Anastasia BOROVYKH

My work centers around algorithms: developing efficient human-centred learning systems, ensuring privacy and robustness, using algorithms to model and better understand and optimise various phenomena in physics, healthcare, finance, and biology.

Languages: fluent in English, Dutch, Russian.
Programming: Python, R, C#, Javascript, React

Academic experience

Fall 2021-now **Assistant Professor Analytics, Warwick Business School, Warwick University**
- Part of the Operations Research department.

2019-2020 **Post-doctoral researcher, Department of Computing, Imperial College London**
- Funded through the JP Morgan AI Research Faculty Award.

Summer 2019 **Visiting researcher, Columbia University, New York**
- Machine learning methods in robo-advising using reinforcements learning.

Fall 2018/19 **Post-doctoral researcher, CWI Amsterdam**
- Better understanding deep neural networks using concepts from probability and scientific computing

Education

- **PhD Student Applied Mathematics (Marie-Curie Fellowship), University of Bologna**
  - Topic: 'Analytical and computational improvements on risk assessment' in a Marie-Curie Industrial Doctorates and Horizon2020 project
  - *PhD awarded cum laude (the highest distinction possible).*
- Master Quantitative Finance (Honours Track, 84ECTS) at **VU University Amsterdam**
- Bachelor Applied Mathematics at **Delft University of Technology**

Professional experience

2019-now **Co-Founder, Skialabs, Amsterdam, the Netherlands**
- *Overview:* Smart waste management software with a user-centric design, easy connectivity to other software and IoT devices. Uses data and optimisation to streamline all from pickups to processing.
- *Role*: Anything from client acquisition, marketing, product management, managing the team.
- *Some stats:* in 6 months over 500k pickups done through our platform while being fully bootstrapped.
- *Clients & partners:* City of Amsterdam, City of Delft, De Clique, EU-funded EIT Urban Mobility

Summer 2018 Internship **Centrica** in Denmark; on *gas storage valuation*
01/2017-12/2017 Analyst at **NIER Ingegneria** in Italy; on *financial risk management models*
04/2015-09/2015 Analyst at **Accenture** in the Netherlands; *data science and machine learning engineer for finance*

Grants

- **JP Morgan AI Research Grant 2021,** Co-applicant "Secure and Self-Optimizing Distributed Inference" 80k budget
- **EIT Digital 2020 project Dronesurance,** Pay-as-you-fly risk insurance for unmanned beyond-the-line-of-sight drones. Partners include Achmea, Bright Cape, Eurapco. Led the grant set-up for the part of the CWI Amsterdam, 150k budget.
- **Marie-Curie, Horizon2020 and European Industrial Doctorates fellowship** for my PhD

Consulting work

- Developing a framework using deep learning for pricing and calibrating financial derivatives for undisclosed hedge fund.
- Advising on how to model risks into mortgage portfolios for the Dutch National Mortgage Guarantee (NHG)

Supervision and teaching

Teaching
- Designed and taught an online course of 5 hrs on "Optimization in neural networks" as part of "Introduction to Optimisation Course and the Advanced Optimisation Course" at Imperial College London for industry practitioners and students - 2020
- Substitute Lecturer, Delft University of Technology on "Computational Finance" - 2019.

PhD and MSc supervision
Jasper Hoogendoorn (in collaboration with Ernst & Young) on "Sequential Monte Carlo methods for training neural networks" (MSc), Stijn Verberne (in collaboration with ABN Amro) on "Mortgage prepayment prediction with neural networks" (MSc), Remco van der Meer on "Solving PDEs with neural networks", *resulted in a paper* (MSc), Henk Jonker on "Cosine-expansion methods for valuing gas storage contracts" (MSc).

