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Education

PhD, Nanyang Technological University, Singapore, 2017

Master of Science, Nanyang Technological University, Singapore, 2012

Bachelor of Engineering, Guangdong University of Technology, China, 2009

Academic Appointments

Assistant Professor of Computer Science, School of Computing and Information Systems, SMU, Jul 2023 - Present

Other Positions and Affiliations

Scientist, Agency for Science, Technology and Research (A*STAR), Singapore, Mar 2021 - Jun 2023

Research Assistant Professor, Industrial Systems Engineering and Management, National University of Singapore, Singapore, Aug 2018 - Feb 2021

Research Fellow, Nanyang Technological University, Singapore, Dec 2016 - Aug 2018

Research Associate, Nanyang Technological University, Singapore, Jan 2013 - Jun 2013

Awards and Honors

Worlds Top 2% Scientist , Elsevier & Stanford University, 2024

Lee Kong Chian Fellowship, Singapore Management University, 2024

IEEE Outstanding Paper Award for the IEEE Transactions on Industrial Informatics, IEEE Industrial Electronics Society, 2024

Nobert Wiener Review Award, IEEE/CAA Journal of Automatica Sinica, 2022

Award for Excellent Research Work, BMW Group Research and Technology, 2014

Professional Memberships

Member, Institute of Electrical and Electronics Engineers, 2023

Member, Institute of Electrical and Electronics Engineers, 2023

RESEARCH

Publications

Journal Articles [Refereed]

Island-based evolutionary computation with diverse surrogates and adaptive knowledge transfer for high-dimensional data-driven optimization, by ZHANG, Xian-Rong; GONG, Yue-Jiao; CAO, Zhiguang; ZHANG, Jun. (2024). *ACM Transactions on Evolutionary Learning and Optimization,* 1-30. https://doi.org/10.1145/3700886 (Advance Online)

Efficient neural collaborative search for pickup and delivery problems, by KONG, Detian; MA, Yining; CAO, Zhiguang; YU, Tianshu; XIAO, Jianhua. (2024). *IEEE Transactions on Pattern Analysis and Machine Intelligence,* 46 (12), 1-15. https://doi.org/10.1109/TPAMI.2024.3450850 (Advance Online)

The low-carbon vehicle routing problem with dynamic speed on steep roads, by XIAO, Jianhua; LIU, Xiaoyang; ZHANG, Huixian; CAO, Zhiguang; KANG, Liujiang; NIU, Yunyun. (2024). *Computers and Operations Research,* 169 1-16. https://doi.org/10.1016/j.cor.2024.106736 (Published)

Deep reinforcement learning for dynamic algorithm selection: A proof-of-principle study on differential evolution, by GUO, Hongshu; MA, Yining; MA, Zeyuan; CHEN, Jiacheng; ZHANG, Xinglin; CAO, Zhiguang; ZHANG, Jun; GONG, Yue-Jiao. (2024). *IEEE Transactions on Systems, Man and Cybernetics Part A: Systems and Humans,* 54 (7), 4247-4259. https://doi.org/10.1109/TSMC.2024.3374889 (Published)

Deep reinforcement learning for solving vehicle routing problems with backhauls, by WANG, Conghui; CAO, Zhiguang; WU, Yaoxin; TENG, Long; WU, Guohua. (2024). *IEEE Transactions on Neural Networks and Learning Systems,* 1-15. https://doi.org/10.1109/TNNLS.2024.3371781 (Advance Online)

Conditional neural heuristic for multiobjective vehicle routing problems, by FAN, Mingfeng; WU, Yaoxin; CAO, Zhiguang; SONG, Wen; SARTORETTI, Guillaume; LIU, Huan; WU, Guohua. (2024). *IEEE Transactions on Neural Networks and Learning Systems,* 1-13. https://doi.org/10.1109/TNNLS.2024.3371706 (Published)

SEGAC: Sample Efficient Generalized Actor Critic for the Stochastic On-Time Arrival Problem, by GUO, Honglian; HE, Zhi; SHENG, Wenda; CAO, Zhiguang; ZHOU, Yingjie; GAO, Weinan. (2024). *IEEE Transactions on Intelligent Transportation Systems,* 1-16. https://doi.org/10.1109/TITS.2024.3361445 (Advance Online)

Cooperative trucks and drones for rural last-mile delivery with steep roads, by XIAO, Jiuhong; LI, Ying; CAO, Zhiguang; XIAO, Jianhua. (2024). *Computers & Industrial Engineering,* 187 1-18. https://doi.org/10.1016/j.cie.2023.109849 (Published)

DL-DRL: A double-level deep reinforcement learning approach for large-scale task scheduling of multi-UAV, by MAO, Xiao; WU, Guohua; FAN, Mingfeng; CAO, Zhiguang; PEDRYCZ, Witold. (2024). *IEEE Transactions on Automation Science and Engineering,* 1-17. https://doi.org/10.1109/TASE.2024.3358894 (Advance Online)

