

ZIHANG LIU

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EDUCATION

University of California, Berkeley

M.Eng in Electrical Engineering and Computer Science

Berkeley, CA

Aug 2024 – Present

Beijing University of Posts and Telecommunications

B.Eng. in Intelligence Science and Technology

Cumulative Average: 90% **Rank:** 4/68

Beijing, China

Sep 2020 – Jun 2024

Core courses: Linear Algebra 98%, Discrete Mathematics 93%, Probability Theory and Statistics 93%, Neural Network and Deep Learning 97%, Design and Analysis of Algorithms 93%, Operating System 90%, Introduction to Reinforcement Learning 95%

Research Interest: (LLM) Model Diagnosis, Robust Machine Learning, Efficient Model Training.

PUBLICATIONS

Model Balancing Helps Low-data Training and Fine-tuning

Zihang Liu, Yuanzhe Hu, Tianyu Pang, Yefan Zhou, Pu Ren, Yaoqing Yang

EMNLP 2024 Main Track

EnsembleMOT: A Step Towards Ensemble Learning of Multiple Object Tracking

Yunhao Du, Zihang Liu, Fei Su

arXiv 2023

RESEARCH EXPERIENCE

Algorithm Discovery with Large Language Model

Graduate Researcher, Advised by Prof. Michael Mahoney at UC Berkeley

Berkeley, CA

Ongoing

Model Diagnosis with Weight Analysis

Undergraduate Researcher (On-site), Advised by Prof. Yaoqing Yang at Dartmouth College

Hanover, NH

July 2023 – July 2024

- * Proposed a layer-wise learning rate scheduler based on heavy-tailed self-regularization theory (HT-SR), that balances temperature parameters of neural network models.
- * Modeled the heavy-tail behavior of optimizers (SAM) and model architectures. Rescheduling the learning rate to optimize the regularization effects, significantly improving performance on Image Classification and Language Modeling (NeurIPS 2023 Spotlight)
- * Diagnosing the limitations of low-data training using Heavy-Tail metrics, and propose layer-wise model balancing to achieve model alignment, achieving up to 9% improvement in Language Model fine-tuning. (EMNLP 2024)

Ensemble Methods in Multiple Object Tracking

Undergraduate Research Assistant, Advised by Prof. Fei Su at BUPT

Beijing, China

Jun 2022 – Jan 2023

- * Proposed a model-independent ensemble method that integrates results from various MOT trackers to achieve higher overall performance, which we named EnsembleMOT.
- * Proposed to use both spatial and temporal IoU (Intersection over Union) to merge and prune trajectories, achieving 3% improvement in MOTA and IDF1, alleviating ID-switch and abnormal bounding box problems.
- * Co-authored a paper with an MCPRL lab member and submitted our work to the International Conference on Acoustics, Speech and Signal Processing (Submitted to ICASSP 2023).

Integrated Time-series Power Grid Load Prediction with Deep Neural Networks

Undergraduate Project

Beijing, China

Nov 2021 – Apr 2022

- * Used Wavelet denoising data preprocessing and RNN/LSTM model to achieve high accuracy on regional power grid throughput prediction.

- * Introduced RNN-based models to the application of short-term power grid load prediction, and proposed a wavelet denoising method to preprocess noisy raw load data.
- * Authored and published a paper in the International Conference of Computer Science and Software Engineering(CSSE 2022).

PROJECTS AND INTERNSHIPS

Reliable dialogue system trained with continuous learning and parameter-efficient fine-tuning

- * Designed a dialogue system with improved consistency and reliability of responses from learning new knowledge while retaining existing knowledge.
- * Constructed a GPT-2-based dialogue system with an interactive interface, fine-tuned with open-source dialogue datasets and parameter-efficient tuning.
- * Proposed a dynamic learning strategy that combines Elastic Weight Consolidation(EWC) and data replay to improve OOD generalization while alleviating the catastrophic forgetting problem.

Social media trend analysis with multi-level fine-tuning

- * Built a social media trend analysis system that automatically collects and classifies trends of user sentiment.
- * Proposed a real-time trend analysis regime based on the fine-tuning of BERT-based language models trained with the latest social media comments and posts.
- * Enhanced the prediction robustness by integrating trust region-based optimization methods, and implemented a comprehensive dashboard for real-time visualization and monitoring of trending sentiments and topics.

Backend Software Engineering Internship

Leadingtek Corp, Beijing

- * Implemented efficient data structures such as hash tables and binary search trees for rapid data access. Utilized algorithms like quicksort for data organization, ensuring efficient data integration, storage, and retrieval.
- * Designed optimized and structured SQL commands, focusing on complex joins, indices, and stored procedures to enhance the speed and accuracy of information retrieval.
- * Collaborated in an agile setting with developers, QA, and product managers, contributing to sprint activities and code quality.

AWARDS & ACHIEVEMENTS

First-class Scholarship (Ranked 1/68): 2022-2023 academic year, Beijing University of Posts and Telecommunications

Second-class Scholarship (Ranked 4/68): 2020-2021 & 2021-2022 academic year, Beijing University of Posts and Telecommunications

National English Competition for College Students: Special Prize (Top 0.1%), 2022

National Mathematics Competition for College Students: Second Place (Top 10%), 2022

”Internet+” Innovation and Entrepreneurship Competition: Third Place (Top 10%), 2022

Canadian Senior and Intermediate Mathematics Contest: Second Place (Top 3%), 2020

National High School Mathematics Competition: Third Place (Top 3%), 2019

Beijing University Student Tennis Tournament: 4th Place, Spring 2023

SKILLS

English Proficiency: TOEFL IBT **114** (reading30 listening29, speaking27, writing28), GRE **328** (Quant 170)

Programming Languages: Python, C/C++, SQL, LaTeX, Rust, VHDL

Frameworks: Linux, Pytorch, Git

Sports: I am a tennis athlete representing BUPT and have played in regional and national championships as a doubles player.