

Robert M. Gower

Curriculum Vitae December 12, 2020

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INFORMATION *Website:* <https://gowerrobert.github.io>

NATIONALITY Brazilian and British

JOBS & EDUCATION 09/2017 – **Assistant Professor in Machine Learning**, Institut Polytechnique de Paris, Télécom-Paristech, Paris, France.

01/2020 – 08/2020 **Visiting Scientist**, Facebook Research, New York.

08/2016 – 09/2017 **Laureate fellowship** of the Fondation Sciences Mathématiques de Paris, École Normale Supérieure and Inria.

09/2012 – 06/2016 **Ph.D.** in Math, **The University of Edinburgh**, UK

05/2011 – 07/2012 **Market Model Analyst**, Itaú-Unibanco, São Paulo, Brazil

03/2009 – 05/2011 **M.Sc.** in Applied Math, **University of Campinas**, São Paulo, Brazil

03/2005 – 12/2008 **B.Sc.** in Applied Math, **University of Campinas**, São Paulo, Brazil

PRIZES AND FUNDING 2020 Top 10% reviewer for Neurips, awarded free ticket and registration.

2019 **\$20k** The Thomas Jefferson Fund grant for the project entitled: “Matrix equations for big data compression”

\$72k Cifre Facebook Research Funding

Top 5% reviewer for ICML, awarded free ticket and registration.

2018 **€8k** Labex Mathématique Hadamard fund for the project “Scalable stochastic variance reduced gradient methods”

2017 The bi-annual Leslie Fox Prize for Numerical Analysis, **2nd place**

2016 **€122k** The Fondation Sciences Mathématiques de Paris Fellowship at Inria/ENS

2014 **Best talk prize** at the Irish SIAM student meeting

Teaching Awards nominated for the 2014 Edinburgh University Students’ Association Teaching Awards by student vote.

2012 **£85,1k** Ph.D. scholarship, University of Edinburgh, School of Mathematics

2009 – 2015 **£10k** in total of undergraduate (FAPESP), graduate (Laura Wisewell fund, CNPq) scholarships and travel awards (ICML 2015 travel award).

8 journal papers, 8 conference proceedings, 13 preprints and reports.

2020 **R. M. G.**, Mark Schmidt, Francis Bach, Peter Richtárik Variance-Reduced Methods for Machine Learning, *Proceedings of the IEEE*, 2020.

Rui Yuan, Alessandro Lazaric, **R.M.G.** Sketched Newton-Raphson, ICML 2020 workshop “Beyond first order methods in ML systems”, *arXiv:2006.12120*.

Ahmed Khaled, Othmane Sebbouh, Nicolas Loizou, **R.M.G.**, Peter Richtárik. Unified Analysis of Stochastic Gradient Methods for Composite Convex and Smooth Optimization, *arXiv:2006.11573*.

R.M.G., Othmane Sebbouh, Nicolas Loizou. SGD for Structured Nonconvex Functions: Learning Rates, Minibatching and Interpolation, *arXiv:2006.10311*.

Aaron Defazio, **R.M.G.** The Power of Factorial Powers: New Parameter settings for (Stochastic) Optimization, *arXiv:2006.01244*.

Othmane Sebbouh, **R.M.G.**, Aaron Defazio. On the convergence of the Stochastic Heavy Ball Method, *arXiv:2006.07867*.

Dmitry Kovalev, **R.M.G.**, Peter Richtárik, Alexander Rogozin. Fast Linear Convergence of Randomized BFGS, *arXiv:2002.11337*.

2019 **R.M.G.**, Denali Molitor, Jacob Moorman, and Deanna Needell, Adaptive sketch-and-project methods for solving linear systems, *arXiv:1909.03604*.

O. Sebbouh, N. Gazagnadou, S. Jelassi, F. Bach, **R.M.G.** Towards closing the gap between the theory and practice of SVRG, *Advances in Neural Information Processing Systems (Neurips)*.

R.M.G., D. Kovalev, F. Lieder, P. Richtárik, RSN: Randomized Subspace Newton, *Advances in Neural Information Processing Systems (Neurips)*.

N. Gazagnadou, **R.M.G.**, J. Salmon, Optimal mini-batch and step sizes for SAGA, *Proceedings of the 33rd International Conference on Machine Learning (ICML)*.

R.M.G., N. Loizou, X. Qian, A. Sailanbayev, E. Shulgin, P. Richtárik, SGD: general analysis and improved rates, (long oral presentation) *Proceedings of the 33rd International Conference on Machine Learning (ICML)*.

2018 A. Bibi, A. Sailanbayev, B. Ghanem, **R.M.G.** and P. Richtárik, Improving SAGA via a probabilistic interpolation with gradient descent, *arXiv:1806.05633*.