Neural airport ground handling, by WU, Yaoxin; ZHOU, Jianan; XIA, Yunwen; ZHANG, Xianli; CAO, Zhiguang; ZHANG, Jie. (2023). *IEEE Transactions on Intelligent Transportation Systems,* 24 (12), 15652-15666. https://doi.org/10.1109/TITS.2023.3253552 (Published)

Instance-specific algorithm configuration via unsupervised deep graph clustering, by SONG, Wen; LIU, Yi; CAO, Zhiguang; WU, Yaoxin; LI, Qiqiang. (2023). *Engineering Applications of Artificial Intelligence,* 125 1-13. https://doi.org/10.1016/j.engappai.2023.106740 (Published)

Distributed representation learning with skip-gram model for trained random forests, by MA, Chao; WANG, Tianjun; ZHANG, Le; CAO, Zhiguang; HUANG, Yue; DING, Xinghao. (2023). *Neurocomputing,* 551 1-12. https://doi.org/10.1016/j.neucom.2023.126434 (Published)

Learning to Solve 3-D Bin Packing Problem via Deep Reinforcement Learning and Constraint Programming, by JIANG, Yuan; CAO, Zhiguang; ZHANG, Jie. (2023). *IEEE Transactions on Cybernetics,* 53 (5), 2864-2875. https://doi.org/10.1109/TCYB.2021.3121542 (Published)

DRL-Searcher: A Unified Approach to Multirobot Efficient Search for a Moving Target, by GUO, Hongliang; PENG, Qihang; CAO, Zhiguang; JIN, Yaochu. (2023). *IEEE Transactions on Neural Networks and Learning Systems, 35* (3), 1-14. http://doi.org/10.1109/TNNLS.2023.3274667 (Advance Online)

Deep Reinforcement Learning for UAV Routing in the Presence of Multiple Charging Stations, by FAN, Mingfeng; WU, Yaoxin; LIAO, Tianjun; CAO, Zhiguang; GUO, Hongliang; SARTORETTI, Guillaume; WU, Guohua. (2023). *IEEE Transactions on Vehicular Technology, 72* (5), 5732-5746. https://doi.org/10.1109/TVT.2022.3232607 (Published)

Reinforced Adaptation Network for Partial Domain Adaptation, by WU, Keyu; WU, Min; CHEN, Zhenghua; JIN, Ruibing; CUI, Wei; CAO, Zhiguang; LI, Xiaoli. (2023). *IEEE Transactions on Circuits and Systems for Video Technology, 33* (5), 2370-2380. https://doi.org/10.1109/TCSVT.2022.3223950 (Published)

A review on learning to solve combinatorial optimisation problems in manufacturing, by ZHANG, Cong; WU, Yaoxin; MA, Yining; SONG, Wen; LE, Zhang; CAO, Zhiguang; ZHANG, Jie. (2023). *IET Collaborative Intelligent Manufacturing, 5* (1), 1-24. https://doi.org/10.1049/cim2.12072 (Published)

Stochastic Economic Lot Scheduling via Self-Attention Based Deep Reinforcement Learning, by SONG, Wen; MI, Nan; LI, Qiqiang; ZHUANG, Jing; CAO, Zhiguang

. (2023). *IEEE Transactions on Automation Science and Engineering, 21* (2), 1-12. https://doi.org/10.1109/TASE.2023.3248229 (Advance Online)

Flexible Job-Shop Scheduling via Graph Neural Network and Deep Reinforcement Learning, by SONG, Wen; CHEN, Xinyang; LI, Qiqiang; CAO, Zhiguang. (2023). *IEEE Transactions on Industrial Informatics, 19* (2), 1600-1610. https://doi.org/10.1109/TII.2022.3189725 (Published)

A diversity-enhanced memetic algorithm for solving electric vehicle routing problems with time windows and mixed backhauls, by XIAO, Jianhua; DU, Jingguo; CAO, Zhiguang; ZHANG, Xingyi; NIU, Yunyun. (2023). *Applied Soft Computing, 134* 1-14. https://doi.org/10.1016/j.asoc.2023.110025 (Published)

Learning feature embedding refiner for solving vehicle routing problems, by LI, Jingwen; MA, Yining; CAO, Zhiguang; WU, Yaoxin; SONG, Wen; ZHANG, Jie; CHEE, Yeow Meng. (2023). *IEEE Transactions on Neural Networks and Learning Systems,* 1-13. https://doi.org/10.1109/TNNLS.2023.3285077 (Published)

Learning Large Neighborhood Search for Vehicle Routing in Airport Ground Handling, by ZHOU, Jianan; WU, Yaoxin; CAO, Zhiguang; SONG, Wen; ZHANG, Jie; CHEN, Zhenghua. (2023). *IEEE Transactions on Knowledge and Data Engineering, 35* (9), 9769-9782. https://doi.org/10.1109/TKDE.2023.3249799 (Published)

Deep Reinforcement Learning for Solving the Heterogeneous Capacitated Vehicle Routing Problem, by LI, Jingwen; MA, Yining; GAO, Ruize; CAO, Zhiguang; LIM, Andrew; SONG, Wen; ZHANG, Jie. (2022). *IEEE Transactions on Cybernetics, 52* (12), 13572-13585. https://doi.org/10.1109/TCYB.2021.3111082 (Published)

