

Cheng He

Curriculum Vitae

EMI group, SUSTech
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Research Interests

theme Model-based evolutionary algorithms
Multi- and many-objective optimization,
Large-scale optimization, constraint handling

application Neural Architecture Search
Hyperparameter Optimization and Automated Machine Learning

Education

2012 - 2018 **Ph.D. in Control Theory and Techniques**, Huazhong University of Science and Technology.
Department of Intelligent Science and Technology, School of Artificial Intelligence and Automation

Advisor: Prof. Linqiang Pan

2008 - 2012 **B.S. in Automation**, Wuhan University of Science and Technology.
Department of Automation, College of Information Science and Technology

Experiences

2018.9-2020.5 **Postdoctoral Researcher**, Southern University of Science and Technology & University of Science and Technology of China.

Topic: Large-scale multiobjective optimization

2018.3-2018.9 **Visiting Scholar**, Southern University of Science and Technology.

Topic: Evolutionary multiobjective optimization

2016.9-2017.3 **Visiting Student**, University of Surrey.

Topic: Data-driven multiobjective optimization

Publications

Journal Papers

- [1] **Cheng He**, Ran Cheng*, Ye Tian, Xingyi Zhang, Kay Chen Tan and Yaochu Jin. Paired Offspring Generation for Constrained Large-Scale Multiobjective Optimization. *IEEE Transactions on Evolutionary Computation*, 25(3), 448-462, 2021.
- [2] **Cheng He**, Shihua Huang, Ran Cheng*, Kay Chen Tan, and Yaochu Jin. Evolutionary Multiobjective Optimization Driven by Generative Adversarial Networks (GANs). *IEEE Transactions on Cybernetics*, 51 (6), 3129-3142, 2021.
- [3] **Cheng He**, Ran Cheng*, and Danial Yazdani. Adaptive Offspring Generation for Evolutionary Large-Scale Multiobjective Optimization. *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, 2020.
- [4] **Cheng He**, Ran Cheng*, Chuanji Zhang, Ye Tian, Qin Chen and Xin Yao. Evolutionary Large-Scale Multiobjective Optimization for Ratio Error Estimation of Voltage Transformers. *IEEE Transactions on Evolutionary Computation*, 24(5), 868-881, 2020.
- [5] **Cheng He**, Lianghao Li, Ye Tian, Xingyi Zhang, Ran Cheng*, Yaochu Jin, and Xin Yao. Accelerating Large-scale Multiobjective Optimization via Problem Reformulation. *IEEE Transactions on*

Evolutionary Computation, 23 (6), 949-961, 2019.

- [6] **Cheng He**, Hao Tan, Shihua Huang, Ran Cheng*. Efficient Evolutionary Neural Architecture Search by Modular Inheritable Crossover. *Swarm and Evolutionary Computation*, 64(2021), 100894, 2021.
- [7] **Cheng He**, Zhixiong Zhang, Jie Ye, Jinbang Xu, and Linqiang Pan*. Switching Ripple Suppressor Design of the Grid-Connected Inverters: A Perspective of Many-Objective Optimization with Constraints Handling. *Swarm and Evolutionary Computation*, 44, 293-303, 2019.
- [8] **Cheng He**, Ye Tian, Yaochu Jin, Xingyi Zhang, and Linqiang Pan*. A Radial Space Division Based Evolutionary Algorithm for Many-Objective Optimization. *Applied Soft Computing*, 61, 603-621, 2017.
- [9] **Cheng He**, Ye Tian, Handing Wang, and Yaochu Jin. A Repository of Real-World Datasets for Data- Driven Evolutionary Multiobjective Optimization. *Complex & Intelligent Systems*, 6, 189-197, 2020.
- [10] Linqiang Pan, Lianghao Li, Ran Cheng, **Cheng He***, and Kay Chen Tan. Manifold Learning Inspired Mating Restriction for Evolutionary Multi-Objective Optimization with Complicated Pareto Sets. *IEEE Transactions on Cybernetics*, 2020.
- [11] Linqiang Pan, Lianghao Li, **Cheng He***, and Kay Chen Tan. A Subregion Division-Based Evolutionary Algorithm with Effective Mating Selection for Many-Objective Optimization. *IEEE Transactions on Cybernetics*, 2020.
- [12] Lianghao Li, **Cheng He***, Wenting Xu, and Linqiang Pan*, Pioneer Selection for Evolutionary Multiobjective Optimization with Discontinuous Feasible Region, *Swarm and Evolutionary Computation*, accepted.
- [13] Linqiang Pan, Wenting Xu, Lianghao Li, **Cheng He***, and Ran Cheng*. Adaptive Simulated Binary Crossover for Rotated Multi-Objective Optimization. *Swarm and Evolutionary Computation*, 60, 100759, 2021.
- [14] Linqiang Pan, **Cheng He**, Ye Tian, Handing Wang, Xingyi Zhang, and Yaochu Jin*. A Classification- Based Surrogate-Assisted Evolutionary Algorithm for Expensive Many-Objective Optimization. *IEEE Transactions on Evolutionary Computation*, 23(1), 74-88, 2019.
- [15] Linqiang Pan, **Cheng He**, Ye Tian, Yansen Su, and Xingyi Zhang*. A Region Division Based Diversity Maintaining Approach for Many-Objective Optimization. *Integrated Computer-Aided Engineering*, 24(3), 279-296, 2017.
- [16] Ye Tian, Langchun Si, Xingyi Zhang*, Ran Cheng, **Cheng He**, Kay Chen Tan, and Yaochu Jin. Evolutionary Large-Scale Multi-Objective Optimization: A Survey. *ACM Computing Surveys*, accepted.
- [17] Hao Tan, Ran Cheng*, Shihua Huang, **Cheng He**, Changxiao Qiu, Fan Yang, and Ping Luo. RelativeNAS: Relative Neural Architecture Search via Slow-Fast Learning. *IEEE Transactions on Neural Networks and Learning Systems*, 2021.
- [18] Shangshang Yang, Tian Ye, **Cheng He**, Xingyi Zhang, Tan Kay Chen, Yaochu Jin. A Gradient-Guided Evolutionary Approach to Training Deep Neural Networks. *IEEE Transactions on Neural Networks and Learning Systems*, 2021.
- [19] Zhenshou Song, Handing Wang, **Cheng He**, and Yaochu Jin. A Kriging-Assisted Two-Archive Evolutionary Algorithm for Expensive Many-Objective Optimization. *IEEE Transactions on Evolutionary Computation*, 2021.
- [20] Jianqing Lin, **Cheng He**, Ran Cheng*. Adaptive Dropout for High-dimensional Expensive Multiobjective Optimization. *Complex & Intelligent Systems*. 2021.

