

KAIXIANG LIN

Github & Google Scholar & Homepage
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EDUCATION

Michigan State University

Aug. 2015 - Aug. 2020

Ph.D. in Computer Science & Engineering

Advisor: Dr. Jiayu Zhou

University of Science and Technology of China

Sept. 2010 - July 2014

B.E. in Electronic Information Engineering

PROFESSIONAL EXPERIENCE

Senior Applied Scientist at **Amazon AGI, Sunnyvale, CA**

Feb 2024 - present

- Multimodal RLHF & RL for reasoning. Core contributor to Amazon Nova Models. Improved multimodal benchmark performance (67% benchmarks) and reduced million-level redundant multimodal production training data. Proposed and implemented algorithmic improvements to stabilize, standardize RL production training pipeline (e.g., advantage normalization, reward normalization, etc.). Proposed and implemented constrained reward modeling to restrict reward score range without sacrificing of performance both theoretically and empirically.
- RLAIIF. Proposed and implemented RLAIIF algorithm to improve Agent performance by 10% on internal benchmark.
- MultiModal Agents. We released the best OSS multimodal web agents (PAE) on open-ended web environments as of 2024, advancing open-source model performance by 10%. On the same model size, we boost the OSS performance from 2% to 33%.
- Long-horizon reasoning. We released (PrefEval) benchmark that reveals all SoTA LLMs (Claude3.5 Sonnet, Gemini1.5 Pro, OpenAI O1-preview) cannot proactively recognize and adhere to user preference, especially in long horizon setting (ICLR'25 Oral).

Senior Applied Scientist at **Amazon web service, Santa Clara, CA**

Oct 25th 2021 - Jan 2024

Post-training, Pre-training, and contrastive learning of foundation models.

- Initiated and led Amazon Titan models RLHF (Reinforcement Learning from Human Feedback) efforts. Align large language model with human preference across various complicated scenarios at industry scale.
 1. Leading the effort of training large-scale RLHF models. We built up Amazon RLHF pipeline from scratch, trained industry-scale RLHF models, and launched RLHF models in production.
 2. Proposed RLHF approach to improve both human preference alignment and standard NLP benchmark performance, which reduces the performance degradation when using PPO and PPO-PTX.
- Proposed and developed SOTA contrastive learning algorithm for text embedding models. Trained (pre-training and contrastive learning) text embedding models from scratch that achieved SOTA performance (outperforming OpenAI, Cohere, and all public models). It was the best text embedding model as of Nov, 2022 across text similarity and retrieval tasks. It was launched as beta version of Amazon Titan embedding.

Applied Scientist II at **Amazon Lab 126, Sunnyvale, CA**

Oct 5th 2020 - Oct 25th 2021

- Embodied Artificial Intelligence. Build infrastructure and model for embodied agents that perceive first-person view images, follow human instruction, and complete household tasks in the simulated environments. It was launched as beta version of Simbot.

Research Intern at **Google Display Ads, Mountain View, CA**

May 28th - Aug. 30th 2019

- Applied learning to rank algorithms (including our ranking policy gradient) to display format selection problems. Seven models checked into production for three ranking tasks.
- Increased revenue by 1.14% based on five days online A/B testing.

Research Intern at **Didi AI Labs, Beijing**

May - Aug. 2017, 2018

- Designed and implemented constrained multi-armed bandit algorithm for a multi-channel marketing project. Return on Investment (ROI) increased over 23% with the same scale of investment. This algorithm was running online at the end of my internship.
- Proposed and implemented a novel multi-agent deep reinforcement learning algorithm for large scale fleet management that is able to coordinate large number of agents and increase the GMV over 15% based on a simulator that is calibrated with real data.

SELECTED PUBLICATIONS

Amazon Artificial General Intelligence team including **Kaixiang Lin***. The Amazon Nova Family of Models: Technical Report and Model Card, Technical Report, 2024. (* denotes core contributor)

Siyan Zhao, Mingyi Hong, Yang Liu, Devamanyu Hazarika, **Kaixiang Lin*** “Do LLMs Recognize Your Preferences? Evaluating Personalized Preference Following in LLMs”, ICLR 2025 **Oral** (* denotes corresponding author.)

