Matias Pablo Borghi Orué

SUMMARY

- 4+ years of work experience in mathematical modeling, numerical simulation and programming.
- Vast experience solving scientific problems in a wide variety of domains, such as quantitative finance and reactor physics.
- Proficient in programming languages.

PROFESSIONAL EXPERIENCE

CRISIL GR&A – S&P Global (Buenos Aires, Argentina)

Senior Quantitative Analyst   Apr 2019 – Present

Responsible for the development of a high-performance library designed to achieve fast and advanced quantitative finance calculations, including:

- Numerical Solution of Stochastic Differential Equations using time discrete approximations with different strong and weak order of convergence, non-autonomous coefficients and with and without diagonal noise. These methodologies allow solving any System of SDEs found in the financial domain.
- One and Multi-Factor Short Rate Models of Affine and Quadratic type, including efficient on the fly computation of Zero Coupon Bonds by solving the corresponding Riccati System of Ordinary Differential Equations. These Short Rate Model types take into account the simple and well known cases: Vasicek, Cox-Ingersoll-Ross, Hull-White, Gaussian Short Rate (GSR) and Quadratic Gaussian. However, many more complicated models can be specified and solved as well.
- Libor Market Model (LMM) framework including all basic fixed income securities and interpolation using, for example, the Schlögl methodology.
- Heath–Jarrow–Morton (HJM) general framework including all basic fixed income securities.
- Local Volatility and Stochastic Volatility models.
- Monte Carlo universal pricing engine for non-callable, callable and cancellable equity and hybrids products with arbitrary basis layers (from polynomials to neural networks). Greeks computation via automatic differentiation.
- Day counters for many different conventions.
- Yield curve construction.
- Domain Specific Language (DSL) design and implementation for syntactically-sweetened inputs.
- Automatic documentation for both code and theory.

Technical leader in charge of the development, maintenance, testing, documentation and deployment of web applications using high standards for microservice deliveries, including:

- Frontend development focused on components reusability for fast high quality and quick UI deployments.
- Backend development using mainly GraphQL endpoints for our high-performance libraries.
- Documenting solution architecture ensuring code maintainability and easier accessibility to new developers.
- Fully automated Migrated environments to the cloud reducing server and infrastructure administration.
- Performing unit tests eliminating system's failures to the minimum.

Junior Quantitative Analyst

Consultant for Tier-1 US investment bank – Equity and Hybrids Group: Aug 2017 – Sep 2018

- o Performed different testing strategies for several Product Models, such as Structured Note and Cross Currency Swap, including:
  - Analyzing different underlying dynamics for currencies, equity, FX and interest rate processes using several types of Volatility Models (Local Volatility and Stochastic Volatility) and Term Structure Models (deterministic rates, Short Rate Models of Affine and Quadratic class and Libor Market Model) for benchmarking purposes.
  - Pricing by means of Analytic, Trees, Finite Difference (PDE) and Monte Carlo methods.
  - Benchmarking against different Product Models by formulation of comprehensive comparisons.
  - Parametric testing modifying relevant dynamics and/or payoff related parameters.
  - Life-cycle testing for schedule sensitive parameters.
  - Limiting cases validation collapsing each product model to simple Vanilla-Like Derivatives, among others.
  - Calibration impact studies for each Model Dynamics using different methodologies.
  - Multi-currency curve handling and construction rationale.
  - Risk-Not-In-Model assessment against complex dynamics, e.g. Stochastic Volatility dynamics w/out jumps.
  - Convergence, computational performance and Hedging studies.
  - Stress Testing scenarios for standardized & required regulatory scenarios.
  - Technical documentation, where all the relevant information and results were detailed for the correct and comprehensive use of each Product Model.

National University of La Plata (Buenos Aires, Argentina)

Teaching Assistant   Sep 2015 – Sep 2017

Responsible for teaching fundamental physical concepts such as Classical Mechanics and Electromagnetism to undergraduate students.

EDUCATIONAL QUALIFICATIONS

MSc. in Physics

- National University of La Plata, Buenos Aires   2010 – 2017

Computer Technician

- Beato Juan XXIII High School, Buenos Aires   2007 – 2009

PROGRAMMING AND SOFTWARE

- o **Backend Technologies**: C/C++/C#, Julia, Python, FORTRAN, R, Node.js, etc.
- o **Frontend Technologies:** HTML, CSS, JavaScript, React, etc.
- o **DataBases:** MySQL, SQLite, MongoDB, PostgreSQL.
- o **APIs:** RestAPIs and GraphQL.
- o **DevOps**: Git (CI/CD), Docker, etc.
- o **Cloud:** AWS, Heroku, etc.
- o **Messaging:** RabbitMQ, ZMQ, etc.
- o **Others:** Scripting, LaTeX, GNU Octave, Matlab, Mathematica, etc.
- o Development and collaborations in many open source projects (my GitHub account).