation of writings, language modeling and identification, automatic language translation, speech recognition, analysis of audio data, as well as analysis, annotation, and description of video data.

Sepp Hochreiter is full professor at the Johannes Kepler University, Linz, Austria and head of the Institute for Machine Learning. He is a German citizen, married and has three children.

Fuzzy Systems Pioneer Award

Lawrence O. Hall, University of South Florida, USA

For acceleration methods in fuzzy clustering and medical image interpretation.

Lawrence O. Hall is a Distinguished University Professor in the Department of Computer Science and Engineering at the University of South Florida and the co-Director of the Institute for Artificial Intelligence + X. He is the 2021 IEEE Vice President for Publications, Products and Services. He received his Ph.D. in Computer Science from the Florida State University in 1986 and a B.S. in Applied Mathematics from the Florida Institute of Technology in 1980. He is a fellow of the IEEE. He is a fellow of the AAAS, AIMBE and IAPR. He received the Norbert Wiener award in 2012 and the Joseph Wohl award in 2017 from the IEEE SMC Society. He is a past President of the IEEE Systems, Man and Cybernetics Society, former EIC of what is now the IEEE Transactions on Cybernetics. He is on the editorial boards of the Proceedings of the IEEE and IEEE Spectrum. His research interests lie in learning from big data, distributed machine learning, medical image understanding, bioinformatics, pattern recognition, modeling imprecision in decision making, and integrating AI into image processing. He continues to explore un and semi-supervised learning using scalable fuzzy approaches. He has authored or co-authored over 100 publications in journals, as well as many conference papers and book chapters. His work has been cited over 34,000 times per Google Scholar. He did early work showing that unsupervised fuzzy clustering could be combined with a knowledge-based approach to segment brain tumors in an explainable manner. He has worked on scalable methods for fuzzy clustering and an evolutionary algorithm approach to optimizing fuzzy clusters. With labeled data, he has done work to learn good models of small classes. His research has been funded by agencies such as the National Science Foundation, National Institutes of Health, Department of Energy, DARPA, and NASA.

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Kazuo Tanaka,
The University of Electro-Communications, JAPAN

For contributions to fuzzy control systems design and analysis.

Kazuo Tanaka received the Ph.D. degree in Systems Science from Tokyo Institute of Technology in 1990. He was a Visiting Scientist at University of North Carolina at Chapel Hill in 1992 and 1993. He was elevated to be an IEEE Fellow for his contribution to fuzzy control systems design and analysis in 2014, and International Fuzzy Systems Association Fellow in 2015. He is the recipients of more ten awards including the 2000 IEEE Transactions on Fuzzy Systems Outstanding Paper Award for his research. He has been frequently invited to plenary addresses, keynote and invited talks at international conference. He delivered invited talks/lectures at 2012, 2014 and 2016 IEEE World Congresses on Computational Intelligence.

He served as the Vice Chair of the IEEE International Symposium on Intelligent Control as part of the IEEE Multi-conference on Systems and Control in Saint Petersburg, Russia, in 2009. He was the Chair of Task Forces on Fuzzy Control Theory and Application in the IEEE CIS Fuzzy Systems Technical Committee. He served as an Associate Editor of Automatica, the IEEE Transactions on Fuzzy Systems, and is currently an Associate Editor on the IEEE Control Systems Society Conference Editorial Board.

He has made pioneering contributions to the theory of fuzzy control systems design and analysis. His research on fuzzy control systems design and analysis started in the late 80's with his advisor, Prof. Michio Sugeno, who is an Emeritus Professor of Tokyo Institute of Technology and the first recipient of IEEE CIS Fuzzy Systems Pioneer Award with Prof. Lotfi A. Zadeh in 2000. Professor Tanaka has made extensively contributions to the development of fuzzy control theory ever since. In the late 90's, he first suggested a linear matrix inequality (LMI) based design framework for fuzzy control systems. Recently he also presented a new sum-of-square (SOS) approach to overcome some drawbacks of the LMI approach. Currently, he is successfully applying his innovative theoretical results to unmanned aerial vehicles (UAVs), particularly, flying-wing type UAVs considered to be some of the most challenging nonlinear control problems. He has published more than 100 journal papers in these areas, as well as 17 books, including the research monograph entitled Fuzzy Control Systems Design and Analysis: A Linear Matrix Inequality Approach (co-authored with H. O. Wang, Wiley-Interscience, 2001). His papers have over 28,500 citations according to Google Scholar, with h-index of 55 and i10-index of 147.