Yifei Zhou*, Qianlan Yang*, **Kaixiang Lin**, Min Bai, Xiong Zhou, Yu-Xiong Wang, Sergey Levine, Erran Li “Proposer-Agent-Evaluator(PAE): Autonomous Skill Discovery For Foundation Model Internet Agents” In submission (* equal contribution)

Xinnan Zhang, Siliang Zeng, Jiaxiang Li, **Kaixiang Lin**, Mingyi Hong “LLM Alignment Through Successive Policy Re-weighting (SPR)”, NeurIPS 2024 Workshop on Fine-Tuning in Modern Machine Learning: Principles and Scalability.

Subramanian Chidambaram*, Erran Li*, Min Bai, Xiaopeng LI, **Kaixiang Lin**, Xiong Zhou, Alex C. Williams “Socratic human feedback (SoHF): Expert steering strategies for LLM code generation”, EMNLP findings, 2024 (* equal contribution)

Dennis Ulmer, Elman Mansimov, **Kaixiang Lin**, Justin Sun, Xibin Gao, Yi Zhang “Bootstrapping LLM-based Task-Oriented Dialogue Agents via Self-Talk”, Pre-prints, 2024.

Rami Aly, Xingjian Shi, **Kaixiang Lin**, Aston Zhang, Andrew Gordon Wilson “Automated Few-Shot Classification with Instruction-Finetuned Language Models”, EMNLP findings, 2023.

Soumajyoti Sarkar, **Kaixiang Lin**, Sailik Sengupta, Leonard Lausen, Sheng Zha, Saab Mansour “Parameter and data efficient continual pre-training for robustness to dialectal variance in Arabic”, NeurIPS 2022 Workshop on Efficient Natural Language and Speech Processing (ENLSP).

Zhaonan Qu*, **Kaixiang Lin***, Zhaojian Li, Jiayu Zhou. “A Unified Linear Speedup Analysis of Stochastic FedAvg and Nesterov Accelerated FedAvg”, Journal of Artificial Intelligence Research (JAIR), 2023. (* **equal contribution**).

Zhuangdi Zhu, **Kaixiang Lin**, Jiayu Zhou. “Transfer Learning in Deep Reinforcement Learning: A Survey”, Transactions on Pattern Analysis and Machine Intelligence (TPAMI), 2023.

Zhiwei Jia, **Kaixiang Lin**^{*}, Yizhou Zhao, Qiaozi Gao, Govind Thattai, Gaurav S. Sukhatme, “Learning to Act with Affordance-Aware Multimodal Neural SLAM” IROS, 2022. (^{*} **denotes that the paper is done when the first author was an intern mentored by Kaixiang**).

Tongzhou Mu, **Kaixiang Lin**^{*}, Feiyang Niu, Govind Thattai, “Learning Two-Step Hybrid Policy for Graph-Based Interpretable Reinforcement Learning” Transactions on Machine Learning Research (TMLR) 2022.(^{*} **denotes that the paper is done when the first author was an intern mentored by Kaixiang**).

Xiaofeng Gao, Qiaozi Gao, Ran Gong, **Kaixiang Lin**, Govind Thattai, Gaurav Sukhatme, “DialFRED: Dialogue-Enabled Agents for Embodied Instruction Following”, IEEE Robotics and Automation Letters (RA-L), 2022.

Zhuangdi Zhu, **Kaixiang Lin**, Bo Dai, Jiayu Zhou. “Self-Adaptive Imitation Learning: Learning Tasks with Delayed Rewards from Sub-optimal Demonstrations”, Proceedings of the AAAI Conference on Artificial Intelligence, 2022.

Yizhou Zhao, **Kaixiang Lin**^{*}, Zhiwei Jia, Qiaozi Gao, Govind Thattai, Jesse Thomason, Gaurav S. Sukhatme, “LUMINOUS: Indoor Scene Generation for Embodied AI Challenges” NeurIPS 2021 Workshop on CtrlGen. (^{*} **denotes that the paper is done when the first author was an intern mentored by Kaixiang**).

