Gao, Ruiyuan

Email: rygao.me [AT] gmail.com (prefer) / rygao [AT] cse.cuhk.edu.hk
Tel: +86 15652580190
Homepage: gaoruiyuan.com
Shatin, Hong Kong, China

Research Interest

My current research interests span **data generation**, including generative models and synthetic data for perception tasks; and **trustworthy AI**, including adversarial attack/defence and AI privacy.

Education

The Chinese University of Hong Kong — Hong Kong, China
PhD of Computer Science and Engineering (PhD candidate) — *Oct. 2020 – Present*

Beihang University — Beijing, China
B.E. in Computer Science and Technology from SHENYUAN Honors College — *Sep. 2016 – Jun. 2020*

Work Experience

Research Intern — Dec. 2022 – Present
AI Theory, Huawei Noah's Ark Lab — *Hong Kong, China*

- Conduct research on data synthesis for perception in autonomous vehicles.
- First-author work *MagicDrive* supports **Pangu Large Model 5.0** and is shown in the keynote on **HDC2024**.
- Obtain "2012 Star" (2012之星), "HKRC Star Individual Awards" (港研之星) and the second prize of "2024H1 Innovation Pioneers" (创新先锋).

Research Intern — Mar. 2022 – Aug. 2022
Digital Twin, SenseTime — *Beijing, China*

- Conduct research on Neural Radiance Field (NeRF) for animatable human.

Research Intern — Jul. 2019 – Nov. 2019
Institute of Automation, Chinese Academy of Sciences — *Beijing, China*

- Conduct research on the Network Architecture Search (NAS) algorithm.
- Conduct research on 3D Object Detection with Point Clouds and Images.
- Implemented parallel code framework design on Pytorch from GPU; data visualization and analysis.

Research Intern — Sep. 2018 – Jun. 2019
State Key Laboratory of Software Development Environment, Beihang University — *Beijing, China*

- Conduct research on few-shot learning and object detection.

First and Co-First Author Publication

(* for equal contribution)

[1] Ziyang Zheng*, **Ruiyuan Gao***, and Qiang Xu. "Non-Cross Diffusion for Semantic Consistency". In: *Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision*. 2025.

[2] **Ruiyuan Gao***, Kai Chen*, Enze Xie, Lanqing Hong, Zhenguo Li, Dit-Yan Yeung, and Qiang Xu. "MagicDrive: Street View Generation with Diverse 3D Geometry Control". In: *International Conference on Learning Representations*. 2024.

[3] Yibo Wang*, **Ruiyuan Gao***, Kai Chen*, Kaiqiang Zhou, Yingjie Cai, Lanqing Hong, Zhenguo Li, Lihui Jiang, Dit-Yan Yeung, Qiang Xu, and Kai Zhang. "DetDiffusion: Synergizing Generative and Perceptive Models for Enhanced Data Generation and Perception". In: *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*. 2024.

[4] **Ruiyuan Gao**, Chenchen Zhao, Lanqing Hong, and Qiang Xu. "DiffGuard: Semantic Mismatch-Guided Out-of-Distribution Detection using Pre-trained Diffusion Models". In: *Proceedings of the IEEE/CVF International Conference on Computer Vision*. 2023.

[5] Yaran Chen*, **Ruiyuan Gao***, Fenggang Liu, and Dongbin Zhao. "ModuleNet: Knowledge-Inherited Neural Architecture Search." In: *IEEE transactions on cybernetics* PP (2021). ISSN: 2168-2275 2168-2267.

[6] **Ruiyuan Gao**, Hailong Yang, Shaohan Huang, Ming Dun, Mingzhen Li, Zerong Luan, Zhongzhi Luan, and Depei Qian. "PriPro: Towards Effective Privacy Protection on Edge-Cloud System running DNN Inference". In: *2021 IEEE/ACM 21st International Symposium on Cluster, Cloud and Internet Computing (CCGrid)*. IEEE. 2021, pp. 334–343.