The IEEE Computational Intelligence Society annually recognizes significant contributions and meritorious service in the field of computational intelligence.

Evolutionary Computation Pioneer Award

Carlos A. Coello Coello,
CINVESTAV-IPN, MEXICO

For contributions to evolutionary multi-objective optimization and constraint-handling techniques.

Carlos A. Coello Coello received a PhD in Computer Science from Tulane University (in the USA) in 1996. His research has mainly focused on the design of new multi-objective optimization algorithms based on bio-inspired metaheuristics. Among other contributions, he proposed the first micro-genetic algorithm for multi-objective optimization, the first Pareto-based multi-objective artificial immune system and new constraint-handling techniques based on multi-objective concepts. He currently has more than 500 publications, including more than 170 journal papers and 50 book chapters. He has published a monographic book and has edited 3 more books. His publications currently report over 57,500 citations in Google Scholar (his h-index is 95). He has received several awards, including the National Research Award (in 2007) from the Mexican Academy of Science (in the area of *exact sciences*), the 2009 Medal to the Scientific Merit from Mexico City's congress, the Ciudad Capital: Heberto Castillo 2011 Award for scientists under the age of 45, in *Basic Science*, the 2012 Scopus Award (Mexico's edition) for being the most highly cited scientist in engineering in Mexico in the 5 years previous to the award and the 2012 National Medal of Science in Physics, Mathematics and Natural Sciences from Mexico's presidency (this is the most important award that a scientist can receive in Mexico). He also received the Luis Elizondo Award from the Tecnológico de Monterrey in 2019. Additionally, he is the recipient of the 2013 IEEE Kiyo Tomiyasu Award, "*for pioneering contributions to single- and multiobjective optimization techniques using bioinspired metaheuristics*", and of the 2016 The World Academy of Sciences (TWAS) Award in "*Engineering Sciences*". Since January 2011, he is an IEEE Fellow. He is currently the Editor-in-Chief of the *IEEE Transactions on Evolutionary Computation*.

He is currently a Full Professor with Distinction (Investigador Cinvestav 3F) at the Department of Computer Science of the Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional (CINVESTAV-IPN) in Mexico City, México.

Meritorious Service Award

Nikhil R. Pal,
Indian Statistical Institute, INDIA

For his leadership in the Computational Intelligence Society and its publications.

Nikhil R. Pal is a Professor in the Electronics and Communication Sciences Unit and the Head of the Centre for Artificial Intelligence and Machine Learning at the Indian Statistical Institute. He has also served as a Chair Professor at the National Chiao Tung University, Taiwan. His research interests include modeling and quantifying different facets of uncertainty, computational intelligence, machine learning, and brain science.

He has served the IEEE Computational Intelligence Society (CIS) in various capacities. He served as the Editor-in-Chief of the IEEE Transactions on Fuzzy Systems (TFS) for six years (2005-2010). As the Editor of TFS, he characterized the necessary attributes that should be possessed by an "Applications Paper" and established a 5-phase transparent guidelines for organizing special issues of the transactions, which clearly explain the various phases from the submission of proposals to publication of accepted special issues. Handling of a short paper that comments on some paper published in the same transactions ("Comments on Paper") could sometimes be tricky. As the Editor he established a six-step transparent procedure for this. He introduced recognition of Outstanding Associate Editors (AEs) with certificates of appreciation during the annual meeting of the Associate Editors.

