Lavanya Yogendra Lahane

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Summary

Aspiring Quantitative Researcher with expertise in statistical modelling, time series forecasting, machine and reinforcement learning. Proficient in Python, with hands-on experience in derivatives, portfolio optimization, and algo-trading strategies.

Education

- **Indian Institute Of Technology, Ropar** *2023-27*
  Bachelor of Technology in Engineering Physics

Relevant Coursework

- Probability
- Statistics
- Data Structures
- Behavioural Finance
- Stochastic Processes
- Reinforcement Learning
- Linear Algebra
- Group Theory

Experience

- **Quantitative Research Intern (Derivatives)** *June 2025 - August 2025*
  Trado - Windigotrade Pvt. Ltd Research Park, IIT Gandhinagar
  - Conducted end-to-end research on derivatives markets, applying ML and statistical tools to develop trading strategies.
  - Validated strategy performance through backtesting and documented research methodologies for broader team utility.

- **Summer Project Intern** *May 2024 - July 2024*
  Dr.Puneet Pasricha, Assistant Professor, Dept. of Mathematics, IIT Ropar IIT Ropar, Rupnagar
  - Built ML models for stock price prediction and portfolio optimization; evaluated performance via backtesting.

Projects

- **Hybrid Option Pricing Using Black-Scholes-Merton and Heston with HMM Regime Detection** *June. 2025*
  Python, yfinance, QuantLib, hmmlearn, pandas, numpy, scikit-learn, matplotlib, seaborn, plotly **Github**
  - Designed a hybrid option pricing framework combining Black-Scholes-Merton and Heston models, with dynamic switching based on market regimes detected via unsupervised Hidden Markov Models (HMM).
  - Empirically validated model-switching logic, achieving a substantial RMSE reduction in volatile regimes (BSM: 44.97 → Heston: 39.21), while maintaining optimal performance in stable regimes (RMSE: 35.32).
- **Reinforcement Learning for Portfolio Optimisation** *April. 2025*
  Python, Stable-Baselines3, Gym, NumPy, pandas, PyPortfolioOpt, yFinance, Matplotlib **Github**
  - Engineered a custom gym.Env for portfolio optimization and trained a Proximal Policy Optimization (PPO) agent via Stable-Baselines3, utilizing a Sortino ratio-based reward function to drive risk-adjusted outperformance.
  - Achieved 19381% cumulative return over traditional benchmarks using a rolling-window backtesting framework (126-day training, 21-day testing) across historical market regimes
- **Black-Litterman Portfolio Optimisation with ML-Based View** *May. 2025*
  Python, scikit-learn (RandomForestRegressor, StandardScaler), scipy.optimize, yfinance, pandas, numpy, matplotlib **Github**
  - Formulated an advanced Black-Litterman model with Random Forest regression, optimizing 30 NIFTY 50 stocks using a 5% risk-free rate and 0.1% transaction costs, achieving a 0.02 RMSE for accurate predictive views
  - Optimized portfolio weights via quadratic utility maximization, ensuring stable, diversified allocations with enhanced performance and market equilibrium balance
- **Miscellaneous Projects**
  - **Currency Exchange Rate Forecasting Using SARIMA Model**, validated using Ljung-Box and heteroskedasticity diagnostics.
  - **Stock Price Prediction Using Machine Learning**, Developed Regression Model and Backtested on historical data.
  - **Algo-Trading Strategies for BTC and ETH Using Statistical Models,** Achieved up to 3400% returns with sharpe > 1.6

Skills

- **Programming Languages:** Python, C++, R, MATLAB, Pine Script
- **Financial Engineering:** Derivative Pricing, Volatility Modeling, Algorithmic Trading, Portfolio & Risk Management
- **Analytical Skills:** Time Series Forecasting, Stochastic Modeling, Machine & Reinforcement Learning, Convex Optimization, Statistical Inference, Numerical Techniques, and Financial Econometrics.
- **Soft Skills:** Analytical Thinking, Problem Solving, Effective Communication, Team Collaboration, Problem Solving

Achievements

- **Stage 2 Qualifier, WorldQuant BRAIN International Quant Championship,** Top 20% worldwide performers *2025*
- **Rank 13, Inter-IIT Tech Meet 13.0, IIT Bombay,** across 23 IITs in Untrade - Zelta Labs Algotrading challenge *2024*
- **National Talent Search Examination (NTSE),** Secured merit-based scholarship (Top 0.17% of 1.2M+ applicants) *2022*

Positions of Responsibility

- **Secretary,** FinCom - Finance, Consulting & Analytics Club, IIT Ropar *May 2025 - Present*
- **Assitant Internship Coordinator,** Career Development and Placement Cell - IIT Ropar *May 2025 - Present*