GIANCARLO KERG

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EDUCATION

Université de Montréal, *PhD student* 09/2017 - 09/2022 (estimated)
Advisor: Prof. Yoshua Bengio (co-advised by Prof. Guillaume Lajoie)
Grad courses: Representation learning (IFT 6135), Reinforcement learning (COMP 767)
GPA: 4.3 /A+

Université Libre de Bruxelles 09/2012 - 06/2013
M.Sc. in Pure Mathematics *(Grande Distinction)*
Courses in Differential Geometry and Geometric Group Theory
Thesis: *On Neretin' s group of tree spheromorphisms*
Advisor: Prof. Pierre-Emmanuel Caprace

University of Cambridge 10/2011 - 06/2012
M.A.St.: Part III of the Mathematical Tripos *(Merit)*
Courses in Probability Theory and Combinatorics
Thesis: *Expansion in groups*
Advisor: Prof. Ben Green

Université Libre de Bruxelles 09/2008 - 06/2011
B.Sc. in Mathematics *(Grande Distinction)*
Minor in Physics

AWARDS

UNIQUE best oral presentation award http://www.crm.umontreal.ca/2019/MAIN2019/
Third Montreal Artificial Intelligence and Neuroscience (MAIN) conference, 2019

International Mathematics Competition http://www.imc-math.org.uk/
Second Prize (2011)

International Mathematical Olympiad http://www.imo-official.org/
Bronze Medal (2007), Honorable Mention (2006, 2008)

Olympiade Mathématique Belge http://omb.sbpm.be/
First Prize (2008), Second Prize (2006), Third Prize (2007), Fourth Prize (2005)

PUBLICATIONS/ PREPRINTS

Network-level computational advantages of single-neuron adaptation.
V. Geadah, G. Lajoie, G.Kerg, Stefan Horoi, Guy Wolf.
Submitted to *Computational and Systems Neuroscience (COSYNE), 2021*

Untangling trade-offs between recurrence and self-attention in artificial neural networks.
G.Kerg*, B. Kanuparthi*, A. Goyal, K. Goyette, Y. Bengio, G. Lajoie.
Advances in Neural Information Processing Systems (NeurIPS), 2020.
https://arxiv.org/abs/2006.09471

Catastrophic Fisher Explosion: Early Phase Fisher Matrix Impacts Generalization.
S. Jastrzebski, D. Arpit, O. Astrand, G.Kerg, H. Wang, C. Xiong, R. Socher, K. Cho, K. Geras.
Accepted for a poster presentation at the *Proceedings of the NeurIPS 2020 Workshop on Optimization*

in Machine Learning (OPT), 2020.
Submitted to the *Ninth International Conference on Learning Representations (ICLR), 2021*
https://openreview.net/forum?id=yT7-k6Q6gda

Guarantees for stable signal and gradient propagation in self-attentive recurrent networks.
G.Kerg, B. Kanuparthi, A. Goyal, K. Goyette, Y. Bengio, G. Lajoie.
DeepMath 2020 (Conference on the Mathematical Theory of Deep Neural Networks), 2020

Learning Long-term Dependencies Using Cognitive Inductive Biases in Self-attention RNNs.
G.Kerg⋆, B. Kanuparthi⋆, A. Goyal, K. Goyette, Y. Bengio, G. Lajoie.
Accepted for a poster presentations at the *ICML 2020 Inductive biases, invariances and generalization in RL workshop, 2020* as well as *The Fourth Annual Montreal AI Symposium (MAIS), 2020.*
https://biases-invariances-generalization.github.io/program/big_31.html

Advantages of biologically-inspired adaptive neural activation in RNNs during learning
V. Geadah, G.Kerg, Stefan Horoi, Guy Wolf, G. Lajoie.
https://arxiv.org/abs/2006.12253

Non-normal Recurrent Neural Network (nnRNN): learning long time dependencies while improving expressivity with transient dynamics.
G.Kerg⋆, K. Goyette⋆, M.P. Touzel, G. Gidel, E. Vorontsov, Y. Bengio and G. Lajoie.
Advances in Neural Information Processing Systems (NeurIPS), 2019.
https://arxiv.org/abs/1905.12080

h-detach: Modifying the LSTM gradient towards better optimization.
B. Kanuparthi⋆, D. Arpit⋆, G.Kerg, R. Ke, I. Mitliagkas and Y. Bengio.
Seventh International Conference on Learning Representations (ICLR), 2019.
https://openreview.net/forum?id=ryf7ioRqFX
https://arxiv.org/abs/1810.03023

Safe Screening for Support Vector Machines.
J. Zimmert, C. Schröder de Witt, G.Kerg, and M. Kloft.
Proceedings of the NIPS 2015 Workshop on Optimization in Machine Learning (OPT), 2015.

WORK EXPERIENCE

QuantCo Deutschland GmbH, *Data scientist (Intern)* 02/2017 - 08/2017
Data-driven claims management, algorithmic pricing, and management consulting
http://www.quantco.com

Hammer Lab, New York City, *Machine learning researcher (Intern)* 06/2016 - 12/2016
Improving state-of-the-art MHC binding affinity prediction using deep learning
Contributing to open source software for designing personalized cancer vaccines

SavingGlobal Gmbh, Berlin, *Business Intelligence Analyst (Intern)* 08/2014 - 10/2014
Fintech startup by McKinsey founder team with 10 million EUR funding.
Development of data-driven and pragmatic customer segmentation to guide marketing campaigns.
Process improvement ideas based on customer segmentation, employee interviews and data analysis.

Startup Institute, Berlin, *Technical Marketing Student* 05/2014 - 07/2014
Full-time career-accelerating program founded by partner startups based in Berlin.
First project: market research project at Delivery Hero.
Second project: matching platform for startup newcomers in Berlin.

ACADEMIC/ TEACHING EXPERIENCE

Université de Montréal, *PhD Student* 09/2017 - present
Co-reviewer for JMLR and NeurIPS
MSc thesis Co-Advisor (Victor Geadah)
Teaching Assistent of Introduction to ML course (Fall 2018)

Humboldt University of Berlin, *Research Associate* 03/2015 - 06/2016
Co-reviewer for JMLR and NIPS
MSc thesis Co-Advisor (Alexander Adler)
Co-lecturer of ML lecture course
Guarantees for learning with weakly dependent random variables, concentration of measure

International Mathematical Olympiad, *Personal Student Mentor* 02/2010 - 07/2012
Privately mentoring students one-on-one, on a weekly basis.
Students achieved the national best results in participation history.

Ministry of Education, Luxembourg, *Mathematics tutor* 09/2009 & 09/2010
Tutoring high school students for their second examination

MOOC

University of Pennsylvania 03/2020
A Crash Course in Causality: Inferring Causal Effects from Observational Data
Certificate: `https://coursera.org/share/5637507d58b8da72b4f36baff995df9b`

VOLOUNTEER WORK

Well-being in machine learning (WBiML), co-organizer at NeurIPS 2019 12/2019

OTHER

Languages	English, German, French, Luxembourgish (Fluent/Native) Italian, Polish (Basic)
Interests	AI, Neuroscience, Psychology, Mathematics education, Chess, Entrepreneurship