Alejandro Carderera

P: +1 404-213-3243 | alejandro-carderera.github.io | alejandro.carderera@gmail.com

EXPERIENCE

Quantfury Remote, USA
Quantitative Researcher in Machine Learning (Mid – Low frequency) Jan 2022 – Present

- Devised two novel trading strategies, one based on unsupervised learning, and the other based on the flow of capital of various financial instruments. The first strategy made it into production and produced a Sharpe ratio of 1.1.
- Improved two of the group's existing trading strategies by refining the underlying hypothesis that underpinned why and how the strategies worked. These changes were rolled out into production and produced an average improvement in P&L of 40% while increasing maximum drawdowns by 7% on average.
- Engineered a modular Python backtesting engine for the Quantitative Research team, capable of running efficiently in an online/streaming and offline/historical fashion.
- Architected and deployed a high-performance pipeline using Azure Functions to ingest raw data and output features used in live trading, with minimal latency (~500 ms.). The pipeline handled different instrument types in parallel - such as equities, futures, commodities, and cryptocurrencies - as well as various feature configurations.

J.P. Morgan Chase NYC, USA
Quantitative Researcher (received full-time work offer after second internship) Summer 2020 and 2021

- Developed dynamic strategies to invest excess capital from the firm's operations to maximize shareholder value.
- Built stochastic pricing model for J.P. Morgan's deposit portfolio, outperforming benchmark with an 80x speed increase and 20% accuracy improvement.

HP Inc. Barcelona, Spain
R&D Engineer (Systems Integration) Aug 2016 – Jul 2018

- Solved and analyzed complex development problems at the intersection of mechanical, electrical engineering and computer science.
- Development of computer vision tools to automate product quality grading.
- Conducted experiments to enhance engineering processes, and designed machine learning tools for data analysis.

EDUCATION

Georgia Institute of Technology Atlanta, USA
Ph.D. in Machine Learning (GPA: 4.0/4.0; Advisor: Sebastian Pokutta) Aug. 2018 – Dec 2021
Thesis: Faster Conditional Gradient Algorithms for Machine Learning

Cornell University Ithaca, USA
M.S. in Applied and Engineering Physics (GPA: 4.01/4.3; Henry S. Sack Memorial Award) Aug 2014 - Jul 2016
Thesis: Drop Electrohydrodynamics

Universidad Politécnica de Madrid Madrid, Spain
B.S. in Industrial Engineering (GPA: 7.7/10) Aug 2010 - Jul 2014

SKILLS

Optimization
Linear optimization, Nonlinear optimization, Convex analysis

Machine Learning
Machine Learning Theory, Probabilistic Graphical Models, Theoretical Statistics, Mathematical Foundations of Machine Learning, Deep Learning, Computational Data Analysis

Software Engineering
Python (8 years, including Numpy, SciPy, Pandas, CVXOPT, scikit-learn), Git (4 years), Microsoft Azure Functions (2 years), SQL (2 years)

PUBLICATIONS

Carderera, A., Pokutta, A, Schütte, C, and Weiser, M. (2024). *CINDy: Conditional gradient-based Identification of Non-linear Dynamics and Noise-robust recovery*. **To appear in Journal of Computational and Applied Mathematics**

Besançon, M., Carderera, A., and Pokutta, S. (2022). *FrankWolfe.jl: a high-performance and flexible toolbox for Frank-Wolfe algorithms and Conditional Gradients*. **INFORMS Journal on Computing**

Carderera, A., Besançon, M., and Pokutta, S. (2021). *Simple steps are all you need: Frank-Wolfe and generalized self-concordant functions*. **Proceedings of NeurIPS**

Carderera, A., Diakonikolas, J., Lin, C. Y., and Pokutta, S. (2021). *Parameter-free Locally Accelerated Conditional Gradients*. **Proceedings of ICML**

Diakonikolas, J., Carderera, A., and Pokutta, S. (2020). *Locally Accelerated Conditional Gradients*. **Proceedings of AISTATS**

PREPRINTS

Braun, G., Carderera, A., Combettes, C. W., Hassani, H., Karbasi, A., Mokthari, A., and Pokutta, S. (2022). *Conditional Gradient Methods*. **Monograph preprint**

Carderera, A., and Pokutta, S. (2020). Second-order Conditional Gradient Sliding. **Preprint**

PROFFESIONAL SERVICES

INFORMS Session Co-chair: Faster Conditional Gradient Methods Oct 2021

TEACHING

Georgia Institute of Technology Atlanta, USA

- Masters in Analytics tutor (Fall 2021): Conducted recitation sessions on the basic principles of linear algebra, probability, and statistics for incoming master's students.
- Basic Statistical Methods (Fall 2018): Introductory statistics course for sophomores.

Cornell University Ithaca, USA

- Continuum Mechanics (Spring 2016): Conducted recitation sessions on various continuum physics topics and graded homework.
- Computational Engineering Physics (Fall 2015): Graded coursework for introductory course on numerical methods for physics applications.

AWARDS

M.H. Stewart Fellowship: Merit-based scholarship (Georgia Institute of Technology, 2018)
Henry S. Sack Memorial Award: Top academic performer (Cornell University 2014-2016)
Research Collaboration Scholarship: Merit-based scholarship (Spanish Ministry of education, 2014)
Excellence Scholarship: Merit-based scholarship (Autonomous Community of Madrid, 2020)

REFERENCES

Sebastian Pokutta pokuta@zib.de
Professor, Technische Universität Berlin Berlin; Vice-President, Zuse Institute Berlin

Luke Brindle luke.brindle@quantfury.com
Head of Automated Trading Strategies, Quantfury