R.M.G., P. Richtárik and F. Bach, Stochastic quasi-gradient methods: variance reduction via Jacobian sketching, *Mathematical Programming*.

R.M.G., F. Hanzely, P. Richtárik and S. Stich, Accelerated stochastic matrix inversion: general theory and speeding up BFGS rules for faster second-order optimization, *Advances in Neural Information Processing Systems (Neurips)*.

B. K. Abid and **R.M.G.**, Greedy Stochastic algorithms for entropy-regularized optimal transport problems, *Proceedings of the 21st International Conference on Artificial Intelligence and Statistics (AISTATS)*.

R.M.G, N. Le Roux and F. Bach, Tracking the gradients using the Hessian: A new look at variance reducing stochastic methods, (long oral presentation) *Proceedings of the 21st International Conference on Artificial Intelligence and Statistics (AISTATS)*.

A. L. Gower, **R.M.G**, J. Deakin, W. J. Parnell and I. D. Abrahams, Learning about random media from near-surface backscattering: using machine learning to measure particle size and concentration, *Europhysics Letters, Volume 122, Number 5* .

2017 **R.M.G** and P. Richtárik, Randomized quasi-Newton updates are linearly convergent matrix inversion algorithms, *SIAM Journal on Matrix Analysis and its applications*, 38(4), 1380-1409.

2016 **R.M.G** and P. Richtárik, Linearly Convergent Randomized Iterative Methods for Computing the Pseudoinverse, *arXiv:1612.06255*.

R.M.G, Donald Goldfarb and P. Richtárik, Stochastic Block BFGS: Squeezing More Curvature out of Data, In *Proceedings of the 33rd International Conference on Machine Learning (ICML)*.

2015 **R.M.G** and P. Richtárik, Stochastic dual ascent for solving linear systems, *arXiv:1437459*.

R.M.G and P. Richtárik. Randomized iterative methods for linear systems, *SIAM Journal on Matrix Analysis and its applications* 36(4), 1660-1690.
Most Downloaded Paper from the SIMAX website (Dec 2020).

2014 **R.M.G** and A. L. Gower. High order reverse automatic differentiation with emphasis on the third order, *Mathematical Programming Series A* 155(1), 81-103.

R.M.G and J. Gondzio, Action constrained quasi-Newton methods, *ERGO14-020*.

R.M.G, *et. al.* Chapter: Drawing a track map In: Train Positioning Using Video Odometry *The MIIS Eprints Archive*.

R.M.G and M. P. Mello, Computing the sparsity pattern of Hessians using automatic differentiation, *ACM Transactions on Mathematical Software*, 40(2).

2012 **R.M.G** and M. P. Mello A new framework for Hessian automatic differentiation *Optimization Methods and Software*, 27(2).

TEACHING

I have given over 360 hours of Lectures on Optimization, Numerical Analysis, and Machine Learning. Prior to that, as a graduate student at the University of Edinburgh, I gave over 350 hours of tutorials and lectures.

2019 – 2020 Fall, *Machine Learning in High Dimensions*, graduate, Télécom Paris [12hr].

2017 – 2020 Fall, *Optimization and Numerical Analysis*, undergraduate, Télécom Paris [24hr].

2017 – 2020 Fall, *Optimization for Data Science*, Data Science masters, Institut Polytechnique de Paris [36hr].

2019 Winter, *Stochastic Optimization for Machine Learning*, African Master's of Machine Intelligence at AIMS, Rwanda [14hr].

2017– 2019 Summer school lectures on *Stochastic Optimization for Machine Learning* at

2018 Yerevan State University, Armenia.

2017 The University of Novi Sad, Serbia.

2010 – 2015 Over 350 hours of tutorials and lectures as a graduate student at The University of Edinburgh including tutoring as a Junior teaching fellow, special needs tutorials for students within Autism spectrum, linear algebra, calculus, financial mathematics, operations research, optimization theory, proofs and problem solving.

ACADEMIC
SERVICES

Reviewer for over 10 journals/proceedings including:

Senior Program Committee, *International Joint Conference on Artificial Intelligence* (IJCAI), 2020

Conference on Neural Information Processing Systems (Neurips)

International Conference on Machine Learning (ICML)

Journal of Machine Learning Research (JMLR)

SIAM Journal on Scientific Computing (SISC)

SIAM Journal on Optimization (SIOPT)

Optimization Methods and Software, Taylor & Francis

Computational and Applied Mathematics, Springer

Mathematical Programming, Springer Computation

BIT Numerical Mathematics, Springer

Numerical Algorithms, Springer