Yiran (Jenny) Shen

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EDUCATION

University of California San Diego — La Jolla, CA, US
Ph.D. in Computer Science and Engineering (GPA: 4/4)); Advisor: Prof. Prithviraj Ammanabrolu — *Sep. 2024 - Now*

Duke University — Durham, NC, US
M.S. in Interdisciplinary Data Science (GPA: 3.86/4) — *Sep. 2022 - May. 2024*
Main Coursework: Algorithms, Machine Learning and Images, NLP, Database Systems, Data Engineering, Algorithmic Trading

University of Melbourne — Melbourne, VIC, AUS
B.Comm. in Economics and Finance, Minor in Statistics (First-Class Honors) — *Mar. 2019 - Dec. 2021*
Main Coursework: Probability, Statistics, Real Analysis, Causal Inference, Time Series, Micro and Macroeconomics

RESEARCH INTERESTS

My research focuses on trustworthy AI for language models and agents, with an emphasis on pluralistic alignment, reasoning, and interpretability. I develop methods that help systems infer user intent through interaction, formalize it into clear, scalable evaluation criteria, and use these signals to train and assess agents on complex, long horizon tasks where success is difficult to verify. I also study reinforcement learning for adaptive multi-agent systems that support effective human AI collaboration while respecting diverse values and constraints. My long term goal is to build safe, controllable agentic systems that reliably accomplish economically valuable work, and to understand their social and ethical implications in real decision-making.

RESEARCH EXPERIENCE

Human-Centered AI Alignment via Reinforcement Learning — La Jolla, CA, US
Graduate Student Researcher @ UC San Diego Advised by Prof. Prithviraj Ammanabrolu

- Developed a unified framework for aligning LLMs across verifiable and non-verifiable rewards using standardized PRM training and Multi-Action-Head DPO, improving multi-domain performance and enabling fine-grained user control at inference.

Dynamic Reasoning of Language Modeling Through Multi-Role Discussion — Hangzhou, China
Research Scientist Intern @ Alibaba Tongyi Lab advised by Dr. Liuyi Yao

- Designed a multi-character LLM discussion system with structured interactions and automated scene generation, improving reasoning and error correction (contributed to AgentScope Project).

Interpretable Alignment of LLMs with Multi-Dimensional Reward Signals — Durham, NC, US
Graduate Student Researcher @ Duke Computer Science Department Advised by Prof. Brandon T. Fain

- Developed an interpretable LLM alignment framework using an LLM-as-judge for sub-dimension scoring and fine-tuned with PPO, achieving comparable performance with greater transparency in RLHF.

Simulating and Optimizing Hospital Scheduling Through Machine Learning — Durham, NC, US
Graduate Student Researcher @ Duke Rhodes Information Initiative Advised by Prof. Ethan Fang and Prof. Yehua Wei

- Leveraged XGBoost and simulated annealing to optimize surgical schedules, cutting bed usage variance by about 20%.
- Built an interface for simulating schedule changes, helping Duke Hospital experts test and improve scheduling policies.

SELECTED PUBLICATIONS

- **Yiran Shen**, Yu Xia, Jonathan D. Chang, Prithviraj Ammanabrolu. Simultaneous Multi-objective Alignment Across Verifiable and Non-verifiable Rewards. **NeurIPS 2025 MATH-AI Workshop. Under Review**.
- **Yiran Shen**, Aditya John, Brandon Fain. Explainable Rewards in RLHF Using LLM-as-a-Judge. **Under Review**.
- Yu Xia, **Yiran Shen**, Junda Wu, Tong Yu, Sungchul Kim, Ryan A. Rossi, Lina Yao, and Julian McAuley. SAND: Boosting LLM Agents with Self-Taught Action Deliberation. **EMNLP 2025**.
- Junda Wu, Rohan Surana, Zhouhang Xie, **Yiran Shen**, Yu Xia, Tong Yu, Ryan A. Rossi, Prithviraj Ammanabrolu, and Julian McAuley. In-context Ranking Preference Optimization. **COLM 2025**.
- Zhouhang Xie, Junda Wu, **Yiran Shen**, Yu Xia, Xintong Li, Aaron Chang, Ryan A. Rossi, Sachin Kumar, Bodhisattwa Prasad Majumder, Jingbo Shang, Prithviraj Ammanabrolu, and Julian McAuley. A Survey on Personalized and Pluralistic Preference Alignment in Large Language Models. **COLM 2025**.

TECHNICAL PROJECTS

LLM Network Acceleration and Compression Research (1yr Capstone Project with Proofpoint) [Link]
Advised by Dan Salo, Ryan Skinner, and Altamash Rafiq from Proofpoint ML Lab

- Finetuned 3B parameter LLMs with quantization, distillation, and pruning to achieve 50% faster inference with less than 2% accuracy loss for generalized cyber threat detection in emails, documents, and other communication channels.

Real-Time Facial Emotion Detection from Partially Obstructed Faces using CNNs [Link]

- Utilized VGG 16, outperforming ResNet50 by 7%, to detect emotions from partially obstructed faces, applied saliency maps for interpretability, and integrated it with OpenCV haar cascade for real time emotion detection.

Customer Profitability Analysis and Predictions using LSTM for Targeted Marketing [Link]

- Classified customer profitability into three tiers using K-means clustering on standardized monthly sales data, then built a customized LSTM model that achieved 96.65% accuracy and improved targeted marketing strategies to drive revenue growth.

Algorithmic Options Trading with Sentiment Analysis and Delta Hedging [Link]

- Built an algorithmic options trading strategy using sentiment adjusted implied versus realized volatility spreads with delta hedging to remain market neutral, achieving consistent risk adjusted returns in backtests across volatile and normal markets.

Domain Adaptive Ophthalmic Image Segmentation using Transfer Learning [Link]

- Improved Diabetic Macular Edema detection on limited OCT images by finetuning MM Segmentation models, achieving mDice 79.38% and mIoU 70.64% with a UNet model using DeepLabV3 heads.

AWARDS

- Duke University - Dean's Research Award
- University of Melbourne - Melbourne International Undergraduate Scholarship (50% fee remission)
- University of Melbourne - International Graduate Merit Scholarship
- University of Melbourne - Melbourne Graduate Scholarship
- University of Melbourne - Leaders in Communities Award
- University of Melbourne - DJI RoboMaster 2021 University AI Challenge Third Prize

TEACHING EXPERIENCE

- UC San Diego - CSE100 Advanced Data Structures
- Duke University - STAT101 Data Analysis and Statistical Inference
- Duke University - DECISION518Q Applied Probability and Statistics

MISCELLANEOUS

Reviewer: COLM'25, ICLR'25

Frameworks: Sklearn, PyTorch, Tensorflow, Numpy, Pandas, Dask, Flask, MySQL, Git, OpenCV, AWS, Streamlit

Interests: Hiking, traveling, watching soccer, sudoku, taekwondo, documentaries