Nikhil A. Patel

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EDUCATION

University of Michigan May 2025
Master of Science in Computer Science and Engineering *Ann Arbor, MI*
University of Southern California, Viterbi School of Engineering May 2023
Bachelor of Science in Computer Science *Los Angeles, CA*
Minor in Mathematics GPA: 3.8/4.0

PROFESSIONAL EXPERIENCE

Amazon Web Services Seattle, WA
Software Development Engineer Intern May 2022-August 2022

- Automated seed table bootstrapping using **Java** as part of the DynamoDB Restore region build process, saving **2 developer days** every build.
- Developed an ACID-compliant transaction system to handle the complexities of **distributed computing**, ensuring support for rollbacks and incorporating deadlock detection mechanisms.
- Spearheaded proposal to use aforementioned automatic bootstrapper to delete and reconstruct all testing tables, moving from on-demand to provisioned capacity, saving the CDP team over **$1.5 Million per year**.

Carl Zeiss Meditec, Inc Dublin, CA
Software Engineering Intern June 2021-August 2021

- Programmed web application using **Angular** and **C#** to provide **more than 50** external scientists access to a new perimetry test prototype enabling continual refinement of the test algorithm.
- Designed and implemented a **distributed service** allowing **hundreds** of users concurrent reads and writes to a common file infrastructure containing algorithm input and output files based on admin's accessibility preferences.

RESEARCH EXPERIENCE

A Hybrid Learning Approach to Synthetic Position Construction for Tax Loss Harvesting December 2021-Present

- Applied **Principal Component Analysis** and regressive techniques such as **GARCH** and **ARIMA** to construct a portfolio of stocks that can accurately model the performance of a given target stock in order to create viable replacement options when harvesting tax alpha whilst direct indexing.
- Architected a bespoke stock market backtester capable of rigorously assessing and contrasting various tax loss harvesting replacement rules informed by various hybrid learning models.
- Presented at the ACM International Conference on AI in Finance 2022.

TCRNet: A Novel CNN for Infrared Target Detection in Cluttered Environments August 2020-September 2021

- Employed **PyTorch** to train a novel Convolutional Neural Network designed to maximize a "target to clutter ratio," offering a **30% increase** in detection probability and a **50% decrease** in false alarm rate compared to Faster RCNN and Yolo-v3.
- Performed ablation studies to demonstrate the contribution of the first layer eigenfilters, additional convolutional layers, and the benefit of the TCR cost function.

PROJECTS

AlphaMax: Stochastic Proximal Policy Optimizing Stock Trading Agent January 2023-Present

- Developed a high-performance reinforcement learning agent using **Proximal Policy Optimization** and **Optuna hyperparameter tuning**, consistently outperforming the S&P 500 Index in a **parallelized custom backtester** with **Joblib** and showcasing results through innovative **Plotly Dash** visualizations..
- Captured asset price dynamics, market volatility, and non-linear relationships in order to refine trading signal generation through **Geometric Brownian Motion modeling**, **Kalman Filtering**, and **Fourier-Based Spectral Estimation**.
- Devised a comprehensive evaluation framework incorporating risk-adjusted metrics (annualized return, max drawdown, Sharpe, and Sortino ratios) to measure the model's performance.

SKILLS

Technical: C++, Python (TensorFlow), OCaml, Java
Miscellaneous: Blackjack, Financial Modeling, Data Visualization