VAIBHAV PAI

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EDUCATION

GEORGIA INSTITUTE OF TECHNOLOGY, School of Mathematics **Atlanta, Georgia**
Master of Science in Quantitative and Computational Finance *August 2024 - December 2025*

- Key Coursework: Stochastic Processes in Finance, AI in Finance, Design and Implementation of Systems to Support Computational Finance, Finance and Investments

MANIPAL INSTITUTE OF TECHNOLOGY **Manipal, India**
Bachelor of Technology in Mechanical Engineering *October 2020*

- GPA: 9.08/10 [Equivalent GPA: 3.86/4] (Top 7% of 2,000 students)
- Minor: Data Science
- Key Coursework: Linear Algebra, Differential Equations, Calculus, Fourier Analysis, Bayesian Statistics

EXPERIENCE

Alchemy Capital Management **Mumbai, India**
Quantitative Research Analyst *January 2023 – July 2024*
Alchemy Capital is a Portfolio Management Services provider, and an Alternative Investment Fund. The firm currently manages and advises AUM worth over USD 1.4Bn (as of July 31, 2024).

- Built and back-tested a small-cap strategy using Python, leveraging fundamental parameters and technical indicators (DMI, MACD) with rebalancing rules. Achieved 37% CAGR, 90% churn, and 35% maximum drawdown.
- Led the onboarding and implementation of a new fundamental data provider, creating applications for data download, warehousing, daily updates, and sanity checks. Implemented a text-based equation parser for field calculations.
- Created a return attribution application for our flagship strategy using the Brinson–Hood–Beebower model, achieving sector-wise effects within 2% of actual returns.
- Ported legacy strategy code from Python 2 to 3, optimizing rolling period calculations with NumPy, Numba JIT, and parallel processing, resulting in a 5x speed increase.

MSCI **Mumbai, India**
Data Science Research Intern *November 2021 – April 2022*

- Developed an ESG rebalancing strategy to ensure portfolio carbon emissions remained below user-defined targets.
- Optimized functions for RSI, ROC, and KAMA, halving computation time for 10-year date ranges. Identified and scripted detection of price data anomalies in the production database.

PROJECTS

Comparative study of machine learning models to predict the movement of SPY

- Created features including log returns, internal bar strength, momentum, VWAP, rolling bands, volatility, RSI, and rolling autocorrelation.
- Engineered features using StandardScaler and Fractional Differentiation, with selection via Shapley values.
- Tested models including Random Forest and ensemble models with VotingClassifier and StackingClassifier, with each using LGBMClassifier, RandomForest, and Logistic Regression as estimators.

Implementation of Modern Portfolio Theory to find the optimal portfolio

- Optimized portfolio weights using scipy.optimize, minimizing negative Sharpe via Sequential Least Squares.
- Employed basin-hopping to avoid local minima and enhance results.
- Backtested optimized weights, achieving a Sharpe ratio of 2.43.

SKILLS

Programming: Python, SQL, GIT, C++
Technical Tools: Bloomberg Terminal
Certifications: Financial Engineering and Risk Management Specialization by Columbia University, Executive Program in Algorithmic Trading by QuantInsti Quantitative Learning
Languages: English, Hindi, Konkani
Interests: Sci-Fi, Nitro RC Racing, Formula 1