Ziheng (Jack) Chen

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Education

University of Illinois Urbana-Champaign (UIUC) Aug 2023 – May 2025
Master of Science in Computer Engineering GPA: 4.00/4.00

University of Illinois Urbana-Champaign (UIUC) Aug 2019 – May 2023
Bachelor of Science in Computer Engineering, Minor in Mathematics GPA: 3.99/4.00 (Highest Honor)

Relevant Coursework Data Structures, Algorithms, Machine Learning, Deep Learning for Computer Vision, Dependable AI Systems, Computational Photography, Data Science Analytics using Probabilistic Graph Models, Statistics and Probability, Fault-Tolerant Digital Systems, Operating Systems, Distributed Systems, Communication Networks, Database Systems, Web Programming

Awards Ackmann Family Scholarship, I-Promise Scholarship, Dean's List, James Scholar

Work Experience

Software Engineer Intern (co-op), StoneX Group – Chicago, IL Jan 2023 – June 2023

- Engineered from scratch a comprehensive evaluation pipeline with `pandas` to benchmark prototypical commodity price indices measured by metrics, e.g., bid-ask spread and volatility
- Quantified the potential profitability of commodity indices generated from 200+ index configurations by changing parameters, e.g., rolling period, rebalancing frequency, and contract calendars, surpassed SPGCCI by 23.3% in 10-year total return and 8.8% in Sharpe Ratio with the top-performing tested index
- Expedited benchmarking processes by parallelizing the execution in `Databricks`, reducing waiting time by 3,000%
- Collaborated closely with marketing associates to validate index generation and refine evaluation requirements
- Created an actively utilized `Python` script for `CI/CD` on `Azure DevOps` to automate `Databricks` workflow migration from testing to production environments, eliminated manual operations and greatly enhancing overall productivity

Data Engineer Intern (co-op), StoneX Group – Chicago, IL Aug 2022 – Dec 2022

- Researched and deployed a proxy to integrate `Okta` authentication into an existing cloud application using `Docker`
- Optimized the data curation ETL pipeline for a data-serving application to cut waiting time by 20 times to 5 seconds
- Developed a real-time usage analysis dashboard in `Splunk`, featuring dynamic filters for associates and categories

Data Engineer Intern (full-time), Ecolab – Saint Paul, MN May 2022 – Aug 2022

- Profiled global sales history table in `Snowflake`, identifying 201M invalid rows to enhance data integrity
- Automated `SQL` query generation through `Python` and `APIs` to streamline the evaluation of data quality and usability

Research Experience

Traffic Risk Assessment and Mitigation, *Machine Learning, Autonomous Vehicles* Aug 2023 – Dec 2023

- Proposed innovative method to assign risks to other vehicles in traffic and introduced methods to improve safety
- Utilized `alphashape` in `Python` to calculate the reachable area of a vehicle following a bicycle model to identify risky vehicles in traffic and introduced methods to improve safety in an end-to-end AV simulation
- Executed simulations in parallel with `subprocess` and `ThreadPoolExecutor` in `Python` to generate 30,000+ traces from adverse seed scenarios with varied parameters, e.g., cut-in speed and timing of safety-critical actors, accelerating experiments by 200%
- Engineered a memory-efficient `ResNet` variant, reducing footprint by 50%, achieving 95%+ testing accuracy and F1-score for predicting vehicle trajectory heatmaps
- Cleansed and statistically analyzed generated datasets using `pandas`, and visualized outcomes with `seaborn` and `matplotlib`, proving the efficacy of the proposed metric over current state-of-the-art risk assignment methods
- Implemented a Reinforcement Learning Agent in `PyTorch`, leveraging ego-vehicle telemetry and camera-feed from three front-facing cameras to achieve a 72.7% reduction in accidents through emergency braking

Friction Model Improvement in CARLA Simulator, *Autonomous Vehicles* Sept 2022 – May 2023

- Studied the vehicle physics model implemented in `CARLA` and improved the friction model as a function of weather settings following previous literature on vehicle friction
- Generated and analyzed 8,000+ vehicle traces in varying weather conditions, creating 300% more accidents
- Acquired expertise in modifying the perception, control, and planning modules in the `CARLA` simulation platform

Teaching Experience

Graduate Teaching Assistant, University of Illinois Urbana-Champaign (UIUC) Aug 2023 – Present

- Facilitated discussion sessions on computer science concepts for CS/ECE 374: Introduction to Algorithms
- Conducted weekly office hours of 20+ students to provide individualized guidance and clarification on assignments

Projects

LLM for Network Configuration, *Large Language Models, Foundational Models* Nov 2023 – Dec 2023

- Injected faults into network configurations based on common root causes and validated outcomes with `Batfish`
- Utilized `GPT-4 Turbo` to methodically detect and resolve network configuration errors, attaining a 70% accuracy rate without contextual information, and an 85% accuracy rate through in-context learning

Object Detection Neural Network, *Machine Learning, Object Detection* March 2023 – April 2023

- Implemented a YOLO-like object detector in `PyTorch` on the PASCAL VOC 2007 dataset
- Achieved 1-mAP score of 0.55 locally and 0.448 on Kaggle

GymLog, *Web Application, Frontend, Backend, Full-Stack Development* Oct 2022 – Dec 2022

- Created a responsive cross-platform workout logging web app with `React` and `TypeScript`, deployed on `Heroku`
- Supported user authentication via `Firebase` to facilitate tracking and deliver personalized recommendations
- Established a `MongoDB` database for seamless data synchronization, employing `Mongoose` for frontend integration
- Earned recognition for exemplary prototyping, securing runner-up accolades in class upon project completion

Coffee4Life OS, *Linux System Kernel, System Programming, Low-Level Programming* Mar 2022 – May 2022

- Developed a functional 32-bit `Linux` kernel in `C` and low-level `x86 Assembly`
- Supported paging, RTC, keyboard, terminal, file system, system calls, context switching, and scheduling operations

OpenFlights, *Data Structures, Network Algorithms, Large-Scale Data Processing* Mar 2021 – May 2021

- Designed data structures to host large-scale flight data with 8,000+ airports and 67,000+ routes in `C++`
- Implemented Landmark, PageRank, and Dijkstra's algorithms to search for possible paths with routing options

Skills

Programming Languages	`Python, C, C++, JavaScript, TypeScript, CSS, SQL, Assembly, CUDA, Bash`
Frameworks and Tools	`Git, Linux, Docker, React, pandas, PyTorch, NumPy, Azure DevOps`
Languages	English, Chinese (Mandarin)