

Thomas Breloff

breloff.com

I am a full-stack **software engineer**, inquisitive **AI researcher**, and former **algorithmic trader**. I specialize in complex system design, custom online statistics, machine learning, and real-time optimization of practical business problems. Never satisfied with the status quo, I constantly seek to push boundaries in algorithms and technologies, looking for an edge wherever I can find it. I am at home deriving novel mathematics, inventing new algorithmic techniques, and designing and building both low level software and high level frameworks.

With more than a decade in finance and over two decades in software engineering, the extensive breadth and depth of my knowledge and skillset allows me to approach problems wholistically, accounting for business needs and technical implementations as part of a unified optimization. I draw from my varied expertise to identify the best question, in addition to the best answer; there is no point implementing and optimizing the wrong problem.

EXPERIENCE

Cointegrated Technologies - Founder

Dec 2014 - PRESENT

- Open Source Development (github.com/tbreloff):
 - ◆ Creator of **Plots**: the new standard for complex visualizations;
 - ◆ Core Contributor to **JuliaML**: tools and components for flexible approaches to Machine Learning research and Optimization;
 - ◆ Creator of **Reinforce**: generic and modular framework for Reinforcement Learning;
 - ◆ Creator of **OnlineAI**: Spiking Neural Networks and Reservoir Computing.
- Machine Learning and Artificial Intelligence R&D (www.breloff.com/blog):
 - ◆ Biologically plausible neural approaches: spiking networks, dendritic functions, etc;
 - ◆ Backprop-free neural network training: Feedback Alignment and variants;
 - ◆ Derivations of batch methods and algorithms for real-time training.
- Consulting:
 - ◆ Data science, visualization, system design.

svls Research - Senior Researcher

Aug 2013 - Nov 2014

- Designed and built a simulation environment (Java/Matlab) for optimal order execution;
- Investigated pricing and alpha models for automated market making strategies.

Yottabit - Founder

May 2011 - July 2013

- Leading a two-man hedge fund: designed, built, and operated a low-latency, high-throughput algorithmic trading business in structural and statistical arbitrage.
- Invented and developed many algorithms and systems: custom portfolio optimization, GPU-optimized genetic algorithms, complex messaging frameworks, front and back office trade platforms, real time arbitrage pricing, etc;

Credit Suisse - High Frequency Trading

June 2008 - March 2011

- Founded and led trading desks in New York and London;
- Designed and built a low-latency, high-throughput ETF arbitrage and market-making trading system, trading as much as 200 million shares per day; (C++/Python/Qt)
- Invented and developed algorithms and models to generate significant proprietary trading profits: very few losses (~95% of days were profitable) and a very high Sharpe Ratio (> 10);
- Personally managed many high-turnover portfolios covering thousands of products and billions of dollars in exposure.

Education:

- **NYU Courant Institute**
MS in Mathematics
Sep 2004 - Dec 2005
- **University of Rochester**
BA in Mathematics
BS in Economics
Sep 1999 - May 2003

Other experience:

- **BNP Paribas**
Algorithmic Trader
Sep 2006 - May 2008

Research & Development

- Deep Learning
- Reinforcement Learning
- Online/Incremental Learning Algorithms
- Optimization Methods
- Spiking Neural Networks
- Stochastic Computation Graphs
- Cognitive Systems
- Hierarchical Models

Technologies

- Julia
- Python, C/C++
- Java, Matlab
- Git, Qt, SQL
- ZeroMQ, IPC

Knowledge/Skills

- Econometrics
- Neural Networks
- Reservoir Computing
- Genetic Algorithms
- Portfolio Optimization
- ETFs, Equities & Futures
- Market Making
- Statistical Arbitrage

Open Source Contributions

- Plots
- StatPlots
- PlotRecipes
- Transformations
- StochasticOptimization
- OnlineAI
- OnlineStats
- Reinforce
- OpenAIGym

Presentations

- **Visualization and Learning in Julia**
NYU Stern
Oct 2015
- **Plots with Plots**
MIT - JuliaCon
June 2016