

**Title :**

Evolutionary Computation for Deep Learning and Machine Learning

Abstract:

Evolutionary computation technique has been widely used for addressing various challenging problems due to its powerful global search ability. There are many complex optimization tasks in the fields of deep learning and machine learning such as neural architecture search, hyper-parameter search, feature selection, feature construction, etc. This workshop aims to collect original papers that develop new evolutionary computation techniques to address any kind of deep learning and machine learning tasks. For all the aforementioned, we kindly invite the scientific community to contribute to this workshop by submitting novel and original research related but not limited to the following topics:

Scope and Topics:

Topics of interest include but are not limited to:

- ✧ Evolutionary Deep Learning/Evolving Deep Learning
- ✧ Neural Architecture Search (NAS)
- ✧ Evolutionary Deep Neural Networks
- ✧ Evolutionary Computation for Deep Neural Networks
- ✧ Evolutionary Neural Architecture Search (ENAS)
- ✧ Self-adaptive Evolutionary NAS
- ✧ EvolNAS
- ✧ Neuroevolution
- ✧ Deep Neuroevolution
- ✧ Evolving Neural Networks
- ✧ Neural Networks with Evolving Structure
- ✧ AutoML
- ✧ Evolutionary Neural Networks
- ✧ Evolutionary Computation for Neural Architecture Search
- ✧ Hyper-parameter Tuning with Evolutionary Computation
- ✧ Hyper-parameter Tuning with Self-adaptive Evolutionary Algorithm
- ✧ Evolutionary Computation in Deep Learning for Regression/Clustering/Classification
- ✧ Hyper-parameter Optimization
- ✧ Evolutionary Computation for Hyper-parameter Optimization
- ✧ Evolutionary Computation for Automatic Machine Learning
- ✧ Evolutionary Computation for Deep Neural Network
- ✧ Evolutionary Transfer Learning
- ✧ Full-space Neural Architecture Search
- ✧ Differentiable NAS
- ✧ Hybridization of Evolutionary Computation and Neural Networks



- ✧ Large-scale Optimization for Evolutionary Deep Learning
- ✧ Evolutionary Multi-task Optimization in Deep Learning

- ✧ Feature Selection, Extraction, and Dimensionality Reduction on High-dimensional and Large-scale Data
- ✧ Evolutionary Feature Selection and Construction
- ✧ Multi-objective Feature Selection/Multi-object classification/ Multi-object clustering
- ✧ Multi-task optimization, Multi-task learning, Meta learning
- ✧ Learning Based Optimization
- ✧ Hybridization of Evolutionary Computation and Cost-sensitive Classification/Clustering
- ✧ Bi-level Optimization (BLO)
- ✧ Hybridization of Evolutionary Computation and Class-imbalance Classification/Clustering

- ✧ Numerical Optimization/Combination optimization/ Multi-objective optimization
- ✧ Genetic Algorithm/Genetic Programming/Particle Swarm Optimization/Ant Colony Optimization/Artificial Bee Colony/Differential Evolution/Fireworks Algorithm/Brain Storm Optimization
- ✧ Classification/Clustering/Regression
- ✧ Machine Learning/Data Mining/Neural Network/Deep Learning/Support Vector Machine/Decision Tree/Deep Neural Network/Convolutional Neural Network/Reinforcement Learning/Ensemble Learning/K-means
- ✧ Real-world Applications of Evolutionary Computation and Machine Learning, e.g. Images and Video Sequences/Analysis, Face Recognition, Gene Analysis, Biomarker Detection, Medical Data Analysis, Text mining, Intrusion Detection Systems, Vehicle Routing, Computer Vision, Natural Language Processing, Speech Recognition, etc.

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Yu Xue received the Ph. D. degree from School of Computer Science and Technology, Nanjing University of Aeronautics and Astronautics, China, in 2013. He is a professor in School of Computer and Software, Nanjing University of Information Science and Technology. He was a visiting scholar in the School of Engineering and Computer Science, Victoria University of Wellington, New Zealand (2016.8-2017.8). He was a research scholar in the Department of Computer Science and Engineering, Michigan State University, the United States of America (2017.10-2018.11). His research interests include Evolutionary Computation, Machine Learning, and Data mining.

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Bing Xue is currently a Professor in Artificial Intelligence, and Program Director of Science in School of Engineering and Computer Science at VUW. She has over 300 papers published in fully refereed international journals and conferences and her research focuses mainly on evolutionary computation, machine learning, classification, symbolic regression, feature selection, evolving deep neural networks, image analysis, transfer learning, multi-objective machine learning.

Dr Xue is currently the Chair of IEEE Computational Intelligence Society (CIS) Task Force on Transfer Learning & Transfer Optimization, Vice-Chair of IEEE CIS Evolutionary Computation Technical Committee, Editor of IEEE CIS Newsletter. Vice-Chair of IEEE Task Force on Evolutionary Feature Selection and Construction, and Vice-Chair IEEE CIS Task Force on Evolutionary Deep Learning and Applications. She is also served as associate editor of several international journals, such as IEEE Computational Intelligence Magazine and IEEE Transactions on Evolutionary Computation.

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Adam Slowik was born in Warsaw, Poland, in 1977. He received the Ph.D. degree in electronics with distinction from the Department of Electronics and Computer Science, Koszalin University of Technology, Koszalin, Poland, in 2007, and the Dr. Habil. (D.Sc.) degree in computer science from the Department of Mechanical Engineering and Computer Science, Czestochowa University of Technology, Czestochowa, Poland, in 2013. Since October 2013, he has been an Associate Professor with the Department of Electronics and Computer Science, Koszalin University of Technology. His research interests include soft computing, computational intelligence, machine learning, and bioinspired global optimization algorithms and their applications. He is an Associate Editor for the IEEE TRANSACTIONS ON INDUSTRIAL INFORMATICS.

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Ferrante Neri (M'03–SM'19) received a Laurea degree (BSc + MSc) and a PhD in Electrical Engineering from the Technical University of Bari, Italy, in 2002 and 2007 respectively. In 2007, he also received a PhD in Scientific Computing and Optimization from University of Jyväskylä, Finland. From the latter institution, he received the DSc degree in Computational Intelligence in 2010. Dr Neri moved to De Montfort University, United Kingdom in 2012, where he was appointed Reader in Computational Intelligence and in 2013, promoted to Full Professor of Computational



Intelligence Optimisation. Since 2019 Ferrante Neri moved to the School of Computer Science, University of Nottingham, United Kingdom. His research interests include algorithmics, hybrid heuristic-exact optimisation, memetic computing, differential evolution, and membrane computing. Dr Neri published nearly 200 items including two editions of the textbook “Linear Algebra for Computational Sciences and Engineering”.