Learning to Solve Multiple-TSP With Time Window and Rejections via Deep Reinforcement Learning, by ZHANG, Rongkai; ZHANG, Cong; CAO, Zhiguang; SONG, Wen; TAN, Puay Siew; ZHANG, Jie; WEN, Bihan; DAUWELS, Justin. (2023). *IEEE Transactions on Intelligent Transportation Systems, 24* (1), 1325-1336. https://doi.org/10.1109/TITS.2022.3207011 (Published)

Learning Improvement Heuristics for Solving Routing Problems, by WU, Yaoxin; SONG, Wen; CAO, Zhiguang; ZHANG, Jie; LIM, Andrew. (2022). *IEEE Transactions on Neural Networks and Learning Systems, 33* (9), 5057-5069. https://doi.org/10.1109/TNNLS.2021.3068828 (Published)

Multi-objective evolutionary algorithm based on RBF network for solving the stochastic vehicle routing problem, by NIU, Yunyun; SHAO, Jie; XIAO, Jianhua; SONG, Wen; CAO, Zhiguang. (2022). *Information Sciences: Informatics and Computer Science Intelligent Systems Applications, 609* 387-410. https://doi.org/10.1016/j.ins.2022.07.087 (Published)

Heterogeneous Attentions for Solving Pickup and Delivery Problem via Deep Reinforcement Learning, by LI, Jingwen; XIN, Liang; CAO, Zhiguang; LIM, Andrew; SONG, Wen; ZHANG, Jie. (2022). *IEEE Transactions on Intelligent Transportation Systems, 23* (3), 2306-2315. https://doi.org/10.1109/TITS.2021.3056120 (Published)

Learning variable ordering heuristics for solving Constraint Satisfaction Problems, by SONG, Wen; CAO,

Zhiguang; ZHANG, Jie; XU, Chi; LIM, Andrew. (2022). *Engineering Applications of Artificial Intelligence, 109* 1-12. https://doi.org/10.1016/j.engappai.2021.104603 (Published)

Improving the Performance of Transportation Networks: A Semi-Centralized Pricing Approach, by CAO, Zhiguang; GUO, Hongliang; SONG, Wen; GAO, Kaizhou; KANG, Liujiang; ZHANG, Xuexi; WU, Qilun. (2021). *IEEE Transactions on Intelligent Transportation Systems, 22* (10), 6353-6364. https://doi.org/10.1109/TITS.2020.2991759 (Published)

GP3: Gaussian Process Path Planning for Reliable Shortest Path in Transportation Networks, by GUO, Hongliang; HOU, Xuejie; CAO, Zhiguang; ZHANG, Jie. (2022). *IEEE Transactions on Intelligent Transportation Systems, 23* (8), 11575-11590. https://doi.org/10.1109/TITS.2021.3105415 (Published)

An improved learnable evolution model for solving multi-objective vehicle routing problem with stochastic demand, by NIU, Yunyun; KONG, Detian; WEN, Rong; CAO, Zhiguang; XIAO, Jianhua. (2021). *Knowledge-Based Systems, 230* 1-19. (Published)

Step-Wise Deep Learning Models for Solving Routing Problems, by XIN, Liang; SONG, Wen; CAO, Zhiguang; ZHANG, Jie. (2021). *IEEE Transactions on Industrial Informatics, 17* (7), 4861-4871. https://doi.org/10.1109/TII.2020.3031409 (Published)

First train timetabling and bus service bridging in intermodal bus-and-train transit networks, by KANG, Liujiang; LI, Hao; SUN, Huijun; WU, Jianjun; CAO, Zhiguang; BUHIGIRO, Nsabimana. (2021). *Transportation Research Part B: Methodological, 149* 443-462. https://doi.org/10.1016/j.trb.2021.05.011 (Published)

MIMOA: A membrane-inspired multi-objective algorithm for green vehicle routing problem with stochastic demands, by NIU, Yunyun; ZHANG, Yongpeng; CAO, Zhiguang; GAO, Kaizhou; XIAO, Jianhua; SONG, Wen; ZHANG, Fangwei. (2021). *Swarm and Evolutionary Computation, 60* 1-12. https://doi.org/10.1016/j.swevo.2020.100767 (Published)

An Accurate Solution to the Cardinality-Based Punctuality Problem, by CAO, Zhiguang; WU, Yaoxin; RAO, Akshay; KLANNER, Felix; ERSCHEN, Stefan; CHEN, Wei; ZHANG, Le; GUO, Hongliang. (2020). *IEEE Intelligent Transportation Systems Magazine, 12* (4), 78-91. https://doi.org/10.1109/MITS.2018.2880260 (Published)

Cost-sensitive deep forest for price prediction, by MA, Chao; LIU, Zhenbing; CAO, Zhiguang; SONG, Wen; ZHANG, Jie; ZENG, Weiliang. (2020). *Pattern Recognition, 107* 1-16. https://doi.org/10.1016/j.patcog.2020.107499 (Published)

