

ZHI ZHENG

Email: zhi.zheng@u.nus.edu; Phone: +86-18605317077; Google Scholar: [link](#)

EDUCATION

Southern University of Science and Technology (SUSTech), China

Sep. 2020 - Jun. 2024

B.Eng. in Intelligent Science and Technology; GPA: 3.62/4.00; Major GPA: **3.72/4.00**.

PUBLICATIONS

Accepted:

- **Zhi Zheng***, Shunyu Yao*, Genghui Li, Linxi Han, and Zhenkun Wang; Pareto Improver: Learning Improvement Heuristics for Multi-Objective Route Planning; *IEEE Transactions on Intelligent Transportation Systems*, 2023;
- Rui sun*, **Zhi Zheng***, Zhenkun Wang; Learning Encodings of Constructive Neural Combinatorial Optimization Needs to Regret; *In Proceedings of the AAAI Conference on Artificial Intelligence*, 2024.
- **Zhi Zheng***, Shunyu Yao*, Zhenkun Wang, Xialiang Tong, Mingxuan Yuan, Ke Tang; DPN: Decoupling Partition and Navigation for Neural Solvers of Min-max Vehicle Routing Problems; *ICML*, 2024.
- **Zhi Zheng**, Changliang Zhou, Xialiang Tong, Mingxuan Yuan, Zhenkun Wang; UDC: A Unified Neural Divide-and-Conquer Framework for Large-Scale Combinatorial Optimization Problems; *NeurIPS*, 2024.

Under review:

- Han Li, Fei Liu, **Zhi Zheng**, Tong Xialiang, Mingxuan Yuan, Zhenkun Wang; Cross-problem Learning with Unified Distribution Transformation for Vehicle Routing; *AAAI under review*, 2024.
- Rui sun, **Zhi Zheng**, Tong Xialiang, Mingxuan Yuan, Zhichao Lu, Zhenkun Wang; Local Consideration with Global Assistance: Towards Effective Neural Solvers for Large-scale Vehicle Routing Problem; *AAAI under review*, 2024

RESEARCH EXPERIENCE

UDC: A Unified Neural Divide-and-Conquer Framework for Large-Scale Combinatorial Optimization Problems

Feb. 2024 - Jun. 2024

First author; Submitted to NeurIPS24 (rated: 7 6 5 5)

Mentored by: Prof. Zhenkun Wang

- Propose a novel method DCR to enhance training by alleviating the negative impact of sub-optimal dividing policies.
- Leveraging DCR in training, the proposed UDC achieves a unified training scheme with significantly superior performance
- UDC demonstrates extensive applicability and exhibits superiority on 10 representative CO problems with similar settings.

Decoupling Partition and Navigation in Neural Min-max VRP Solvers

Oct. 2023 - May. 2024

First author; Accepted by ICML24

Mentored by: Prof. Zhenkun Wang & Prof. Ke Tang

- Proposed a novel attention-based encoder to represent the features for partition and navigation independently. And leveraged symmetries in the order of routes in loss functions for faster convergence in RL training.
- Achieved outstanding performances on four representative min-max VRPs

Learning Encodings of Constructive Neural Combinatorial Optimization Needs to Regret

Feb. 2023 - Dec. 2023

Co-first author; Accepted by AAAI24 NeurIPS fast track.

Mentored by: Prof. Zhenkun Wang

- The first to modify the autoregressive solution construction process for learning constructive heuristics.

- Implemented a model-agnostic method LCH-Regret that can be applied to modify various learning constructive heuristic methods like AM, POMO, and MatNet, showing significantly better performance and generalization on TSP, CVRP, and FFSP.
- Was responsible for article writing and assisting with a portion of the code work on FFSP and AM.

Pareto Improver: Learning Improvement Heuristics for Multi-Objective Route Planning

May 2021 - Aug. 2023

First author; Accepted by IEEE-TITS

Mentored by: Prof. Zhenkun Wang & Dr. Genghui Li

- Innovatively proposed the first learn-to-improve(L2I)-based multi-objective combinatorial optimization (MOCO) method.
- Proposed a novel population-based framework and curriculum learning strategy for a denser Pareto Front (PF).
- Innovation: The proposed Pareto Improver uses only a single reinforcement learning model, which makes it more lightweight than existing Learn to construct(L2C)-based MOCO methods on various MOCO problems like MOTSP and MOCVRP.

RESEARCH ACTIVITY

- **Reviewer:** IEEE trans journals, NeurIPS 2024, ICLR 2025. Aug. 2023 - present
- Participated in the 2020 China Earth Science Joint Academic Annual Conference (Chongqing). Oct. 2020

HONORS & AWARDS

- Outstanding Graduation Thesis of Southern University of Science and Technology. Jun. 2024
- Outstanding Graduates of Southern University of Science and Technology. Jun. 2024
- **Second prize** in the ACM content of SUSTech. Jan. 2021
- **First prize** in the 23rd National Olympiad in Informatics in Provinces (NOIP2018). Oct. 2018

INTERNSHIP EXPERIENCE

Shandong Inspur Scientific Research Institute, China

July 2022 - Aug. 2022

- Worked on channel pruning for deep learning computer vision models.

RESEARCH ASSISTANT

Research Assistant in the School of System Design and Intelligent Manufacturing Department, SUSTech.

Supervisor: Prof. Zhenkun Wang

Apr. 2021 - Sep. 2023

- Worked on Learning for Optimization (L4Opt).

Research Assistant in the Department of Earth Science and Space, SUSTech.

Supervisor: Prof. Jiangjun Ran

Sep. 2020 - Apr. 2021

- Worked on deep learning-based edge detection of lakes in the Qinghai-Tibet Plateau.
- Worked on Google Earth Engine (GEE) for data processing and edge segmentation model design.

SKILLS

- Program Language: C++, Python, Numpy, Pytorch.
- Talents: Goalkeeper; Erhu amateur level 10.
- English: GRE: V157+Q170. TOEFL: 99