Run He

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Research Interests: Machine Learning, Continual Learning, Federated Learning, Large Language Model

Education

South China University of Technology (SCUT) Guangzhou, China

Master Student of Engineering in Control Science and Engineering Sept. 2023 - June 2026

- **Supervisor**: Huiping Zhuang
- **GPA**: 3.74/4.0

South China University of Technology (SCUT) Guangzhou, China

Bachelor of Engineering in Robotic Engineering Sept. 2019 - June 2023

- **GPA**: 3.98/4.0 (Fully English-taught undergraduate program)
- **Rank**: 1/45

Publications

[1] **Run He**, Di Fang, Yicheng Xu, Yawen Cui, Ming Li, Cen Chen, Ziqian Zeng, Huiping Zhuang*. "Semantic Shift Estimation via Dual-Projection and Classifier Reconstruction for Exemplar-Free Class-Incremental Learning." **ICML 2025** (accepted).

[2] **Run He**, Kai Tong, Di Fang, Han Sun, Ziqian Zeng, Haoran Li, Tianyi Chen, Huiping Zhuang*. "AFL: A Single-Round Analytic Approach for Federated Learning with Pre-trained Models." **CVPR 2025** (accepted).

[3] Xiang Zhang, **Run He**, Chen Jiao, Di Fang, Ming Li, Ziqian Zeng, Cen Chen, Huiping Zhuang*. "L3A: Label-Augmented Analytic Adaptation for Multi-Label Class Incremental Learning." **ICML 2025** (accepted).

[4] Huiping Zhuang, **Run He**, Kai Tong, Ziqian Zeng, Cen Chen*, and Zhiping Lin. "DS-AL: A Dual-Stream Analytic Learning for Exemplar-Free Class-Incremental Learning." **AAAI 2024** (student first author).

[5] Huiping Zhuang*, Zhenyu Weng, **Run He**, Zhiping Lin, and Ziqian Zeng. "GKEAL: Gaussian Kernel Embedded Analytic Learning for Few-Shot Class Incremental Task." **CVPR 2023**.

[6] Huiping Zhuang†, Yuchen Liu†, **Run He**, Kai Tong, Ziqian Zeng, Cen Chen, Yi Wang, Lap-pui Chau. "F-OAL: Forward- Only Online Analytic Learning with Fast Training and Low Memory Footprint in Class Incremental Learning." **NeurIPS 2024**.

[7] Huiping Zhuang†, Yizhu Chen†, Di Fang, **Run He**, Kai Tong, Hongxin Wei, Ziqian Zeng*, Cen Chen*. "GACL: Exemplar-Free Generalized Analytic Continual Learning." **NeurIPS 2024**.

[8] Huiping Zhuang, Yue Yan, **Run He**, Ziqian Zeng*. "Class incremental learning with analytic learning for hyperspectral image classification." **Journal of the Franklin Institute** (**JCR Q1**).

[9] Xiang Zhang, **Run He**, Kai Tong, Shuquan Man, Jingyu Tong, Haodong Li, Huiping Zhuang*. "Complex Motion Planning for Quadruped Robots Using Large Language Models." **2024 IEEE International Symposium on Circuits and Systems (ISCAS)**.

Manuscripts Under Review

[10] **Run He**, Di Fang, Yizhu Chen, Kai Tong, Cen Chen, Yi Wang, Lap-pui Chau, Huiping Zhuang*. "REAL: Representation Enhanced Analytic Learning for Exemplar-Free Class-Incremental Learning." **submitted to Knowledge-Based System.**

[11] Kai Tong, Kang Pan, Xiao Zhang, Erli Meng, **Run He**, Yawen Cui, Nuoyan Guo, Huiping Zhuang*. "Analytic Subspace Routing: How Recursive Least Squares Works in Continual Learning of Large Language Model." **submitted to ICCV 2025.**

Research Projects

Continual Learning in Complex Scenarios Jan. 2024 - Dec. 2026

National Natural Science Foundation of China Youth Science Fund Project Participant

- Developed a continual learning framework based on least-square solutions to overcome the **catastrophic forgetting, privacy concerns and difficulty in cross-scenario applications**.
- This framework enhanced the continual learning in both representation learning and classifier learning, extending the existing analytic methods to various scenarios including **few-shot learning, online learning, and generalized continual learning**.
- Technical achievements in this project are summarized in papers **[1][3][4][5][6][7][10]**.

Mitigation of Catastrophic Forgetting in Large Language Models Finetuning July 2024 - July 2025

Xiaomi Open Innovation Challenge Program Participant

- Developed an analytic routing mechanism for continual learning of LLMs in different domains. The learning of each vertical domain utilizes a distinct LoRA model, thereby achieving **no interference across domains**.
- The router is designed as a linear classifier with the input of embeddings extracted by the shallow layer of LLMs and is trained by recursive least-square to **achieve non-forgetting**.
- Results are summarized in paper **[11].**

Awards

Student Awards

- Outstanding Undergraduate Thesis Award June 2023
- The Second Prize Scholarship of South China University of Technology Dec. 2022
- “Triple Excellence" Student Award of South China University of Technology Dec. 2021
- The First Prize Scholarship of South China University of Technology Dec. 2021

Competition Awards

- First Prize, “Hongping Changqing Foundation" Student Science and Technology Innovation Competition Nov. 2022
- Second Prize, Guangdong Division of China Undergraduate Mathematical Contest in Modeling (CUMCM) Oct. 2022
- Meritorious Winner, Mathematical Contest in Modeling/Interdisciplinary Contest in Modeling (MCM/ICM) May 2021

Academic Service

- **Reviewer**: Knowledge-Based System, NeurIPS 2025

Teaching Assistant

- Deep Learning, graduate course Spring 2025
- Deep Learning, graduate course Spring 2024
- Natural Language Processing, undergraduate course Spring 2023

Campus Involvement

Director of Academic Affairs, Student Union of SCUT June 2021 - June 2022

- Led the planning and execution of the 15th "Debate on Campus" (Bian Zai Hua Yuan) Inter-School Debate Tournament, co-organized the 273rd "Century Kapok" (Shi Ji Mu Mian) Academic Lecture Series.

Academic Affairs Coordinator, Student Union of Junde College, SCUT Sept. 2020 - June 2021

- Assisted in the 1st “Cosmos Cup" (Lun Yu Bei) Debate Competition and the 1st “Odyssey of the Mind (OM)" Innovation Challenge at Junde College, SCUT.