WiFi-Based Indoor Robot Positioning Using Deep Fuzzy Forests, by ZHANG, Le; CHEN, Zhenghua; CUI, Wei; LI, Bing; CHEN, Cen; CAO, Zhiguang; GAO, Kaizhou
. (2020). *IEEE Internet of Things Journal, 7* (11), 10773-10781. https://doi.org/10.1109/JIOT.2020.2986685 (Published)

Using Reinforcement Learning to Minimize the Probability of Delay Occurrence in Transportation, by CAO, Zhiguang; GUO, Hongliang; SONG, Wen; GAO, Kaizhou; CHEN, Zhengghua; ZHANG, Le; ZHANG, Xuexi. (2020). *IEEE Transactions on Vehicular Technology, 69* (3), 2424-2436. https://doi.org/10.1109/TVT.2020.2964784 (Published)

A Sampling Approach for Proactive Project Scheduling under Generalized Time-dependent Workability Uncertainty, by SONG, Wen; KANG, Donghun; ZHANG, Jie; CAO, Zhiguang; XI, Hui
. (2019). *Journal of Artificial Intelligence Research, 64* 385-427. https://doi.org/10.1613/jair.1.11369 (Published)

A Simulation Environment for Evaluation of Routing Algorithms for Improvement of Electromobility Related Services, by RAO, Akshay; CAO, Zhiguang; KLANNER, Felix. (2018). *IEEE Intelligent Transportation Systems Magazine, 10* (1), 133-144. http://doi.org/10.1109/MITS.2017.2776122 (Published)

Finding the 'faster' path in vehicle routing, by GUO, Jing; WU, Yaoxin; ZHANG, Xuexi; ZHANG, Le; CHEN, Wei; CAO, Zhiguang; GUO, Hongliang. (2017). *IET Intelligent Transport Systems, 11* (10), 685-694. https://doi.org/10.1049/iet-its.2016.0288 (Published)

A multiagent-based approach for vehicle routing by considering both arriving on time and total travel time, by CAO, Zhiguang; GUO, Hongliang; ZHANG, Jie. (2017). *ACM Transactions on Intelligent Systems and Technology, 9* (3), 1-21. https://doi.org/10.1145/3078847 (Published)

A Unified Framework for Vehicle Rerouting and Traffic Light Control to Reduce Traffic Congestion, by CAO, Zhiguang; JIANG, Siwei; ZHANG, Jie; GUO, Hongliang. (2017). *IEEE Transactions on Intelligent*

Transportation Systems, 18 (7), 1958-1973. https://doi.org/10.1109/TITS.2016.2613997 (Published)

Routing Multiple Vehicles Cooperatively: Minimizing Road Network Breakdown Probability, by GUO, Hongliang; CAO, Zhiguang; SESHADRI, Madhavan; ZHANG, Jie; NIYATO, Dusit; FASTENRATH, Ulrich. (2017). *IEEE Transactions on Emerging Topics in Computational Intelligence, 1* (2), 112-124. https://doi.org/10.1109/TETCI.2017.2665592 (Published)

Improving the Efficiency of Stochastic Vehicle Routing: A Partial Lagrange Multiplier Method, by CAO, Zhiguang; GUO, Hongliang; ZHANG, Jie; NIYATO, Dusit; FASTENRATH, Ulrich. (2016). *IEEE Transactions on Vehicular Technology, 65* (6), 3993-4005. https://doi.org/10.1109/TVT.2015.2480964 (Published)

Finding the Shortest Path in Stochastic Vehicle Routing: A Cardinality Minimization Approach, by CAO, Zhiguang; GUO, Hongliang; ZHANG, Jie; NIYATO, Dusit; FASTENRATH, Ulrich Fastenrath. (2016). *IEEE Transactions on Intelligent Transportation Systems, 17* (6), 1688-1702. http://doi.org/10.1109/TITS.2015.2498160 (Published)

Book Reviews

Review of shared online hailing and autonomous taxi services, by ZENG, Weiliang; WU, Miaosen; CHEN, Peng; CAO, Zhiguang; XIE, Shengli. (2023). *Transportmetrica B: Transport Dynamics, 11* (1), 486-509 https://doi.org/10.1080/21680566.2022.2092231 (Published)

A Review on Swarm Intelligence and Evolutionary Algorithms for Solving Flexible Job Shop Scheduling Problems, by GAO, Kaizhou; CAO, Zhiguang; ZHANG, Le; CHEN, Zhenghua; HAN, Yuyan; PAN, Quanke. (2019). *IEEE/CAA Journal of Automatica Sinica, 6* (4), 904-916 https://doi.org/10.1109/JAS.2019.1911540 (Published)

