Ruochen Wang (王若宸)

Home page: https://ruocwang.github.io/ • ruocwang@ucla.edu / ruocwang@umich.edu

Research Interests

My research aims to enable self-improving AI, i.e., to leverage the power of AI Agents to automatize the development & deployment of themselves. To achieve this goal, I founded AIGC Research Collaboration (ARC), a multi-lab research team focused on developing highly automated and trustworthy Multimodal Language Agents.

- LLM-era: core technologies in Multimodal Language Agents, including MLLM-Diffusion Synergy, Prompt Optimization, Reasoning and Safety of Multimodal Large Language Models (MLLMs).
- Pre-LLM-era: Efficient ML pipelines, including AutoML and Dataset Compression

Education

01/2020 to present	**University of California at Los Angeles (UCLA)** *Computer Science Department*	**U.S.**

- Ph.D. in Computer Science; Advisor: Prof. Cho-Jui Hsieh
- M.S. in Computer Science; GPA=4.0/4.0; Advisor: Prof. Cho-Jui Hsieh

09/2015 to 08/2019	**The University of Michigan-Ann Arbor (UMich)** *Department of Electrical Engineering and Computer Science (EECS)*	**U.S.**

- B.S. in Computer Science & B.S. in Statistics; GPA: 4.0/4.0

09/2013 to 06/2015	**(Transferred) Shanghai University of Finance and Economics (SUFE)** *School of Finance*	**China**

- Financial Experimental Class; GPA: 3.93/4.0; Program Rank: 1/30

Selected Honors

- Outstanding Graduate Student (for Master's degree, 1 per department), ***UCLA CS Department***, 05/2022.
- Outstanding Paper Award, ***ICLR 2021***, 04/2021.
- Award of Excellence (10%), ***Microsoft Research Asia (MSRA)***, 09/2019.
- Highest Distinction Graduate Award, ***The University of Michigan***, 08/2019.
- Berkeley Fung's Excellence Scholarship, ***UC Berkeley Graduate Admission Committee***, 03/2019.
- Outstanding Intern Award, ***SenseTime***, 01/2019.
- James B. Angell Scholar, ***The University of Michigan***, 2017-2019.
- Shanghai City Scholarship (0.6%), ***Shanghai City Government***, 09/2014.

Publications (* denote equal contribution)

ARC - Multimodal Language Agent

- Yuanhao Ban, **Ruochen Wang**, Tianyi Zhou, Minhao Cheng, Cho-jui Hsieh. Understanding the Impact of Negative Prompts: When and How Do They Take Effect? (*ARC Presents, Under Review 2024*)
- Sen Li, **Ruochen Wang**, Cho-jui Hsieh, Minhao Cheng, Tianyi Zhou. MuLan: Multimodal-LLM Agent for Progressive Multi-Object Diffusion. (*ARC Presents, Under Review 2024*)
- Xirui Li, **Ruochen Wang**, Ting Liu, Cho-jui Hsieh, Boqing Gong. DrAttack: Prompt Decomposition and Reconstruction Make Powerful LLM Jailbreakers. (*Arc Presents, Under Review 2024*)
- **Ruochen Wang***, Sohyun An*, Minhao Cheng, Tianyi Zhou, Sung Ju Hwang, Cho-jui Hsieh. Mixture-of-Prompt Optimization. (*Under Review 2024*)
- **Ruochen Wang**, Ting Liu, Cho-jui Hsieh, Boqing Gong. Diff-DPO: On the Discrete Prompt Optimization for Text-to-Image Diffusion Models. (*Arc Presents, Under Review 2024*)

Dataset Compression

- Justin Cui, **Ruochen Wang**, Yuanhao Xiong, Cho-Jui Hsieh. Mitigating Bias in Dataset Distillation. (*ICML 2024*)
- Yuanhao Xiong*, **Ruochen Wang***, Minhao Cheng, Cho-Jui Hsieh. FedDM: Iterative Distribution Matching for Communication-Efficient Federated Learning. (*CVPR 2023*)
- Justin Cui, **Ruochen Wang**, Si Si, Cho-Jui Hsieh. Scaling Up Dataset Distillation to ImageNet-1K with Constant Memory. (*ICML 2023*)
- Justin Cui, **Ruochen Wang**, Si Si, Cho-Jui Hsieh. DC-BENCH: Dataset Condensation benchmark. (*NeurIPS 2022*)