Boyang Liu, Ding Wang, **Kaixiang Lin**, Pang-Ning Tan, Jiayu Zhou. “RCA: A Deep Collaborative Autoencoder Approach for Anomaly Detection”, IJCAI, 2021.

Zhuangdi Zhu, **Kaixiang Lin**, Bo Dai, Jiayu Zhou. “Off-Policy Imitation Learning from Observations”, Thirty-fourth Conference on Neural Information Processing Systems (NeurIPS), 2020.

Kaixiang Lin and Jiayu Zhou. “Ranking Policy Gradient”, International Conference on Learning Representations (ICLR), 2020.

Kaixiang Lin, Renyu Zhao, Zhe Xu, Jiayu Zhou. “Efficient Large-Scale Fleet Management via Multi-Agent Deep Reinforcement Learning”, the 24th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD), 2018. [**Research track Oral**][**Acceptance rate: 10.9%**]

Kaixiang Lin, Shu Wang, Jiayu Zhou. “Collaborative Deep Reinforcement Learning”, Preprint, 2017.

Liyang Xie, Inci M. Baytas, **Kaixiang Lin**, Shu Wang, Jiayu Zhou. “Privacy-preserving distributed multi-task learning with asynchronous updates”, the 23rd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD), 2017.

Inci M. Baytas, **Kaixiang Lin**, Fei Wang, Anil K. Jain and Jiayu Zhou. “PhenoTree: Interactive Visual Analytics for Hierarchical Phenotyping from Large-Scale Electronic Health Records”, IEEE Transaction on Multimedia, 2016.

Kaixiang Lin and Jiayu Zhou. “Interactive Multi-Task Relationship Learning”, IEEE International Conference on Data Mining (ICDM), 2016.[**Oral**][**Acceptance rate: 8.5%**]

Inci M. Baytas, **Kaixiang Lin**, Fei Wang, Anil K. Jain and Jiayu Zhou. “Stochastic Convex Sparse Principal Component Analysis” EURASIP Journal on Bioinformatics and Systems Biology, 2016.

Kaixiang Lin, Jianpeng Xu, Inci M. Baytas, Shuiwang Ji and Jiayu Zhou. “Multi-Task Feature Interaction Learning”, the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD), 2016. [**Research track**][**Acceptance rate: 18.1%**]

Jianpeng Xu, **Kaixiang Lin**, Pang-Ning Tan and Jiayu Zhou. “Synergies that Matter: Efficient Interaction Selection via Sparse Factorization Machine”, SIAM International Conference on Data Mining (SDM) 2016.

HONORS AND AWARDS

Conference Travel Grant: SDM2016, KDD2016, SDM2017, SDM2018, KDD2018
Best Poster Award, Doctoral Forum, SDM2017

INVITED TALKS

- Guest lecture on Deep Reinforcement Learning at Northeastern CS7150 Deep Learning.
- Invited Talk "Ranking Policy Gradient" at DRL4IR Workshop, SIGIR, July 15th, 2021.
- LinkedIn Tech Talk: "Ranking Policy Gradient: Towards Sample-efficient Reinforcement Learning", Aug 9th, 2019.

SERVICES

Program Committee (PC) member:

- AAAI 2021, ICLR 2021, Neurips 2021, ICLR 2022, ICLR 2024, ICLR 2025.
- ICML 2020, IJCAI 2020, NeurIPS 2020, ICLR 2020, AAAI 2020.
- IJCAI 2019, IEEE BigData 2019, ICDM 2018, IEEE BigData 2018.

Journal Reviewer:

- Machine Learning
- ACM Transactions on Intelligent Systems and Technology (TIST)
- IEEE Transactions on Neural Networks and Learning Systems (TNNLS)
- Transactions on Knowledge and Data Engineering (TKDE)
- The Transportation Research Board (TRB) 98th Annual Meeting
- International Journal of Machine Learning and Cybernetics (JMLC)
- Neurocomputing
- Pattern Recognition
- Data Mining and Knowledge Discovery
- Transactions on Knowledge Discovery from Data (TKDD)