Conference Proceedings

Learning to handle complex constraints for vehicle routing problems, by BI, Jieyi; MA, Yining; ZHOU, Jianan; SONG, Wen; CAO, Zhiguang; WU, Yaoxin; ZHANG, Jie . (2024.0). *Proceedings of the 38th Conference on Neural Information Processing (NeurIPS 2024), Vancouver, Canada, December 10-15,* (pp. 1-25) California: Neural information Processing Systems Foundation. https://neurips.cc/virtual/2024/poster/95638 (Advance Online)

Collaboration! Towards robust neural methods for routing problems, by ZHOU, Jianan; WU, Yaoxin; CAO, Zhiguang; SONG, Wen; ZHANG, Jie; SHEN, Zhiqi. (2024.0). *Proceedings of the 38th Conference on Neural Information Processing (NeurIPS 2024), Vancouver, Canada, December 10-15,* (pp. 1-28) California: Neural information Processing Systems Foundation. https://neurips.cc/virtual/2024/poster/94681 (Advance Online)

ReEvo: Large language models as hyper-heuristics with reflective evolution, by YE, Haoran; WANG, Jiarui; CAO, Zhiguang; BERTO, Federico; HUA, Chuanbo; KIM, Haeyeon; PARK, Jinkyoo; SONG, Guojie. (2024.0). *Proceedings of the 38th Conference on Neural Information Processing (NeurIPS 2024), Vancouver, Canada, December 10-15,* (pp. 1-32) California: Neural Information Processing Systems Foundation. https://neurips.cc/virtual/2024/poster/96692 (Advance Online)

Hierarchical neural constructive solver for real-world TSP scenarios, by GOH, Yong Liang; CAO, Zhiguang; MA, Yining; DONG, Yanfei; DUPTY, Mohammed Haroon; LEE, Wee Sun. (2024.0). *KDD '24: Proceedings of the 30th ACM SIGKDD Conference on Knowledge Discovery and Data Mining, Barcelona, Spain, August 25-29,* (pp. 884-895) New York: ACM. https://doi.org/10.1145/3637528.3672053 (Published)

Cross-problem learning for solving vehicle routing problems, by LIN, Zhuoyi; WU, Yaoxin; ZHOU, Bangjian; CAO, Zhiguang; SONG, Wen; ZHANG, Yingqian; JAYAVELU, Senthilnath . (2024.0). *Proceedings of the Thirty-Third International Joint Conference on Artificial Intelligence, Jeju, Korea, 2024 August 3-9,* (pp. 1-12) USA: IJCAI. https://doi.org/10.24963/ijcai.2024/769 (Published)

MVMoE: Multi-task vehicle routing solver with mixture-of-experts, by ZHOU, Jianan; CAO, Zhiguang; WU, Yaoxin; SONG, Wen; MA, Yining; ZHANG, Jie; XU, Chi. (2024.0). *Proceedings of the 41st International Conference on Machine Learning, Vienna, Austria, 2024 July 21-27,* (pp. 1-21) USA: ICML. https://openreview.net/forum?id=lsQnneYa8p (Published)

Adaptive stabilization based on machine learning for column generation, by SHEN, Yunzhuang; SUN, Yuan; LI, Xiaodong; CAO, Zhiguang; EBERHARD Andrew; ZHANG, Guangquan. (2024.0). *Proceedings of the*

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Learning topological representations with bidirectional graph attention network for solving job shop scheduling problem, by ZHANG, Cong; CAO, Zhiguang; WU, Yaoxin; SONG, Wen; SUN, Jing. (2024.0). *Proceedings of the 40th Conference on Uncertainty in Artificial Intelligence, Barcelona, Spain, 2024 July 15,* (pp. 1-17) USA: UAI. https://www.auai.org/uai2024/accepted_papers (Published)

Deep reinforcement learning guided improvement heuristic for job shop scheduling, by ZHANG, Cong; CAO, Zhiguang; SONG, Wen; WU, Yaoxin; ZHANG, Jie. (2024.0). *Proceedings of the 12th International Conference on Learning Representations, Vienna, Austria, 2024 May 7-11,* (pp. 1-21) Vienna, Austria: ICLR. https://openreview.net/forum?id=jsWCmrsHHs (Published)

Collaborative deep reinforcement learning for solving multi-objective vehicle routing problems, by WU, Yaoxin; FAN, Mingfeng; CAO, Zhiguang; GAO, Ruobin; HOU, Yaqing; SARTORETTI, Guillaume. (2024.0). *AAMAS '24: Proceedings of the 23rd International Conference on Autonomous Agents and Multiagent Systems, Auckland, New Zealand, 2024 May 6-10 ,* (pp. 1956-1965) New York: ACM. https://doi.org/10.5555/3635637.3663059 (Published)

GLOP: Learning global partition and local construction for solving large-scale routing problems in real-time, by YE, Haoran; WANG, Jiarui; LIANG, Helan; CAO, Zhiguang; LI, Yong; LI, Fanzhang. (2024.0). *Proceedings of the 38th AAAI Conference on Artificial Intelligence, AAAI 2024: Vancouver, February 20-27,* (pp. 20284-20292) Vancouver: AAAI Press. https://doi.org/10.1609/aaai.v38i18.30009 (Published)

