

Cheng He

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Research Interests

I am particularly interested in computational intelligence based optimization, including data-driven/model-based optimization, multi/ many-objective optimization, constraint handling, large-scale optimization, the combination of deep learning and evolutionary algorithm, and real-world problems.

Education

2012 - 2018: PhD in Control Science and Engineering, Huazhong University of Science and Technology, China

Thesis: *Many-Objective Optimization Algorithms and Their Applications*

Supervisor: Prof. Linqiang Pan

2008 - 2012: B.Eng. in Automation, Wuhan University of Science and Technology, China

Work

2020.7 - present: Research Assistant Professor, Department of Computer Science and Engineering, Southern University of Science and Technology, China.

2018.10 - 2020.5: Postdoctoral Research Fellow, Department of Computer Science and Engineering, Southern University of Science and Technology, China.

2018.3 - 2018.9: Visiting Scholar, Department of Computer Science and Engineering, Southern University of Science and Technology, China.

Collaborator: Prof. Xin Yao (IEEE Fellow)

2016 - 2017: Visiting Student, University of Surrey, U.K.

Collaborator: Prof. Yaochu Jin (IEEE Fellow)

Research Grants

2021 - 2022: Voltage Transformer Ratio Error Estimation Driven by Computational Intelligence, **PI**, Shenzhen Science and Technology Program, China

2020 - 2024: Computational Intelligence based Error State Evaluating for Grouped Instrument Transformers : Key Technologies and Applications, **Co- PI**, National Science Foundation, China

2020 - 2023: Computationally Expensive Large-Scale Multi-Objective Optimization Driven by Generative Learning, **PI**, National Science Foundation, China

2020 – 2024: Deep Learning Based Aerofoil Design, **Co-PI**, Ministry of Industry and Information Technology, China

2020 – 2022: Evolutionary Computation Based Deep Neural Architecture Search for Microchips, **Co-PI**, Huawei Hisilicon, China

Honors and Awards

2020: Presidential Outstanding Postdoctoral Award, *Southern University of Science and Technology*, China

2019: Best Paper Award, *The 14th International Conference on Bio-inspired Computing: Theories and Applications (BIC-TA 2019)*, China.

Publications

Refereed Journal Articles (: Corresponding Author)*

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 Multi-Objective Optimization Driven by Generative Adversarial Networks (GANs). *IEEE Transactions on Cybernetics*, 2020.
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**, 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.
7. **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.
8. **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.
9. 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.
10. 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.

11. 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.
12. 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, 2020.
13. 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.
14. **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.
15. Lianghao Lia, **Cheng He***, Wenting Xua, Linqiang Pan*. Pioneer Selection for Evolutionary Multiobjective Optimization with Discontinuous Feasible Region. *Swarm and Evolutionary Computation*, 2021.
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*, 2021.
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**, and Ran Cheng*. Adaptive Dropout for High-dimensional Expensive Multiobjective Optimization. *Complex & Intelligent Systems*, 2021.
21. Danial Yazdani, Ran Cheng*, **Cheng He**, and Jurgen Branke. Adaptive Control of Sub-Populations in Evolutionary Dynamic Optimization. *IEEE Transactions on Cybernetics*, 2020.
22. 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.
23. 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.
24. Zhanglu Hou, **Cheng He**, and Ran Cheng*. Reformulating Preferences into Constraints for Evolutionary Multi- and Many-Objective Optimization. *Information Sciences*, 541, 1-15, 2020.
25. 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.
26. Ran Cheng*, **Cheng He**, Yaochu Jin and Xin Yao. Model-based evolutionary algorithms: a short survey. *Complex & Intelligent Systems*, 4 (4), 283-292, 2018.

27. 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.

Conference Proceedings

1. Shihua Huang, Zhichao Lu, Ran Cheng, and **Cheng He***. FaPN: Feature-aligned Pyramid Network for Dense Image Prediction. *IEEE International Conference on Computer Vision (ICCV'2021)*, 2021.
2. 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)*, Kraków, Poland, June 2021.
3. **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.
4. 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.
5. 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.
6. 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.
7. 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: 492-503.
8. **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.
9. 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.
10. 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*
11. **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.
12. 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.
13. **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.

Professional Services

Organizer of Academic Events

IEEE MBEA'2020: Co-Chair, 2020 IEEE Symposium on Model-Based Evolutionary Algorithms, Canberra, Australia

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

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

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

Program Committee Membership

EMO'2021: PC Member, 2021 International Conference on Evolutionary Multi-Criterion Optimization, Shenzhen, China

IEEE CEC'2020: PC Member, 2020 IEEE Congress on Evolutionary Computation, Glasgow, United Kingdom

ACM GECCO'2020: PC Member, 2020 ACM Genetic and Evolutionary Computation Conference, Cancun, Mexico

ACM GECCO'2019: PC Member, 2019 ACM Genetic and Evolutionary Computation Conference, Prague, Czech Republic

IEEE SSCI'2019: Track Chair, 2019 IEEE Symposium Series on Computational Intelligence, Xiamen, China

BIC-TA'2019: PC Member, 14th Bio-Inspired Computing: Theories and Applications, Zhengzhou, China

IEEE CEC'2019: PC Member, 2019 IEEE Congress on Evolutionary Computation, Wellington, New Zealand

BIC-TA'2018: PC Member, 13th Bio-Inspired Computing: Theories and Applications, Beijing, China

BIC-TA'2017: PC Member, 12th Bio-Inspired Computing: Theories and Applications, Harbin, China

IEEE SSCI'2016: PC Member, IEEE Symposium Series on Computational Intelligence, Orlando, USA

BIC-TA'2015: PC Member, 10th Bio-Inspired Computing: Theories and Applications, Hefei, China

Referees

Xin Yao

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Last updated: August 4, 2021