Lucas RODRIGUEZ

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Business-oriented engineer specialized in **Quantitative/Computational finance**, **CS** & **Mathematics**. Currently looking for a **full-time** opportunity in these domains, starting in **October/November 2023**.

Relevant Projects & Activities

Vice-President & Head of IT Systems | DataScIIEnce - *Data science student club* Sep. 2021 – Sep. 2022

- Main developer & Maintainer of the web applications (MkDocs + PHP/JS/OAuth)
- Implemented features meeting business needs (showcase webapp for partnership, calendar, announcement center)
- Created catalog of open-source references for data science/engineering
- Lecturer for 80+ attendees: *Intro. to web scraping - Intro. to time-series analysis*
- Represented the association at specialized conference : *Forum Data Days 2021*

Numerical optimization of vessel flows | *Algorithmic analysis & Cartographic software development*

- Studied, implemented & tested several operations research greedy-algorithms dedicated to solve an adapted Shortest Path Problem, to optimize a vessel route, using data collected from proprietary APIs and "basic environmental & HR constraints" *(Dijkstra & custom A* algorithms)*

AIS data feed handler | *Websocket, Python, Q/KDB+*

- Use of AIS data streaming services to recreate real-time data handler using WebSocket API

ML Crypto trading strategies | *BTC & ETH with Transfer Learning* (Python)

- State-of-the-art on existing & cuttind-edge crypto ML/DL trading strategies applied on BTC-USD
- Use of NN (CNN/LSTM) models to predict future market price movements using several classifiers (implementation + benchmark)
- Use of transfer learning techniques to apply BTC *forecast knowledge* to ETH
- Forthcoming extension from historical to real-time data (using Binance WS API) & Use of L2/L3 LOB data for trade dynamics modelling

High Frequency & Limit Order Book simulation/data analysis | *Research project over L2 HF datasets* (Python)

- Analysis of main characteristics of L2 HF LOB (trades + quotes) data & stylized facts
- Simulation of point/self-exciting processes ((Non-)Homogenerous Poisson, Hawkes, Cox)
- Analysis of several LOB models & market-microstructure noise estimation (Epps effect, ACD, signature plots))
- Implementation of a LOB generator (market/limit orders/cancellations) (L2 quotes dataset)

Real-time financial data feed-collector | *Options, ETF, Futures, Crypto, Commodities* (Q/KDB+ & Python)

- Study of WebSockets API used by Yahoo Finance & Retro-engineering of ProtoBuf (RPC) schemas used by the API
- Implementing a Python tool with tickers feed-subscribing and data storage for further processing
- Attempt to implement the same solution with columnar in-memory time-series DB Q/KDB+ *(forthcoming solution)*

Financial market modeling | *Study of various European/American options pricing tools* (C++/Python/VBA)

- Use of a discrete-time solution using the Cox-Ross-Rubinstein model (binomial tree)
- Enhancement of the first solution using Black-Scholes formula with Monte-Carlo simulation and Closed Form
- Stochastic study of the convergence from the discrete to the continuous system + main Greeks computing
- Numerical determination using Finite Difference methods (Explicit, Implicit and Crank-Nicholson stencils) and the BlackScholes PDE's formula & implementation of a Smart DirectMedia Layer (SDL2) wrapper to handle plotting

Intraday volatility estimation for HFT data | *Research project - Econometrics* (Python/R & Q/KDB+)

- Use of OHLCV HF data to compute an estimation of daily volatility in high-frequency setting
- Estimation of the realized volatility of the iShares S&P IVE index for various observation frequencies (1 sec/15 min)
- Comparison with long range estimation of the volatility (based on monthly computations)
- Estimation of the microstructure noise size using autocorrelation analysis and closed-formula (time-series methods)

Big data analysis on GDELT global news/event database | *NLP applications & Google BigQuery queries*

- Use of Spacy & NLTK libraries for data analysis
- Database centralizing people/events/places over NoSQL architecture & Queries using Google BigQuery

SABR model calibration for swaptions | *Interest rates modeling* (Python)

- Optimal calibration of model parameters & Computation of implied volatiltiy smiles with historical data

Lifted Heston model (SVM) | *fBm, Estimation of Hurst exp, Calibration & Implied volatility estimation* (Python)

Swing option pricing using Longstaff-Schwartz algorithm

- Theoretical study of swing option pricing: Finite Differences, simulation & DP using trees
- Implementation of a Monte-Carlo pricer with Longstaff-Schwartz algorithm

Oil option pricing using CGMY & Variance-Gamma models | *Thesis*

- In-depth study of oil option pricing using CGMY & VG models (using Monte-Carlo simulations)
- Comparative analysis with other Lévy processes to best model jump phenomena (compared to NIG model)

Founder & Main writer of HFT Book | *Website centralizing HFT techniques & main notions* $\longrightarrow$ **hftbook.github.io**

Contributor | *Open-source community* : 1,900+ commits on GitHub

Conferences attending *related to HPC, low-latency systems & real-time processing*

- P99 Conf 2022, Big Data & AI Paris 2022, Databricks Data+AI Summit 2022, Data Days 2021

Links

- ◇ Articles **lcsrodriguez.github.io/articles**
- ◇ Projects **lcsrodriguez.github.io/projects**