Learning to search feasible and infeasible regions of routing problems with flexible neural k-opt, by MA, Yining; CAO, Zhiguang; CHEE, Yew Meng. (2023.0). *Proceedings of the 37th Conference on Neural Information Processing, New Orleans, United States, December 12-14,* (pp. 1-24) California: Neural information processing systems foundation. (Published)

Efficient meta neural heuristic for multi-objective combinatorial optimization, by CHEN, Jinbiao; ZHANG, Zizhen; YE, Te; CAO, Zhiguang; CHEN, Siyuan; WANG, Jiahai. (2023.0). *Proceedings of the 37th Conference on Neural Information Processing, New Orleans, United States, December 12-14,* (pp. 1-25) California: Neural information processing systems foundation. (Published)

Ensemble-based deep reinforcement learning for vehicle routing problems under distribution shift, by JIANG, Yuan; CAO, Zhiguang; WU, Yaoxin; SONG, Wen; ZHANG, Jie. (2023.0). *Proceedings of the 37th Conference on Neural Information Processing, New Orleans, United States, December 12-14,* (pp. 1-14) California: Neural information processing systems foundation. (Published)

Neural multi-objective combinatorial optimization with diversity enhancement, by CHEN, Jinbiao; ZHANG, Zizhen; CAO, Zhiguang; WU, Yaoxin; MA, Yining; YE, Te; WANG, Jiahai. (2023.0). *Proceedings of the 37th Conference on Neural Information Processing, New Orleans, United States, December 12-14,* (pp. 1-22) California: Neural information processing systems foundation. (Published)

MetaBox: A benchmark platform for meta-black-box optimization with reinforcement learning, by MA, Zeyuan; GUO, Hongshu; CHEN, Jiacheng; LI, Zhenrui; PENG, Guojun; GONG, Yue-Jiao; MA, Yining; CAO, Zhiguang. (2023.0). *Proceedings of the 37th Conference on Neural Information Processing, New Orleans, United States, December 12-14,* (pp. 1-21) California: Neural information processing systems foundation. (Published)

DeepACO: neural-enhanced ant systems for combinatorial optimization, by YE, Haoran; WANG, Jiarui; CAO, Zhiguang; LIANG, Helan; LI, Yong. (2023.0). *Proceedings of the 37th Conference on Neural Information Processing, New Orleans, United States, December 12-14,* (pp. 1-23) California: Neural information processing systems foundation. (Published)

Interpreting trajectories from multiple views: A hierarchical self-attention network for estimating the time of arrival, by CHEN, Zebin; XIAO, Xiaolin; GONG, Yue-Jiao; FANG, Jun; MA, Nan; CHAI, Hua; CAO, Zhiguang. (2023.0). *KDD '22: Proceedings of the 28th ACM SIGKDD Conference on Knowledge Discovery and Data Mining, Washington, DC, August 14-18,* (pp. 2771-2779) New York: ACM. https://doi.org/10.1145/3534678.3539051 (Published)

Multi-view graph contrastive learning for solving vehicle routing problems, by JIANG, Yuan; CAO, Zhiguang; WU, Yaoxin; ZHANG, Jie. (2023.0). *Proceedings of the Thirty-Ninth Conference on Uncertainty in Artificial Intelligence, Pittsburgh, USA, 2023 July 31-August 4,* (pp. 984-994) Netherland: ML Research Press. https://proceedings.mlr.press/v216/jiang23a/jiang23a.pdf (Published)

Towards omni-generalizable neural methods for vehicle routing problems, by ZHOU, Jianan; WU, Yaoxin; SONG, Wen; CAO, Zhiguang; ZHANG, Jie
. (2023.0). *Proceedings of the 40th International Conference on Machine Learning 2023, Honolulu, HI, July 23-29,* (pp. 42769-42789) Honolulu, Hawaii, USA: PMLR.
https://proceedings.mlr.press/v202/zhou23o/zhou23o.pdf (Published)

Graph learning assisted multi-objective integer programming, by WU, Yaoxin; SONG, Wen; CAO, Zhiguang; ZHANG, Jie; GUPTA, Abhishek; LIN, Mingyan . (2022.0). *Proceedings of the 36th Conference on Neural Information Processing Systems, Hybrid Conference, 2022 28 Nov - 9 Dec,* California: Neural information processing systems foundation. (Published)

Learning generalizable models for vehicle routing problems via knowledge distillation, by BI, Jieyi; MA, Yining; WANG, Jiahai; CAO, Zhiguang; CHEN, Jinbiao; SUN, Yuan; CHEE, Yeow Meng. (2022.0). *Proceedings of the 36th Conference on Neural Information Processing Systems, NeurIPS 2022, New Orleans, November 28 - December 9,* (pp. 1-13) La Jolla, CA: NIPS Foundation. (Published)

