

GABE HEIM

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EXPERIENCE

Senior Software Engineer - Fixed Income, Dimensional Fund Advisors

Feb 2021 - Present

- Built a Python fixed income basket optimizer supporting 10 ETFs / ~ \$30B public AUM, maximizing expected return on create/redeem baskets up to ~ \$100M under portfolio, issuer, and PM-defined constraints.
- Designed a constrained bond allocation optimizer in Python for rollout across 50+ funds, automating a previously manual process in ~ 0.2 seconds while balancing pro-rata targets, trade request closure, and min-size constraints.
- Built an expected return engine that constructs smoothed yield and credit curves, prices 20K+ bonds via cash-flow PV, and evaluates reinvestment- and projected-curve-aware ER across holding horizons in under 4 minutes.
- Built the app used daily by PMs to analyze optimized ETF baskets, visualize inventory/constraints, override optimization parameters, and publish baskets to Bloomberg and the OMS, replacing legacy Excel workflows.
- Architected the firm's first Redis cluster for live pub/sub updates in the ETF basket optimization app.

Machine Learning Engineer, Reynolds Journalism Institute

Oct 2019 - Feb 2021

- Built a supervised image-quality scoring model using transfer learning, replacing the final layer of an ImageNet-pretrained ResNet-50 and retraining on AVA human-rated labels to predict continuous aesthetic quality scores.

Data Science Researcher, CHAOSS (Augur) - Linux Foundation

Apr 2018 - Feb 2021

- Collaborated with MU's graduate Data Science program director to design time-series health metrics and build a Python application to calculate/visualize them and detect anomalies across 100+ open-source projects.

EDUCATION

Master of Artificial Intelligence, University of Texas - Austin

Jan 2024 - Expected Dec 2027

4.0 GPA. Relevant Coursework: Machine Learning, Reinforcement Learning, Deep Learning

Bachelor of Computer Science, Minor in Mathematics, University of Missouri

Aug 2017 - Dec 2020

Magna Cum Laude, Honors Scholar, 3.796 Undergraduate GPA, 3.7 Graduate GPA

Relevant Coursework: Supervised Learning (grad), Mathematics of Financial Derivatives

QUANT PROJECTS

Machine Learning Statistical Arbitrage - Wall Street Quants

- Trained a multi-factor decision tree strategy on engineered price/volume, implied-volatility, trade-flow, and on-chain crypto features trading 21 crypto pairs with a 1-hour holding period producing 2.44 SR (net).
- Used convex optimization to convert target weights into trades, balancing risk-adjusted deviation against costs.
- Built an end-to-end research pipeline with Optuna hyperparameter search, weighted metric evaluation, MLflow experiment tracking, and walk-forward Backtrader validation of execution-optimized strategies.

Deep Learning for Numerai Quant Tournament

- Deployed 4 live models, reaching a top-7% alpha / meta-model contribution rank, averaging 69th-percentile target correlation across resolved rounds, and achieving positive payouts on 100% of resolved rounds.
- Built PyTorch cross-sectional alpha models using MLPs and attention to combine stock-level features with era-wide market context, with class-weighted losses for imbalanced stock-return targets.

QUANT SKILLS

Programming Languages / DevOps
Data Science Libraries

Python, PSQL/MSSQL, Linux, Apache Airflow, Ansible, GCP, Redis
Pandas, NumPy, Scikit-Learn, PyTorch, Optuna, MLflow, CVXPY