Competition on Bound Constrained Single and Multiobjective Numerical Optimization

Competition goal: The goal is to compare evolutionary algorithms based on the accuracy as well as speed and also by considering every run of every algorithm separately. The current approaches are unable to accomplishing this task effectively. In addition, participants are also asked to improve upon the current state of the art in single and multi-objective numerical optimization with bound constraints in order to participate in this competition.

Competition Setup: In this competition, two tracks have been established: Bound Constrained Single-Objective Numerical Optimization and Bound Constrained Multi-Objective Numerical Optimization. Each track consists of multiple single-objective and multi-objective benchmark problems, each with boundary conditions. Each track will be evaluated according to specific criteria, including solution speed and solution quality, with unique evaluation metrics and testing conditions for each track. The top three participants in each track will receive an award certificate issued by the conference.

Contributions to the Evolutionary Computation Community: Numerical optimization is the most important class of problems. Most new evolutionary and swarm algorithms are tested on numerical benchmark problems. In addition, these benchmark problems can be transformed into dynamic, niching, composition, computationally expensive and many other classes of problems. Therefore, novel performance comparison approaches considering the speed, quality of the solutions and will be very valuable to further the research in evolutionary computation field.

How to submit an entry and how to evaluate them: Potential authors are asked to make use of the software of benchmark problems (in Matlab, C, etc.) to be distributed from the competitions' web pages to test their algorithms. The authors have to execute their novel algorithms on the given benchmark problems and present the results in various formats as outlined in the associated technical report. The evaluation criteria will also be specified in the technical report. The authors are asked to prepare a conference paper detailing the algorithms used and the results obtained on the given benchmark problems and submit their papers to the special session associated with this competition within CEC 2025. The authors presenting the best results should also be willing to release their software for verification before declaring the eventual winners of the competition.

Expected number of entries: There were around 10+ submissions and ~5 registrations associated with the competition at recent CEC conferences. In 2025 also, we expect around 10+ submissions and correspondingly a healthy number of registrations and participations.

SS Associated with This Competition: This competition permits entries with an associated conference paper submitted to the CEC 2025 or without submitting a conference paper. If the conference paper is accepted, we also expect at least one author of each entry to register, attend the conference and present their results/paper(s). Papers on novel concepts that help us in understanding problem characteristics are also

welcome.

URL for the competition: A URL will be set up similar to the URLs of previous CEC competitions since 2005 at https://github.com/P-N-Suganthan and http://www5.zzu.edu.cn/cilab/Code.htm

Competition Organizers

Ponnuthurai Nagaratnam Suganthan is/was an associate editor of the Applied Soft Computing (Elsevier, 2018-), Neurocomputing (Elsevier, 2018-), IEEE Trans on Cybernetics (2012 - 2018), IEEE Trans on Evolutionary Computation (2005 -), IEEE Trans on SMC: Systems (2020 -), Information Sciences (Elsevier, 2009 -), Pattern Recognition (Elsevier, 2001 -) and Neurocomputing (2018 -) Journals. He is a founding co-editor-in-chief of Swarm and Evolutionary Computation (2010 -), an SCI Indexed Elsevier Journal. His research interests include swarm and evolutionary algorithms, pattern recognition, big data, deep learning and applications of swarm, evolutionary & machine learning algorithms. He was selected as one of the highly cited researchers by Thomson Reuters yearly from 2015 to 2023 in computer science. He served as the General Chair of the IEEE SSCI 2013. He has been a member of the IEEE (S'91, M'92, SM'00, F'15) since 1991 and an elected AdCom member of the IEEE Computational Intelligence Society (CIS) in 2014-2016. He is an IEEE CIS distinguished lecturer (DLP) in 2018-2021.

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Kenneth V. Price earned his B.Sc. in physics from Rensselaer Polytechnic Institute in 1974. He briefly worked as a supervisor at the Teledyne-Gurley Scientific Instrument Company in Troy, New York before moving to San Francisco. He currently resides in Vacaville, California. An avid hobbyist, he is self-taught in the field of evolutionary computation. In 1994, he published an early ensemble annealing, threshold accepting algorithm ("genetic annealing"), which led Dr. R. Storn to challenge him to solve the Chebyshev polynomial fitting problem. Ken's discovery of differential mutation proved to be the key to solving not only the Chebyshev polynomial fitting problem, but also many other difficult numerical global optimization problems. He is co-author of both the seminal paper on the differential evolution algorithm and the book "Differential Evolution: A practical approach to global optimization". In 2017, Ken was awarded the IEEE CIS Pioneer Award for his seminal work on the differential evolution algorithm. Ken has also authored or coauthored seven additional peer-reviewed papers, contributed chapters to three books on optimization and has served as a reviewer for twelve different journals.

Jing Liang (Senior Member, IEEE) received the B.E. degree from Harbin Institute of Technology, China and the Ph.D. degree from the School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore. She is currently a Professor at the School of Electrical and Information Engineering, Zhengzhou University, China and the School of Electrical Engineering and Automation, Henan Institute of Technology, China. Her main research interests are evolutionary computation, swarm intelligence, multiobjective optimisation and neural network. Dr. Liang serves as Associate Editor of IEEE Transactions on Evolutionary Computation, and the

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