Learning generalizable models for vehicle routing problems via knowledge distillation, by BI, Jieyi; MA, Yining; WANG, Jiahai; CAO, Zhiguang; CHEN, Jinbiao; SUN, Yuan; CHEE, Yeow Meng. (2022.0). *Proceedings of the 36th Conference on Neural Information Processing System, New Orleans, USA, 2022 Nov 28-Dec 09,* California: Neural information processing systems foundation.
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Efficient neural neighborhood search for pickup and delivery problems, by MA, Yining; LI, Jingwen; CAO, Zhiguang; SONG, Wen; GUO, Hongliang; GONG, Yuejiao; CHEE, Meng Chee. (2022.0). *Proceedings of the 31st International Joint Conference on Artificial Intelligence Vienna, Austria, 2022 Jul 23-29,* (pp. 4776-4784) California: International Joint Conferences on Artificial Intelligence.
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Learning to solve routing problems via distributionally robust optimization, by YUAN, Jiang; WU, Yaoxin; CAO, Zhiguang, ZHANG, Jie
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Learning scenario representation for solving two-stage stochastic integer programs, by WU, Yaoxin; SONG, Wen; CAO, Zhiguang; ZHANG, Jie. (2022.0). *ICLR 2022: Proceedings of the 10th International Conference on Learning Representations, Virtual, April 25-29,* (pp. 1-19) Appleton, WI: ICLR. (Published)

Learning large neighborhood search policy for integer programming, by WU, Yaoxin; SONG, Wen; CAO, Zhiguang; ZHANG, Jie
. (2021.0). *Proceedings of the 35th Conference on Neural Information Processing Systems, Virtual conference, 2021 Dec 6-14,* (pp. 30075-30087) California: Neural information processing systems foundation. http://doi.org/10.48550/arXiv.2111.03466 (Published)

NeuroLKH: Combining deep learning model with Lin-Kernighan-Helsgaun heuristic for solving the traveling salesman problem, by XIN, Liang; SONG, Wen; CAO, Zhiguang; ZHANG, Jie. (2021.0). *Proceedings of the 35th Conference on Neural Information Processing Systems, Virtual Conference, 2021 Dec 6-14 ,* (pp. 7472-7483) California: Neural information processing systems foundation. http://doi.org/10.48550/arXiv.2110.07983 (Published)

Learning to iteratively solve routing problems with dual-aspect collaborative transformer, by MA, Yining; LI, Jingwen; CAO, Zhiguang; SONG, Wen; ZHANG, Le; CHEN, Zhenghua; TANG, Jing. (2021.0). *Proceedings of then 35th Conference on Neural Information Processing Systems, Virtual Conference, 2021 Dec 6-14,* (pp. 11096-11107) California: Neural information processing systems foundation. http://doi.org/10.48550/arXiv.2110.02544 (Published)

Solving 3D bin packing problem via multimodal deep reinforcement learning, by JIANG, Yuan; CAO, Zhiguang; ZHANG, Jie. (2021.0). *Proceedings of the 20th International Conference on Autonomous Agents and Multiagent Systems, Virtual, United Kingdom, 2021 May 3-7,* (pp. 1548-1550) New York: ACM. (Published)

Multi-decoder attention model with embedding glimpse for solving vehicle routing problems, by XIN, Liang; SONG, Wen; CAO, Zhiguang; ZHANG, Jie. (2021.0). *Proceedings of the 35th AAAI Conference on Artificial Intelligence, Virtual event, 2021 February 2–9,* (pp. 12042-12049) California: Association for the Advancement of Artificial Intelligence. http://doi.org/10.1609/aaai.v35i13.17430 (Published)

Learning to dispatch for job shop scheduling via deep reinforcement learning, by ZHANG, Cong; SONG,

Wen; CAO, Zhiguang; ZHANG, Jie; TAN, Puay Siew; CHI, Xu. (2020.0). *Proceedings of the 34th Conference on Neural Information Processing Systems, Virtual Conference, 2020 Dec 6-12,* (pp. 1621-1632) California: Neural information processing systems foundation. http://doi.org/10.48550/arXiv.2010.12367 (Published)

GeoPrune: Efficiently matching trips in ridesharing through geometric properties, by XU, Yixin; QI, Jianzhong; BOROVICA-GAJIC, Renata; KULIK, Lars. (2020.0). *Proceedings of the 32nd International Conference on Scientific and Statistical Database Management, Vienna, Austria, 2020 July 7-9,* (pp. 1-12) New York: ACM. https://doi.org/10.1145/3400903.3400912 (Published)

AATEAM: Achieving the ad hoc teamwork by employing the attention mechanism, by CHEN, Shuo; ANDREJCZUK, Ewa; CAO, Zhiguang; ZHANG, Jie. (2020.0). *Proceedings of the 34th AAAI Conference on Artificial Intelligence, New York, USA, 2020 Feb 7-12,* (pp. 7095-7102) Washington: AAAI press. http://doi.org/10.1609/aaai.v34i05.6196 (Published)

Maximizing the probability of arriving on time: A practical q-learning method, by CAO, Zhiguang; GUO, Hongliang; ZHANG, Jie; OLIEHOEK, Frans; FASTENRATH, Ulrich. (2017.0). *Proceedings of the 31st AAAI Conference on Artificial Intelligence, California, United States of America, 2017 Feb 4-9,* (pp. 4481-4487) Washington: AAAI press. http://doi.org/10.1609/aaai.v31i1.11170 (Published)

