

Gary Bécigneul

Born on 11.11.1994

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www.hyperbolicdeeplearning.com
www.openconsulting.ai

Working hard to buy a private jet so I can finally be in the now. Write me if you can help me get it.

Education

- 2016 - 2020 **Doctoral Studies in machine learning**, *ETH Zürich & MPI Tübingen*.
Thomas Hofmann & Bernhard Schölkopf
- 02/20 - **Visiting Researcher**, *MPI Tübingen, Germany*.
08/20 with Bernhard Schölkopf
- 09/19 - **Visiting Researcher**, *MIT, Cambridge, USA*.
02/20 with Tommi Jaakkola & Regina Barzilay
- 2016 **Master of Advanced Studies, mathematics**, *University of Cambridge, UK*.
Probability theory, differential geometry, stochastic calculus, Morse theory, Schramm-Loewner evolutions, modern statistical methods, machine learning
- 2015 **Bachelor of Science, mathematics**, *Université Pierre & Marie Curie, Paris 6th*.
Linear algebra, pure algebra, real analysis, complex analysis, integration, combinatorics, dynamical systems, functional analysis

Master Thesis

- 2016 **Statistical Applications of Persistent Homologies**, *University of Cambridge*.
Supervised by John Aston (statistics) & Jacob Rasmussen (algebraic topology)
- Abstract Persistent homology is a method from topological data analysis used to analyze geometrical properties of high dimensional point-clouds. I studied how these could be used for time series analysis by extracting topological invariants of attractors in phase space, as well as the asymptotic homologies of Erdős-Rényi random graphs.

Classes taken during my Ph.D at ETH Zürich

- Cryptographic Protocols: *zero-knowledge proof of knowledge, secure multi-party computation, oblivious transfer, broadcast & consensus*
- Cryptography Foundations: *pke schemes, towp, digital signatures, cbc-mac, block-ciphers, AES, simulators, ind-cpa, reduction, composition, converters, privacy amplification*

- o Algorithms Lab: *dynamic programming, geometric computing, graph representations, network flow, proximity structures, CGAL & BGL in C++*

██████████ Awards & Fellowships

2018 **Paid Internship at MIT**, *Funded by the DARPA & MLPDS.*

2016 **CLS Ph.D Fellowship.**

2015 **Junior Fermat Prize**, *Frequency and regularity of an accumulation point.*

The Junior Fermat Prize is a mathematical prize, awarded every two years to a student in the first four years of university for a contribution to mathematics. The amount of the prize is 2000 Euros.

██████████ Scientific Publications (* indicates equal contribution)

Published in Conference Proceedings

1. **ICML'2020**: *Constant Curvature Graph Convolutional Networks*, Gregor Bachmann*, Gary Bécigneul*, Octavian-Eugen Ganea, (Poster)
2. **AISTATS'2020**: *A Continuous-Time Perspective for Modeling Acceleration in Riemannian Manifolds*, Foivos Alimisis, Antonio Orvieto, Gary Bécigneul, Aurélien Lucchi, (Poster)
3. **ICLR'2020**: *Mixed-Curvature Variational Autoencoders*, Ondrej Skopek, Octavian-Eugen Ganea, Gary Bécigneul, (Poster)
4. **ICLR'2019**: *Riemannian Adaptive Optimization Methods*, Gary Bécigneul, Octavian-Eugen Ganea, (Poster)
5. **ICLR'2019**: *Poincaré GloVe: Hyperbolic Word Embeddings*, Alexandru Tifrea*, Gary Bécigneul*, Octavian-Eugen Ganea*, (Poster)
6. **ICML'2019**: *Breaking the Softmax Bottleneck via Learnable Monotonic Pointwise Non-Linearities*, Octavian-Eugen Ganea, Sylvain Gelly, Gary Bécigneul, Aliaksey Severin, (Oral)
7. **NeurIPS'2018**: *Hyperbolic Neural Networks*, Octavian-Eugen Ganea*, Gary Bécigneul*, Thomas Hofmann, (with a **spotlight**, i.e. **top 4% of all submissions**)
8. **ICML'2018**: *Hyperbolic Entailment Cones for Learning Hierarchical Embeddings*, Octavian-Eugen Ganea, Gary Bécigneul, Thomas Hofmann, (Oral)
9. **Quadrature'2016**: *Fréquence et Régularité d'une Valeur d'Adhérence*, Gary Bécigneul (Fermat Junior Prize 2015)

Currently under Review

10. **NeurIPS'2020**: *Optimal Transport Graph Neural Networks*, Gary Bécigneul*, Octavian-Eugen Ganea*, Benson Chen*, Regina Barzilay, Tommi Jaakkola
11. **NeurIPS'2020**: *Bloom Origami Assays: Practical Group Testing*, Louis Abraham, Gary Bécigneul, Ben Coleman, Anshumali Shrivastava, Bernhard Schölkopf and Alexander J Smola
12. **NeurIPS'2020**: *Computationally Tractable Riemannian Manifolds for Graph Embeddings*, Calin Cruceru, Gary Bécigneul, Octavian-Eugen Ganea