AutoML

- **Ruochen Wang**, Yuanhao Xiong, Minhao Cheng, Cho-Jui Hsieh. Efficient Non-Parametric Optimizer Search for Diverse Tasks. (*NeurIPS 2022*)

- Yuanhao Xiong, Li-Cheng Lan, Xiangning Chen, **Ruochen Wang**, Cho-Jui Hsieh. Learning to Schedule Learning Rate with Graph Neural Networks. (*ICLR 2022*)
- Shoukang Hu*, **Ruochen Wang***, Lanqing Hong, Zhenguo Li, Cho-Jui Hsieh, Jiashi Feng. Generalizing Few-Shot NAS with Gradient Matching. (*ICLR 2022*)
- **Ruochen Wang**, Xiangning Chen, Minhao Cheng, Xiaocheng Tang, Cho-Jui Hsieh. RANK-NOSH: Efficient Predictor-Based Architecture Search via Non-Uniform Successive Halving. (*ICCV 2021*)
- **Ruochen Wang**, Minhao Cheng, Xiangning Chen, Xiaocheng Tang, Cho-Jui Hsieh. Rethinking architecture selection in differentiable NAS. (*ICLR 2021*) **Outstanding Paper Award**.
- Xiangning Chen*, **Ruochen Wang***, Minhao Cheng*, Xiaocheng Tang, Cho-Jui Hsieh. DrNAS: Dirichlet Neural Architecture Search. (*ICLR 2021*).

Research Experience

2023 to Present	**Google Research - Ads ML**	**U.S.**

Student Researcher on LLM, with Prof. Indejri Dellion, Dr. Felix Yu, and Dr. Si Si.
- Demonstrated that Multimodal Large Language Models (MLLMs) are interpretable knowledge learners and can be used to implement accurate and interpretable Neural Symbolic Programs.
- Proposed a family of algorithms that enable MLLMs to extract structured predictive knowledge from raw data, which went into production (paper coming soon)

09/2023 to Present	**ARC - AIGC Research Collaboration**	**U.S.**

Founder & Principal
<u>Advisory Board</u>: *Cho-Jui Hsieh (Prof), Tianyi Zhou (Prof), Minhao Cheng (Prof)*
<u>Researchers</u>: *Xirui Li, Yuanhao Ban, Sen Li, Sohyun An, Hengguang Zhou, Licheng Lan, Andrew Bai*
- ARC is a small elite team focusing on developing Multimodal Multi-Agent Foundational Systems (MAFS), and eventually commercializing the results.

05/2022 to 2023	**Google Research - Perception Team**	**U.S.**

Student Researcher on Diffusion Models and Transformers, with Dr. Boqing Gong and Dr. Ting Liu
- Controllable generation of Text-to-Image Diffusion Models
- Efficient CNN-Transformer hybrid architecture with linear attention for video processing.

01/2020 to 06/2023	**UCLA Samueli School of Engineering**	**U.S.**

Graduate Student Researcher with Prof. Cho-Jui Hsieh
- Understanding and improving full-stack AutoML Algorithms, including Neural Architecture Search, Optimizer Search, and Hyperparameter Optimization.
- Efficient and scalable Dataset Compression methods and benchmarks.

05/2019 to 09/2019	**Microsoft Research**	**China**

Research Intern
- Resource-constrained neural architecture search.
- Improving the optimization of the Proximal Policy Gradient via Interior Point methods.

09/2018 to 03/2019	**SenseTime**	**China**

Research Intern
- Adversarial robustness in the frequency domain.

09/2017 to 04/2018	**UMich College of Engineering**	**U.S.**

Research Assistant with Prof. Honglak Lee
- Worked on debasing a language-queried object detection model trained on datasets with sparse annotations.

Services

- Co-organizer of the 1st Dataset Distillation Workshop at CVPR 2024
- Reviewer for ICML Since 2021, NeurIPS Since 2021, ICLR Since 2022, TMLR, CVPR Since 2023, ICCV Since 2023, ECV 2023, NeuroComputing, e.t.c.