

Utkarsh Raj Sutihar

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EDUCATION

Singapore University of Technology and Design

09/2023 to 05/2027

Bachelor of Engineering in Engineering Systems and Design (Specialization in Financial Services and Business Analytics & Operations Research) with a minor in Design, Technology and Society.

- GPA 4.33/5.0, SUTD Design & Engineering Scholarship – merit based full scholarship

TECHNICAL SKILLS

- Languages:** Python, R, Julia, SQLite
- Data Science Libraries:** NumPy, Pandas, Scikit-learn, statsmodels, TensorFlow
- Mathematics:** Probability Theory, Convex Optimization, Bayesian Inference, Statistical Modeling

ACADEMIC PROJECTS

Stock Portfolio Optimization using Holt-Winters Forecasting and Linear Programming

01/2025 to 04/2025

- Developed a predictive stock investment model with LSTM-based 2 layered recurrent neural network, leveraging time series forecasting techniques to forecast stock prices two years into the future.
- Formulated a mathematical optimization model incorporating risk (volatility), stock diversification ($\leq 12.5\%$ per company), and ESG score to maximize expected return.
- Designed a portfolio allocation strategy ensuring loan repayment with $\geq 10\%$ profit on initial \$1M investment, using Python (statsmodels, SciPy) for forecasting and Julia (JuMP, Mosek) for optimization.

Probabilistic Modeling of Investment Risk using Stochastic Processes

01/2025 to 04/2025

- Modeled investment outcomes as a discrete-time random walk, employing the Gambler's Ruin framework to derive analytical win/loss probabilities using difference equations.
- Applied Bernoulli and binomial transformations and utilized normal approximation to simulate long-term investment behavior within the stochastic process, under varying probability scenarios.
- Demonstrated the impact of investor "skill" ($p > 0.5$) on survival probability, rigorously showing that with $p < 0.5$, the probability of eventual loss approaches 100% as the number of investment periods (N) increases indefinitely.

Bayesian Regression for Probabilistic Prediction

03/2025 to 04/2025

- Built a Bayesian multiple linear regression model to analyze 30+ data points, applying Gaussian priors and computing posterior distributions for predictive modeling.
- Applied Bayesian inference to update predictions with real data, achieving high-confidence posterior estimates with a variance reduction of $\sigma^2 = 8$.
- Visualized 10+ posterior predictive samples using Python (NumPy, pandas, Matplotlib), improving uncertainty quantification in probabilistic forecasting.

WORK EXPERIENCE

Mathvision Enrichment Centre

11/2023 to Present

Part-Time Tutor, IB-SL Math

- Teach advanced mathematics topics, including calculus, algebra, probability and statistics, to IB-SL students, focusing on conceptual understanding and practical applications.
- Provide tailored guidance in 200+ sessions and counting, to improve problem-solving skills and academic performance in a rigorous curriculum

CO-CURRICULAR ACTIVITIES

Institute of Physics, Singapore – Student Chapter

10/2023 to Present

Singapore Territorial Committee for International Association of Physics Students

President and Co-Founder

- Founded and lead Singapore's national student chapter for physics, representing students across universities and polytechnics.
- Spearheaded high-impact initiatives - PLANCKS Preliminary Physics Festival 2025 (with highest turnout 55 participants and observers), Astronomy Symposium, and public outreach in collaboration with Science Centre Singapore.
- Collaborate on national and international projects with Institute of Physics Singapore, IAPS, Territorial Committee India, Local Committee Kathmandu and Ediphy, managing 200+ students in online session.