Talks and poster presentations

Invited seminars Warwick University, Yale University, Fields Institute Seminar, CWI Amsterdam, University of Oxford, University of Nottingham

Invited conferences ICL-CNRS workshop, 18th Winter school on Mathematical Finance, International Conference on

	Numerical Analysis and Applied Mathematics 2018, SIAM Annual Meeting 2018, 2nd International Congress on Actuarial Science and Quantitative Finance
Contributed talks	INFORMS Annual Meeting, SIAM Conference on Financial Mathematics & Engineering, Quantitative Methods in Finance Conference 2017, 2nd International Conference on Computational Finance
Industry presentations:	JP Morgan London, Duality Group, VORtech Delft, Prometeia Milan, EY Amsterdam, Banca IMI Milan, Prometeia Bologna

Organization of conferences

Program committee at *2nd ACM International Conference on AI in Finance 2021*, Program committee at *2nd Workshop on Women in AI and Finance 2021*, Organisation of symposium on *'Machine learning in computational finance' at International Conference on Computational Finance 2019*

Awards

Travel award at Time Series Workshop of International Conference of Machine Learning 2019, Journal of Computational Finance Young Researcher Award 2019

Reviewer work

International Conference on Learning Representations (ICLR), Journal of Computational Finance, Physica D, Quantitative Finance

Selected publications

Privacy and human-centred systems

- M. Malekzadeh, A. Borovykh, D. Gündüz , *Honest-but-Curious Nets: Sensitive attributes of private inputs can be secretly encoded into the entropy of classifiers' outputs*, ACM Conference on Computer and Communications Security (ACM CCS 2021 B) [0 citations]
- M. Fan, A. Borovykh, M. Malekzadeh, S. Demetriou, H. Haddadi, *Layer-wise Characterization of Latent Information Leakage in Federated Learning*, International Conference on Learning Representations (ICLR) 2021 Workshop 'Distributed and Private Machine Learning (DPML)' [3 citations]

The design of effective optimization algorithms and understanding into deep learning

- A. Borovykh, N. Kantas, P. Parpas, G. Pavliotis, *Optimizing interacting Langevin dynamics using spectral gaps,* International Conference on Machine Learning (ICML) 2021 Workshop on "Beyond First Order Methods in Machine Learning [0 citations]
- A. Borovykh, N. Kantas, P. Parpas, G. Pavliotis, *Stochastic mirror descent for fast distributed optimization and federated learning*, Conference on Neural Information Processing Systems (NeurIPS) Workshop 'Optimization for Machine Learning (NeurOPT)' [1 citation]
- A. Borovykh, N. Kantas, P. Parpas, G. Pavliotis, *On stochastic mirror descent with interacting particles: convergence properties and variance reduction*, Physica D Nonlinear Phenomena 418, 132844 [6 citations]
  - A shorter version appeared in International Conference Machine Learning (ICML) Workshop on 'Beyond First order methods in ML Systems'
- A. Borovykh, *A Gaussian process perspective on convolutional neural networks,* Available on ArXiv (2018) [11 citations]
- A. Borovykh, *The effects of optimization on generalization in infinitely wide neural networks*, International Conference on Machine learning (ICML) Workshop 'Understanding and Improving Generalization in Deep Learning' [1 citation]

Applications in finance and engineering

- A. Borovykh, C. W. Oosterlee, and R. van der Meer, *Optimally weighted loss functions for solving PDEs with neural networks*, Submitted to Journal of Computational and Applied Mathematics [14 citations]
- S. Liu, A. Borovykh, C. W. Oosterlee, and L. A. Grzelak, *A neural network-based framework for financial model calibration*, Journal of Mathematics in Industry 9 (1), [36 citations]
- A. Borovykh, C. W. Oosterlee, and S. M. Bohte, *Generalization in fully-connected neural networks for time series forecasting*, Journal of Computational Science 36 [14 citations]
  - A shortened version appeared in International Conference on Machine Learning (ICML) Time Series Workshop
- A. Borovykh, A. Pascucci, S. La Rovere, *A mean-field model of interbank lending with self-exciting shocks*, IISE Transactions 50 (9), 806–819, 2018 [2 citations]
- A. Borovykh, C.W. Oosterlee, A. Pascucci, *Efficient computation of various valuation adjustments under local Lévy models*, SIAM Journal on Financial Mathematics 9 (1), 251–273, 2018 [8 citations]
- A. Borovykh, C.W. Oosterlee, S. Bohte, *Dilated convolutional neural networks for time series forecasting,* Journal of Computational Finance 22 (4), 73-101, 2018 [286 citations]
- A. Borovykh, C.W. Oosterlee, A. Pascucci, *Pricing Bermudan options under local Lévy models with default*, Journal of Mathematical Analysis and Applications 459 (2), 929–953, 2017 [13 citations]