Rany Stephan

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Education

Stanford University Expected June 2026
M.S. in Mathematical and Computational Engineering *Stanford, CA*
- Coursework: Convex Optimization, Numerical Linear Algebra, Stochastic Differential Equations, Beyond Worst-Case Analysis, Mathematical Finance, Advanced Probability and Statistics, Parallel Computing, Deep Reinforcement Learning
- Presented my **HExIF** project at the **ICME Research Symposium**

American University of Beirut June 2024
B.B.A. Finance & B.Sc. Computer Science (Dual Degree), Minor in Applied Mathematics *Beirut, Lebanon*
- **Honors:** Dean's Honors List | **Major GPA: 4.00/4.00**
- **Thesis:** Leveraged NLP and Generative Models for Financial Analysis in MENA, addressing Data Scarcity.
- **Extracurricular:** Model United Nations in NYC, 2x National Gold Medalist in Brazilian Jiu-Jitsu.

Research Experience

Graduate Researcher, Convex Optimization June 2025 – Present
Advisor: Prof. Stephen Boyd *Stanford, CA*
- Develop portfolio transition strategies using **Model Predictive Control (MPC)** and **convex optimization** to minimize implementation shortfall while tracking a benchmark. **Manuscript in progress**.
- Engineer a high-fidelity backtesting framework in **Python** using **CVXPY**, **Pandas**, and **NumPy** to simulate multi-period portfolio transitions under transaction costs and market impact models.
- Implement efficient numerical methods, including sparse Cholesky factorization and risk factor models to accelerate optimization solver performance within the simulation environment.

Graduate Researcher, Fixed Income Modeling Dec 2024 – Present
Advisor: Prof. Darrell Duffie *Stanford, CA*
- Model off-the-run bond inventories and dealer behavior by formulating and solving **Hamilton-Jacobi-Bellman (HJB) equations** to derive analytically-grounded optimal control. **Manuscript in progress**.
- Develop dynamic market equilibrium experiments in **Python** and **Julia**, providing actionable insights for bond market structure and liquidity analysis.

Graduate Researcher, AI and ML in Computational Pathology Jan 2025 – Present
Advisor: Dr. Andrew Gentles *Stanford, CA*
- Lead development of HExIF, an end-to-end **PyTorch** pipeline that generates virtual multiplex immunofluorescence images from H&E stains, reducing analysis time and cost. **Manuscript in preparation**.
- Architect and train conditional GANs (**pix2pix**) and multi-task **U-Net** models to synthesize fluorescence intensity maps and cell segmentation masks from histopathology inputs.

Research Assistant, Machine Learning, NLP & Time-Series Analysis Sept 2022 – Aug 2024
American University of Beirut *Beirut, Lebanon*
- **Co-author** in "Opportunities for circular economy in waste reuse: Insights from social media data mining", journal of Resources, Conservation & Recycling. Applying transfer learning on 10,000+ scraped articles.
- Engineered regression models to quantify equity price delay and conducted a 20-year sentiment-based time-series analysis of 1,200+ financial reports, identifying signals of market inefficiency.
- Fine-tuned a MobileNetV2 image classifier in **TensorFlow**, improving accuracy by **15%** on specialized datasets for a co-authored publication on waste reuse analysis.

Projects & Competitions

Teaching Assistant, Stanford MLab (ACM Machine Learning Lab) *Oct 2025 – Present*
- Advise and participate with student teams on SemEval-2026 (e.g., Task 8: multi-turn RAG evaluation; Task 3: DimABSA; Task 2: temporal emotion modeling), emphasizing rigorous evaluation and clean computational semantics pipelines.

Winner, Murex Best Development Project Award ($3,000) *June 2023*
- **NeuralFin:** full-stack research platform (Django, Python) for **predictive signals** with data ingestion, feature engineering, cross-validation, and backtest reporting; designed for fast **iterate→evaluate→ship** loops.

University Representative, Refinitiv Portfolio Management Competition *Oct 2023*
- Built allocation engine using **Markowitz + CVaR**, with periodic rebalancing and risk constraints; achieved top-quartile results managing a $1M mock portfolio.

Professional Experience

Venture Capital Intern June – Aug 2022
Insure and Match Ventures *Beirut, Lebanon*
- Automated KPI reporting (PowerBI) and built a lead-scoring model; emphasized data quality, latency, and reproducibility.
- Increased team's deal sourcing efficiency by **30%** by creating a relational database and statistical models to score and rank over 1,000 inbound leads.

Technical Skills

Programming: **C++**, **Python**, Julia, C, SQL, Java, JavaScript
Numerical/ML: CVXPY, NumPy, Pandas, PyTorch, scikit-learn, TensorFlow, Matplotlib
Systems/Tools: Git, Docker, CUDA, Linux, Next.js/React, Django, PowerBI, LaTeX
Languages: English, French, Arabic, Italian (working)