Kevin Ren

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Education

Carnegie Mellon University May 2025
Bachelor of Science in Statistics and Machine Learning, Minor in Computer Science *Pittsburgh, PA*

- *GPA:* 4.0/4.0
- *Relevant Coursework:* Intermediate Deep Learning, Introduction to Machine Learning (PhD), Advanced Methods for Data Analysis, Parallel and Sequential Data Structures and Algorithms, Computer Systems
- *Extracurricular Involvement:* Sustainable Earth (Treasurer), Asian Students Association (Secretary)

Research / Teaching Experience

Carnegie Mellon Machine Learning Department, Lab for AI and Social Impact May 2023 - Current
Advised by Prof. Bryan Wilder, Prof. Zhiwei Steven Wu *Pittsburgh, PA*

- Proposed novel, decision-focused method of evaluating worst-case distribution shifts, given a predictive model, population of individuals, and downstream loss function.
- Applied theoretical hierarchical framework to US Census datasets, building a pipeline for data processing and model evaluation in Python. Outperformed traditional empirical risk minimization (ERM) methods.
- Researched capabilities of foundational models for assisting with the training of robust discriminative models under prior-known distribution shifts.

Carnegie Mellon Robotics Institute, Search-Based Planning Laboratory March 2023 - Current
Advised by Prof. Maxim Likhachev *Pittsburgh, PA*

- Conducted experiments studying ability of neural networks to mimic centralized planning algorithm.
- Engineered machine learning pipeline to parse agent path data into training data for CNN/GNN models.
- Integrated heuristic search methods to improve collision shielding for ML-based MAPF systems.
- Trained large-scale graph neural network for MAPF, outperforming SOTA ML solutions.
- Implemented path reuse alteration on multi-agent pathfinding algorithm in a C++ codebase, identifying 5% speedup on sparse maps relative to SOTA algorithm when planning conflict-free paths for many agents.

Carnegie Mellon School of Computer Science January 2023 - May 2024
Teaching Assistant, Introduction to Machine Learning *Pittsburgh, PA*

- Led maintenance and feature development on course-hosted office hours queue web application.
- Hosted recitations and office hours, helping students on topics from linear regression to recommender systems.
- Collaborated with other TAs and course faculty to develop a new coding assignment on deep learning, constructing RNNs from scratch in Pytorch.

Metro21: Smart Cities Institute August 2022 - May 2023
Intern *Pittsburgh, PA*

- Analyzed regional economic health using municipality employment, financial, and education metrics
- Led data pipelining and visualization process in Python/R to generate insights from regional poverty/transportation data, cruicial to National Science Foundation proposal for regional economic stimulation funding

Carnegie Mellon University May 2022 - August 2022
Summer Undergraduate Research Fellow *Pittsburgh, PA*

- Formulated research questions modeling Pittsburgh light pollution as primary researcher
- Applied hot spot, TIN surface analysis in ArcGIS creating compelling geographic visualizations of skyglow
- Implemented ML models relating skyglow with demographic data after aggregating census datasets

Peer-Reviewed Publications

- **Ren, K.**, Byun, Y., Wilder, B. "Decision-Focused Evaluation of Worst-Case Distribution Shift", Conference on Uncertainty in Artificial Intelligence (UAI), 2024.
- Veerapaneni, R., Wang, Q., **Ren, K.**, Jakobsson, A., Li J., Likhachev, M., "Improving Learnt Local MAPF Policies with Heuristic Search", International Conference on Automated Planning and Scheduling (ICAPS), 2024.

Preprints

- Veerapaneni, R., Jakobsson, A., **Ren, K.**, Kim, S., Li, J., Likhachev, M. "Work Smarter Not Harder: Simple Imitation Learning with CS-PIBT Outperforms Large Scale Imitation Learning for MAPF", Arxiv Preprint, Under Review, 2024.

Industry Experience

TikTok May 2024 - November 2024
Machine Learning Engineer Intern *San Jose, CA*

- Develop pipeline for fine-tuning and evaluating LLMs for time series forecasting, combating overfitting with hyperparameter tuning and data augmentation techniques, achieving 20% higher accuracy.
- Integrate new components into advertisement inventory system by creating a new SQL table and updating downstream dependencies, after presenting data analysis of necessity for more detailed forecasting techniques to 20+ person development group, reducing percent error by 40%.
- Research deep learning (i.e., LLMs) for time series forecasting, reading 15+ papers to create a literature review, and using compiled information to choose models to use in production.
- Pushed 2 new neural-network-based forecasters to production, contributing to ensemble model for time series forecasting.
- Researched new metrics for forecast evaluation, taking into consideration downstream evaluation of forecasts to develop business-focused evaluation metrics that replaced outdated metrics.
- Wrote and maintained dashboard keeping track of forecast metrics over time per model.

Fifth Third Bank May 2023 - August 2023
Software Engineer Intern, Secure Development Team *Cincinnati, OH*

- Developed client-facing NodeJS, AWS-hosted microservice to onboard internal apps to encryption service.
- Configured and wrote Java (Spring Boot) tokenizer API to give clients example use cases of tokenization.

Skills / Interests

Theoretical: Distribution Shift, Robustness, Deep Learning, Time Series Forecasting, Multi-Agent Pathfinding
Software: Python, C, C++, SQL, JavaScript (React, NodeJS), Java (Spring Boot, Gradle), Rust, R, Bash, Excel
Libraries: PyTorch, NumPy, Pandas, Matplotlib, PySpark, SciPy, SciKit-learn, Seaborn, SciPy
Technologies: AWS, Git, VSCode, Splunk, Jenkins, Docker, Terraform, HashiCorp Vault, Linux, Bash, PowerShell

Awards

- 1st Place Coolest Graphs (CMU Statistics Department for project: Manrattan - A Look into NYC's Rats, link), December 2022
- Dietrich College Dean's List, High Honors (Spring/Fall 2021/2022/2023, Spring 2024)