He served as an Administrative Committee (AdCom) member of CIS for the period 2010-2012. This was followed by his election as the Vice-President (VP) for Publications, which he served for two consecutive terms, 2013-2016. As the VP for Publications he took major initiatives to restructure two cosponsored transactions to make those more attractive and was responsible for the successful proposal of IEEE Transactions on Emerging Topics in Computational Intelligence. Prof. Pal served as the President of CIS for the period 2018-2019. He took initiatives to expand the scope of the CIS Distinguished Lecture program to include mentoring sessions to interact with young researchers about their research problems. The Distinguished Lecturers are also encouraged to give an open-to-all additional lecture to a nearby university/institute for undergraduate students. He proposed and took lead to introduce the CIS Member Get a Member Program (CIS MGM) in line with the IEEE MGM program.

He is a Fellow of the National Academy of Sciences, India; Indian National Science Academy; Indian National Academy of Engineering; The World Academy of Sciences, and a Fellow of the IEEE.

IEEE Transactions on Neural Networks and Learning Systems Outstanding Paper Award

"Broad Learning System: An Effective and Efficient Incremental Learning System Without the Need for Deep Architecture," by C.L.Philip Chen and Zhulin Liu, Vol. 29, No. 1, pp. 10–24, January 2018.

IEEE Transactions on Fuzzy Systems Outstanding Paper Award

"On Distributed Fuzzy Decision Trees for Big Data," by Armando Segatori, Francesco Marcelloni, and Witold Pedrycz, Vol. 26, No. 1, pp. 174–192, February 2018.

IEEE Transactions on Evolutionary Computation Outstanding Paper Award

"A Decision Variable Clustering-Based Evolutionary Algorithm for Large-scale Many-objective Optimization," by Xingyi Zhang, Ye Tian, Ran Cheng, and Yaochu Jin, Vol. 22, No. 1, pp. 97–112, February 2018.

IEEE Transactions on Cognitive and Developmental Systems Outstanding Paper Award

"Adaptive Robot Path Planning Using a Spiking Neuron Algorithm with Axonal Delays," by Tiffany Hwu, Alexander Y. Wang, Nicolas Oros, and Jeffrey L. Krichmar, Vol. 10, No. 2, pp. 126–137, June 2018.

IEEE Transactions on Games Outstanding Paper Award

"Game Tree Search Based on Nondeterministic Action Scripts in Real-Time Strategy Games," by Nicolas A. Barriga, Marius Stanescu, and Michael Buro, Vol. 10, No. 1, pp. 69–77, March 2018.

IEEE Transactions on Emerging Topics in Computational Intelligence Outstanding Paper Award

"Light Gated Recurrent Units for Speech Recognition," by Mirco Ravanelli, Philemon Brakel, Maurizio Omologo, and Yoshua Bengio, Vol. 2, No. 2, pp. 92–102, April 2018.

IEEE Computational Intelligence Magazine Outstanding Paper Award

"Recent Trends in Deep Learning Based Natural Language Processing," by Tom Young, Devamanyu Hazarika, Soujanya Poria, and Erik Cambria, Vol. 13, No. 3, pp. 55–75, August 2018.

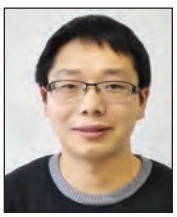
Outstanding Chapter Award

IEEE CIS Student Chapter at the Universidade de Brasilia

Outstanding Organization Award

McAfee

Outstanding PhD Dissertation Award



Shouyong Jiang for his thesis entitled "Evolutionary Algorithms for Static and Dynamic Multiobjective Optimization" for the degree of Doctor of Philosophy, De Montfort University, UK, 2017.

Supervisor: Shengxiang Yang, De Montfort University, UK.

