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Education

Ecole Polytechnique, Palaiseau, France 2023-Present
- Third-year student specializing in Statistics and Applied Mathematics.

Relevant courses: Statistics, Machine Learning, Advanced Probabilities, Optimization, Monte Carlo

Esprit Prépa, Aryanah, Tunisia 2021-2023
- Preparatory classes for top French engineering schools. Mathematics and Physics track.

Professional Experience

Internship at ALFIC : CVA and CVA sensitivities Computation Optimization 2025
- Optimized CVA calculations by implementing Monte Carlo and Deep Learning for derivative portfolios.
- Reduced computation time by 70% while maintaining 95% precision.
- Delivered recommendations, including a comparative analysis of CVA sensitivities computation.
- Developed Python/PyTorch prototypes and tested them on modeled client portfolios.

Volunteer at Association le Valdocco, France 2023-2024
- Designed and led weekly tutoring sessions for 30+ underserved students.
- Coordinated 3 community events to promote educational engagement.

Projects

Rare Events Estimation in Order Books 2025
- Developed Queue-Reactive models analyzing order book imbalance dynamics.
- Implemented AMS and MCMC to estimate rare event probabilities (10^{-5} to 10^{-8}) with 90%+ efficiency.
- Developed Quantile estimation of second order distributions via Importance Sampling ($> 99\%$ acc).

Swing Contract Pricing : A Stochastic Optimization Approach 2025
- Achieved $> 95\%$ pricing accuracy for swing contracts using stochastic control and bang-bang strategies.
- Built a scalable PyTorch framework with parallelization for efficient contract valuation.

Modeling of Synaptic Plasticity in Neural Networks 2024-2025
- Studied memory maintenance with Hodgkin–Huxley and Integrate-and-Fire models.
- Optimized model parameters using MSE, and gradient boosting.
- Applied statistical tests (Jarque–Bera, Ljung–Box, Anderson) for model diagnostics and validation.

Unblock me : Solving RushHour Project 2025
- Achieved 100% solution accuracy through systematic state-space exploration.
- Implemented and validated heuristic optimizations across 35+ complex puzzle test cases.
- Achieved 30% faster execution versus baseline through optimized data structure and heuristic guidance.

Additional Qualifications

Achievements: 3rd Place, National Mathematical Intelligence Competition (Tunisia)
- Ranked among top 2% of 200+ national participants.
- Demonstrated quantitative reasoning through complex pattern recognition and advanced logical puzzles.

Certificates : Finance and Quantitative Modeling - University of Pennsylvania (Online) 2024
- Developed expertise in market finance (Black-Scholes model, Greeks, Hedging, Exotic Options)

Sports: - Member of the École Polytechnique Football Team (Competitive Division)

Languages and Other Skills

Languages: Arabic/French (Bilingual), English (Fluent), German (Beginner, A2).
Programming Languages: Python, Java.