- [21] Jing Wang, Runze Li, **Cheng He**, Haixin Chen, Ran Cheng, Chen Zhai, and Miao Zhang. An Inverse Design Method for Supercritical Airfoil based on Conditional Generative Models. *Chinese Journal of Aeronautics*, 2021.
- [22] Yanguo Kong*, Xiangyi Kong*, **Cheng He**, Changsong Liu, Liting Wang, Lijuan Su, Jun Gao, Qi Guo, and Ran Cheng*. Constructing an Automatic Diagnosis and Severity-Classification Model for Acromegaly Using Facial Photographs by Deep Learning. *Journal of Hematology & Oncology*, 13(1): 1-4, 2020.
- [23] Danial Yazdani, Ran Cheng*, **Cheng He**, and Jurgen Branke. Adaptive Control of Sub-Populations in Evolutionary Dynamic Optimization. *IEEE Transactions on Cybernetics*, 2020.
- [24] Ye Tian, **Cheng He**, Ran Cheng, and Xingyi Zhang. A Multi-Stage Evolutionary Algorithm for Better Diversity Preservation in Multi-Objective Optimization. *IEEE Transactions on Systems, Man and Cybernetics: Systems*, 2020.
- [25] Ye Tian, Xingyi Zhang, Ran Cheng*, **Cheng He**, and Yaochu Jin. Guiding Evolutionary Multiobjective Optimization with Generic Front Modeling. *IEEE Transactions on Cybernetics*, 50(3), 1106-1119, 2020.
- [26] Zhanguo Hou, **Cheng He**, and Ran Cheng*. Reformulating Preferences into Constraints for Evolutionary Multi- and Many-Objective Optimization. *Information Sciences*, 541, 1-15, 2020.
- [27] Ran Cheng*, **Cheng He**, Yaochu Jin and Xin Yao. Model-based evolutionary algorithms: a short survey. *Complex & Intelligent Systems*, 4 (4), 283-292, 2018.
- [28] Wenbo Dong, Kang Zhou, Huaqing Qi, **Cheng He**, Jun Zhang*. A Tissue P System Based Evolutionary Algorithm for Multi-Objective VRPTW. *Swarm and Evolutionary Computation*, 39, 310-322, 2018.
- [29] Shihua Huang, Zhichao Lu, Ran Cheng, and **Cheng He**, FaPN: Feature-aligned Pyramid Network for Dense Image Prediction, IEEE ICCV'21, accepted, 2021.
- [30] Lianghao Li, **Cheng He***, Ran Cheng, and Linqiang Pan*. Large-Scale Multiobjective Optimization via Problem Decomposition and Reformulation. IEEE Congress on Evolutionary Computation (CEC), 2021, accepted.
- [31] **Cheng He** and Ran Cheng*. Population Sizing of Evolutionary Large-Scale Multiobjective Optimization. International Conference Series on Evolutionary Multi-Criterion Optimization (EMO), 2021, 41-52.
- [32] Lianghao Li, **Cheng He***, Ran Cheng, and Linqiang Pan. Manifold Learning Inspired Mating Restriction for Evolutionary Constrained Multiobjective Optimization. International Conference Series on Evolutionary Multi-Criterion Optimization (EMO), 2021, 296-307.
- [33] Changwu Huang, Lianghao Li, **Cheng He***, Ran Cheng, and Xin Yao. Operator-Adapted Evolutionary Large-Scale Multiobjective Optimization for Voltage Transformer Ratio Error Estimation. International Conference Series on Evolutionary Multi-Criterion Optimization (EMO), 2021, 672-683.
- [34] Jianqing Lin, **Cheng He**, and Ran Cheng*. Dimension Dropout for Evolutionary High-Dimensional Expensive Multiobjective Optimization. International Conference Series on Evolutionary Multi-Criterion Optimization (EMO), 2021, 567-579.
- [35] Shengran Hu, Ran Cheng*, **Cheng He**, and Zhichao Lu. Multi-Objective Neural Architecture Search with Almost No Training. International Conference Series on Evolutionary Multi-Criterion Optimization (EMO), 2021, accepted.