Abstract— Many real-world optimization problems consist of conflicting objectives that need to be optimized simultaneously. Due to the presence of multiobjectivity, there is no single solution that can optimize all the objectives. Therefore, the resulting multiobjective optimization problems (MOPs) resort to a set of trade-off optimal solutions, called the Pareto set in the decision space and the Pareto front in the objective space. Traditional optimization

methods can at best find one solution in a single run, thereby making them inefficient to solve MOPs. In contrast, evolutionary algorithms (EAs) can approximate multiple optimal solutions. There have been increasing research interests in developing EAs or improving their performance for MOPs. However, EAs depend largely on the properties of the MOPs in question, e.g., static/dynamic optimization environments, simple/complex Pareto front characteristics, and low/high dimensionality. Therefore, it is not trivial to further study the generalization of EAs for wider use.

This thesis explores EAs' ability to solve a variety of MOPs with different problem characteristics, attempting to widen EAs' applicability with greater performance. First, decomposition-based EAs are generalized to handle complex Pareto fronts with a two-phase search and niche-guided selection strategy. Second, new scalarizing functions are proposed, and an efficient decomposition-based EA is introduced to deal with a class of hard MOPs. Third, a diversity-first-and-convergence-second sorting method is suggested to handle possible drawbacks of convergence-first based sorting methods and shows great promise for MOPs with an increase of objective dimensionality. After that, EAs are investigated for dynamic multiobjective optimization where objective functions and constraints can change over time. A new set of test problems consisting of a wide range of dynamic characteristics is introduced to standardize test environments for dynamic multiobjective optimization, thereby aiding fair algorithm comparison and sound performance analysis. Finally, a dynamic EA is developed to tackle dynamic MOPs by exploiting the advantages of both generational and steady-state algorithms. All the proposed approaches have been extensively examined against existing state-of-the-art methods, showing robust performance in a variety of test scenarios.

Recognizing volunteers and eminent colleagues is a key element to keep our Society alive and to promote research excellence in computational intelligence.

The research work presented in the thesis is the output of initiative and novel attempts to tackle some challenging issues in evolutionary multiobjective optimization. This research has not only increased the applicability of some of the existing approaches, such as decomposition-based or Pareto-based algorithms, for complex or hard MOPs, but also moved forward dynamic multiobjective optimization with novel ideas including new test suites and novel algorithm design.

Outstanding Early Career Award

Zhi-Hui Zhan,
South China University of Technology, CHINA

For contributions to the efficiency of swarm optimizers.

Zhi-Hui Zhan received the Bachelor's degree and the Ph. D. degree in Computer Science from the Sun Yat-Sen University, Guangzhou, China, in 2007 and 2013, respectively.

He is currently the Changjiang Scholar Young Professor with the School of Computer Science and Engineering, South China University of Technology, Guangzhou, China. His current research interests include evolutionary computation, swarm intelligence, and their applications in real-world problems and in environments of cloud computing and big data.

Evolutionary computation and swarm intelligence optimizers are popular tools for solving optimization problems in many fields. However, the performance and applicability of swarm optimizers are related to the optimization efficiency that whether they have strong global search ability to avoid premature in local optima, and whether they can converge fast and use acceptable running time to obtain good enough solutions for real-world optimization problems. To these aims, Dr. Zhan has put his heart and soul in the field of evolutionary computation and swarm optimizers and has made significant outstanding achievements. Specially, his contributions to the efficiency of swarm optimizers mainly include to enhance the optimization efficiency of swarm optimizers in terms of "Stronger Search Ability," "Faster Convergence Speed," and "Shorter Running Time", so as to make the algorithms more efficient in "Harder Problem Solving" and successful in "Broader Application Fields".

For his contributions in the related works, Dr. Zhan received the Outstanding Youth Science Foundation from National Natural Science Foundations of China and the Wu Wen-Jun Artificial Intelligence Excellent Youth from the Chinese Association for Artificial Intelligence. He is appointed as the Changjiang Scholar Young Professor from Ministry of Education, China. His doctoral dissertation was awarded the IEEE Computational Intelligence Society Outstanding Ph. D. Dissertation and the China Computer Federation Outstanding Ph. D. Dissertation. He is listed as one of the Highly Cited Chinese Researchers in Computer Science. He is currently an Associate Editor of the *IEEE Transactions on Evolutionary Computation*, the *Memetic Computing*, and the *Neurocomputing*.