Other Publication

(* for equal contribution)

[7] Kai Chen*, Yanze Li*, Wenhua Zhang*, Yanxin Liu, Pengxiang Li, **Ruiyuan Gao**, Lanqing Hong, Meng Tian, Xinhai Zhao, Zhenguo Li, et al. "Automated Evaluation of Large Vision-Language Models on Self-driving Corner Cases". In: *Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision*. 2025.

[8] Pengxiang Li*, Kai Chen*, Zhili Liu*, **Ruiyuan Gao**, Lanqing Hong, Dit-Yan Yeung, Huchuan Lu, and Xu Jia. "TrackDiffusion: Tracklet-Conditioned Video Generation via Diffusion Models". In: *Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision*. 2025.

[9] Yijun Yang, **Ruiyuan Gao**, Xiaosen Wang, Tsung-Yi Ho, Nan Xu, and Qiang Xu. "MMA-Diffusion: MultiModal Attack on Diffusion Models". In: *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*. 2024.

[10] Minhao Liu, Ailing Zeng, Qiuxia Lai, **Ruiyuan Gao**, Min Li, Jing Qin, and Qiang Xu. "T-WaveNet: A Tree-Structured Wavelet Neural Network for Time Series Signal Analysis". In: *The Tenth International Conference on Learning Representations*. 2022.

[11] Yijun Yang, **Ruiyuan Gao**, Yu Li, Qiuxia Lai, and Qiang Xu. "What You See is Not What the Network Infers: Detecting Adversarial Examples Based on Semantic Contradiction". In: *Network and Distributed System Security Symposium (NDSS)*. 2022.

[12] Yijun Yang, **Ruiyuan Gao**, and Qiang Xu. "Out-of-Distribution Detection with Semantic Mismatch under Masking". In: *European Conference on Computer Vision*. Springer. 2022.

[13] Ailing Zeng, Xuan Ju, Lei Yang, **Ruiyuan Gao**, Xizhou Zhu, Bo Dai, and Qiang Xu. "DeciWatch: A Simple Baseline for 10x Efficient 2D and 3D Pose Estimation". In: *European Conference on Computer Vision*. Springer. 2022.

[14] Yaran Chen, Haoran Li, **Ruiyuan Gao**, and Dongbin Zhao. "Boost 3-D Object Detection via Point Clouds Segmentation and Fused 3-D GIoU-L_1 Loss". In: *IEEE Transactions on Neural Networks and Learning Systems* (2020).

Preprint

(* for equal contribution)

[15] **Ruiyuan Gao**, Kai Chen, Zhihao Li, Lanqing Hong, Zhenguo Li, and Qiang Xu. "MagicDrive3D: Controllable 3D Generation for Any-View Rendering in Street Scenes". In: *arXiv preprint arXiv:2405.14475* (2024).

Professional Activities

- Organize ECCV2024 workshop - "Multimodal Perception and Comprehension of Corner Cases in Autonomous Driving" and challenge track 2: Corner Case Scene Generation.
- Conference Reviewer: AISTATS (2025), ICLR (2025), AAAI (2025), CVPR (2024), NeurIPS (2023, 2024).
- Journal Reviewer: International Journal of Computer Vision, Neurocomputing

Competition

International Algorithm Case Competition (Huangpu) | *Distributed Training* Aug. 2022 – Nov. 2022
粤港澳大湾区（黄埔）国际算法算例大赛

- As the **team leader** on the team of CURE Lab from CUHK.
- **2nd place** in competition problem of Adversarial Robustness Defense Algorithm of Deep Learning Models.

ASC Student Supercomputer Challenge | *Python, Docker, Distributed Programming* Jan. 2018 – Apr. 2019

- As a core member on the team of Beihang University, responsible for AI topics.
- **1st place** in tasks of Single Image Super Resolution (1/300+) and Face Super Resolution (1/20).
- First Prize & Highest LINPACK awards.

Awards & Scholarships

- Full Postgraduate Studentship, The Chinese University of Hong Kong.
- Outstanding Graduate in Beijing (北京市优秀毕业生).
- Second-class Undergraduate Merit Scholarship, Beihang University.
- Special Undergraduate Merit Scholarship for Discipline Competition, Beihang University.
- Meritorious Winner, American College Students Mathematical Modeling Competition.