- [36] **Cheng He**, Ran Cheng, Ye Tian, and Xingyi Zhang. Iterated Problem Reformulation for Evolutionary Large-Scale Multiobjective Optimization. IEEE Congress on Evolutionary Computation (CEC' 2020), Glasgow, UK, June 2020.
- [37] Yiming Chen, Tianci Pan, **Cheng He***, and Ran Cheng*. Efficient Evolutionary Deep Neural Architecture Search (NAS) by Noisy Network Morphism Mutation. The 14th International Conference on Bio-inspired Computing: Theories and Applications (BIC-TA), Zhengzhou, China, December 2019.
- [38] Hao Tan, **Cheng He***, Dexuan Tang, and Ran Cheng*. Efficient Evolutionary Neural Architecture Search (NAS) by Modular Inheritable Crossover. The 14th International Conference on Bio-inspired Computing: Theories and Applications (BIC-TA), Zhengzhou, China, December 2019. Best Paper Award
- [39] **Cheng He**, Ran Cheng, Yaochu Jin, and Xin Yao. Surrogate-Assisted Expensive Many-Objective Optimization by Model Fusion. IEEE Congress on Evolutionary Computation (CEC' 2019), Wellington, New Zealand, June 2019.
- [40] Kanzhen Wan, **Cheng He**, Auraham Camacho, Ke Shang, Ran Cheng, and Hisao Ishibuchi. A Hybrid Surrogate-Assisted Evolutionary Algorithm for Computationally Expensive Many-Objective Optimization. IEEE Congress on Evolutionary Computation (CEC' 2019), Wellington, New Zealand, June 2019.
- [41] **Cheng He**, Linqiang Pan, Hang Xu, Ye Tian, and Xingyi Zhang. An Improved Reference Point Sampling Method on Pareto Optimal Front. IEEE Congress on Evolutionary Computation (CEC' 2016), Vancouver, Canada, June 2016.

Honors and Awards

- 2020 SUSTech the 6th Presidential Outstanding Postdoctoral Award
- 2019 The 14th International Conference on Bio-inspired Computing: Theories and Applications (BIC-TA 2019) Best Paper Award, China.

Projects

- 2020 - 2022: Computationally Expensive Large-Scale Multi-Objective Optimization Driven by Generative Learning, PI, National Science Foundation of China.
- 2020-2022: Computational Intelligence based Error State Evaluating for Grouped Instrument Transformers: Key Technologies and Applications, PI, National Science Foundation of China.
- 2021-2022: Voltage Transformer Ratio Error Estimation Driven by Computational Intelligence, PI, Shenzhen.
- 2020 – 2024: Deep Learning Applied to Aerofoil Design, Co-PI, China.
- 2020-2022: Evolutionary Computation Based Deep Neural Architecture Search for Microchips, Co-PI, China.

Academic Services

IEEE CIS Task Force: Chair, Intelligent Systems for Health

IEEE CIS Task Force: Member, Data-Driven Evolutionary Optimization of Expensive Problems

Complex & Intelligence Systems, Leading guest editor, Special Issue: Emerging Topics in Evolutionary Multiobjective Optimization

IEEE MBEA'2019-2021: Co-Chair, 2019 IEEE Symposium on Model-Based Evolutionary Algorithms, Xiamen, China

IEEE CEC'2019: Co-Chair of Competition on Online Data-Driven Multi-Objective Optimization, Wellington, New Zealand

BIC-TA'2017: Publication Chair, 12th International Conference on Bio-inspired Computing: Theories and Applications, Harbin, China