Multiagent-based route guidance for increasing the chance of arrival on time, by CAO, Zhiguang; GUO, Hongliang; ZHANG, Jie; FASTENRATH, Ulrich. (2016.0). *Proceedings of the 30th AAAI Conference on Artificial Intelligence, Arizona, United States of America, 2016 Feb 12-17,* (pp. 3814-3820) Washington: AAAI press. http://doi.org/10.1609/aaai.v30i1.9893 (Published)

Research Grants

Singapore Management University

Learning Robust Neural Heuristic for Solving Vehicle Routing Problems in Logistics, SMU Internal Grant, Ministry of Education (MOE) Tier 1 , PI (Project Level): CAO Zhiguang, 2023, S$107,300

Other Institutions

Towards Generalizable Deep Models for Solving Vehicle Routing Problems in Logistics, A*STAR Career Development Fund, Agency for Science, Technology and Research (A*STAR) PI (Project Level): CAO Zhiguang, 2022, SGD142,000

The Air Cargo Load Planning and Break-down Problem, ST Engineering – NTU Corporate Lab, SINGAPORE TECHNOLOGIES LAND SYSTEMS LTD Co-PI (Project Level): CAO Zhiguang, 2018, SGD870,000

Intellectual Property

Application/Filed: CAO Zhiguang, "Verfahren zur Ermittlung von Fahrrouten für Landfahrzeuge", DE102016220561A1

TEACHING

Teaching Areas

Computer Science

Courses Taught

<u>Singapore Management University</u>

Undergraduate Programmes :

    Statistical Thinking for Data Science

Postgraduate Research Programmes :

    Empirical Research Project 2

    Empirical Research Project 3

THESES AND DISSERTATIONS

Theses and Dissertations Assessed

<u>Other Institutions</u>

External Examiner, "Reinforcement Learning for Combinatorial Optimization: Leveraging Uncertainty, Structure, and Priors", Thesis by Nathan Grinsztajn, Doctor of Philosophy, National Institute for Research in Digital Science and Technology, France, 2023

OTHER ACADEMIC AND PROFESSIONAL ACTIVITIES

Presentation and Talks

<u>Presentations</u>

Learning to Solve Combinatorial Optimization Problems, (07 Mar 2023). *A*STAR Mini Symposium on Quantum Science & Technology,*

Learning to Solve Vehicle Routing Problems, (10 Jul 2022). *The 22nd COTA International Conference of Transportation Professionals,*

<u>Invited Seminars, Talks and Lectures</u>

Learning to Solve Vehicle Routing Problems, 22 Jan 2024. AI Assisted Solver Series, Online

Learning to Solve Vehicle Routing Problems, 25 Oct 2023. School of Artificial Intelligence, Nanjing University, Online, China

Learning to Optimize, 01 Dec 2022. School of Computer Science and Engineering, Sun Yat-sen University

Learning to Solve Vehicle Routing Problems, 09 Nov 2022. IEEE ESCO Taskforce Webinar

Learning to Solve Vehicle Routing Problems, 02 Jul 2022. Department of Electronic Engineering, Tsinghua University

UNIVERSITY SERVICE

Singapore Management University

Committee Member, PhD Qualifying Examination Committee for Mr. PHAM Hung Manh, Nov 2024 - Present

Invited Speaker, AI Translational Seminar (MITB), SCIS, Nov 2024 - Present

Nominees Recommender, Nominees Recommendation for QS Ranking Survey, Oct 2024 - Present

Committee Member, MPhil Thesis Defense Committee for Mr. LIU Suyu, Sep 2024 - Present

Committee Member, PhD Dissertation Proposal Committee for Mr. XIAO Hanhua, Jul 2024 - Present

Interviewer, IS Regular Admissions Interviews (RAI), SCIS, Apr 2024 - Present

Committee Member, PhD Qualifying Examination Committee for Mr. Brahmanage Janaka Chathuranga, Nov 2023 - Present

EXTERNAL SERVICE – PROFESSIONAL

Area Chair, Senior Program Committee, NeurIPS'24, 2024 - Present

Guest Editor, Swarm and Evolutionary Computation, 2024 - Present

Area Chair, Senior Program Committee, KDD'24, 2024 - Present

Area Chair, Senior Program Committee, ICML'24, 2024 - Present

Reviewer Grant Proposal, Dutch Research Council , 2023 - Present

Task Force Member, IEEE Taskforce on Evolutionary Scheduling and Combinatorial Optimisation, 2022 - Present

Editor Associate Editor, IET Collaborative Intelligent Manufacturing, 2022 - Present

Member, Senior Program Committee, IJCAI'23, 2022 - Present

Member, Program Comittee, AAAI, NeurIPS, ICLR, IJCAI, etc., 2018 - Present

Reviewer Journal Article, TNNLS, TCYB, TITS, TII, etc., 2017 - Present