13. **NeurIPS'2020: Practical Accelerated Optimization on Riemannian Manifolds**, Foivos Alimisis, Antonio Orvieto, Gary Bécigneul, Aurélien Lucchi

Unpublished work

14. *Crackovid: Optimizing Group Testing*, Louis Abraham, Gary Bécigneul, Bernhard Schölkopf
15. *Escaping Flat Areas by Function-Preserving Structural Network Modifications*, Yannic Kilcher*, Gary Bécigneul*, Thomas Hofmann
16. *Learning a Riemannian Metric with an Energy-based GAN*, Gary Bécigneul, Yannic Kilcher, Thomas Hofmann
17. *Parametrizing Filters of a CNN with a GAN*, Yannic Kilcher*, Gary Bécigneul*, Thomas Hofmann
18. *On the Effect of Pooling on the Geometry of Representations*, Gary Bécigneul

█ Programming Experience

Python	Experiments of academic papers & NLP side projects	<i>PyTorch, spaCy, POT</i>
C++	Basic problem solving, Olympiad/ACM style	<i>BGL, CGAL</i>
Ocaml	Basic functional programming	

█ Teaching

Supervision of Master Thesis between MIT and Munich University

1. Octav Dragoi: *Riemannian Geometry of Optimal Transport*
February 2020 - Ongoing (jointly with Octavian-Eugen Ganea)

Supervision of Master Thesis at ETH Zürich

2. Panayiotis Panayiotou: *Molecular Generative Models*
February 2020 - Ongoing (jointly with Octavian-Eugen Ganea)
3. Jovan Andonov: *Learning Explicit Word Distributions for Language Modelling*
April 2019 - October 2019 (jointly with Octavian-Eugen Ganea)
4. Ondrej Skopek: *Variational Autoencoders in Products of Spaces of Constant Curvature*
April 2019 - October 2019 (jointly with Octavian-Eugen Ganea)
5. Philipp Wirth: *Hierarchical Language Modeling in Hyperbolic Spaces*
March 2019 - September 2019 (jointly with Octavian-Eugen Ganea)
6. Calin Cruceru: *Learning Embeddings in Matrix Manifolds*
April 2019 - October 2019 (jointly with Octavian-Eugen Ganea)
7. Foivos Alimisis: *Accelerated methods on Riemannian manifolds: Discrete and Continuous*
April 2019 - October 2019 (jointly with Aurélien Lucchi and Antonio Orvieto)

8. Gregor Bachmann: *Hyperbolic Graph Neural Networks*
April 2019 - October 2019 (jointly with Octavian-Eugen Ganea)
9. Gokul Santhanam: *Understanding and Interpreting Adversarial Samples*
May 2018 - November 2018 (jointly with Paulina Grnarova)
10. Alexandru Tifrea: *Hyperbolic Word Embeddings*
April 2018 - October 2018 (jointly with Octavian Ganea)
11. Igor Petrovski: *Hyperbolic Sentence Embeddings*
October 2017 - April 2018 (jointly with Octavian Ganea)
12. Charles Ladari: *Parallelizable tensor decomposition and new approach to dictionary learning*
June 2017 - December 2017
13. Severin Bahman: *Channel combination for wavelet scattering networks*
December 2016 - June 2017

Supervision of Bachelor Thesis at ETH Zürich

14. Andreas Bloch: *Recommender Systems in Products of Spaces of Constant Curvature*
April 2019 - October 2019 (jointly with Octavian-Eugen Ganea)

Supervision of Research Projects at ETH Zürich

15. Yashas Annadani: *Posterior Collapse in Variational Autoencoders*
Fall 2018 (jointly with Octavian-Eugen Ganea)
16. Foivos Alimisis: *Second order ODE for accelerated methods on Riemannian manifolds*
Fall 2018 (jointly with Aurélien Lucchi and Antonio Orvieto)

Teaching Assistant

- o Deep Learning: Fall 2016, 2017, 2018
- o Computational Intelligence Lab: Spring 2017
- o Natural Language Understanding: Spring 2018, 2019

■ Invited Talks

2018

Hyperbolic Neural Networks, spotlight presentation, NIPS'18, Montreal, Canada

Hyperbolic Geometry in Machine Learning, geometry department, University of Fribourg, Switzerland

Hyperbolic Entailment Cones for Learning Hierarchical Embeddings, ICML'18, Stockholm, Sweden

2016

Statistical Applications of Persistent Homologies, MPI Tübingen, Germany

Side Projects & Websites

1. openconsulting.ai: Free consulting for NGOs
2. hyperbolicdeeplearning.com: Blogposts vulgarizing our ML research
3. garybe.com: Personal webpage
4. bloom-origami.github.io: Group Testing Software with Louis Abraham

Interests

Fighting MMA, Thai boxing and a bit of Judo (Blue Belt)
Literature Baudelaire, Laclos, Kierkegaard, Nietzsche, Rimbaud, Nabokov, Chateaubriand
Fitness Calisthenics, Power-lifting

Languages

French Native
English Fluent
Russian Beginner