

Jean-Baptiste Cordonnier

Curriculum Vitae

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Education

- 2018– **École Polytechnique Fédérale de Lausanne**
Ph.D. in the Machine Learning and Optimization laboratory supervised by Prof. Martin Jaggi.
Expected graduation date: February 2023
- 2015–2018 **École Polytechnique Fédérale de Lausanne**
M.Sc. in Communication Systems. GPA: 5.57/6.
- 2014–2015 **Carnegie Mellon University**
Exchange Program. GPA 3.78/4.0 (*Dean's list*).
- 2012–2015 **École Polytechnique Fédérale de Lausanne**
B.Sc. in Communication Systems. GPA: 5.74/6.

Experience

- 2022 **Inceptive Nucleics** · Research Intern (4 months) · Berlin and Geneva
Improve RNA design for new vaccines and therapeutics using machine learning.
- 2020 **Google Brain** · Research Intern (5 months) · Berlin (from Lausanne)
Developed sampling approaches for self-attention in transformers. Leveraged differentiable top-k to efficiently process large images by patch with end-to-end learning.
- 2017 **Amazon** · Applied Scientist Intern (5 months) · Berlin
Built a framework for metadata extraction of MXNet and scikit-learn models. Experimented with WGAN and LSTM seq2seq for time-series forecasting. Contributed to ML computing platform on AWS.
- 2017 **UPC Cablecom** · Data Analyst Intern (3 months) · Zurich
Improved Swiss network metrics ingestion with longer history (x5) and faster querying (x100).
Created Elasticsearch plugin for near real-time topology aware aggregation at node level with Neo4j.
Built a real-time alarming system on business metrics using Kafka.
- 2015 **Amazon** · Software Developer Intern (3 months) · Berlin
Developed profiling tools for cluster computation and notebook interface for scientific data visualization.
Worked on performance issues and Spark optimizations in Scala.

Publications

- **Differentiable Patch Selection for Image Recognition.** Jean-Baptiste Cordonnier*, Aravindh Mahendran*, Alexey Dosovitskiy, Dirk Weissenborn, Jakob Uszkoreit, Thomas Unterthiner. In *Conference on Computer Vision and Pattern Recognition, CVPR 2021*. [🔗](#)
- **Attention is Not All You Need: Pure Attention Loses Rank Doubly Exponentially with Depth.** Yihe Dong, Jean-Baptiste Cordonnier, Andreas Loukas. In *International Conference on Machine Learning, ICML 2021*. [🔗](#)
- **Group Equivariant Stand-Alone Self-Attention For Vision.** David W. Romero*, Jean-Baptiste Cordonnier*. In *International Conference on Learning Representations, ICLR 2021*. [🔗](#)
- **Multi-Head Attention: Collaborate Instead of Concatenate.** Jean-Baptiste Cordonnier, Andreas Loukas and Martin Jaggi. In *abs/2006.16362, arXiv 2020*. [🔗](#)
- **On the Relationship between Self-Attention and Convolutional Layers.** Jean-Baptiste Cordonnier, Andreas Loukas and Martin Jaggi. In *International Conference on Learning Representations, ICLR 2020*. [🔗](#)
- **Extrapolating Paths with Graph Neural Networks.** Jean-Baptiste Cordonnier and Andreas Loukas. In *International Joint Conference on Artificial Intelligence, IJCAI 2019*. [🔗](#)
- **Robust Cross-lingual Embeddings from Parallel Sentences.** Ali Sabet, Prakhar Gupta, Jean-Baptiste Cordonnier, Robert West and Martin Jaggi. In *abs/1912.12481, arXiv 2019*. [🔗](#)
- **Sparsified SGD with Memory.** Sebastian U. Stich, Jean-Baptiste Cordonnier and Martin Jaggi. In *Neural Information Processing Systems, NeurIPS 2018*. [🔗](#)

Patent

- 2022 **End-to-End Training of Neural Networks for Image Processing**
J.-B. Cordonnier, A. Mahendran, T. Unterthiner, A. Dosovitskiy, D. Weissenborn, J. Uszkoreit
US Patent App. 17/538,891, 2022

Awards

- 2019 **Swiss Data Science Center Ph.D. Fellowship.** Four-year funding for doctoral studies.
2018 **EPFL IC Department Fellowship.** One-year funding for a Ph.D. candidate.
2015 **Excellence Scholarship for the Master.** EPFL award for academic excellence during the Bachelor.
2014 **Exchange Student Scholarship.** Selected for an exchange program at CMU with financial support.

Teaching Assistant

- Bachelor Discrete Math, Calculus I and II, Linear Algebra, Algorithms,
Functional Programming (Scala), Parallelism and Concurrency.
Graduate Deep Learning, Information Theory.

Skills

- Languages Python, Scala, Java, Javascript, C++, C, Bash.
Frameworks Jax, PyTorch, NumPy, Tensorflow, Spark, scikit-learn, Elasticsearch, Kafka, Neo4j, React, D3.js.
DevOps Docker, Kubernetes, Google Cloud, AWS, continuous integration.
Misc. Unix, shell, git, vim, LaTeX.

Other Projects

- 2017 **Unsupervised Learning of Sentence Representations** with Prof. Jaggi (EPFL)
Implemented Sent2vec in PyTorch for sentence embeddings and experimented with multi-head attention mechanisms. Optimized training on GPU with multi-threaded data queue and LMDB.
- 2017 **Swiss Avalanches Visualization** with Prof. West (EPFL) swiss-avalanches.github.io/explore
Visualization platform for 20 years of avalanche casualties and risk reports in Switzerland.
Poster in *Applied Machine Learning Days*, AMLD 2018.
- 2015 **Offline Spanning Tree Maintenance** with Prof. Svensson (EPFL)
Studied a special case of spanning tree maintenance approximation algorithm involving combinatorial proofs, LP relaxation and primal-dual analysis.
- 2014 **Virtual Traffic Lights** with Prof. Tonguz (CMU)
Worked on open research problem for traffic jam reduction. Analyzed the benefits of virtual traffic lights in different situations. Implemented scalable traffic optimization algorithm in Python.

Languages

French (mother-tongue) · English (C1) · German (B1)

Interests and Volunteering

- 2017–2019 **Erasmus Student Network** · Logistic manager
Organized outings and week-ends for 200 Erasmus students in Lausanne and Switzerland.
- Fall 2016 **Hiking Expedition in Nepal** · Everest and Annapurna region
Hiked with a partner for 3 months in semi-autonomy between 300m and 5400m of elevation.
- 2015–2016 **Ingénieurs Nomades** · Vice-president
Bought and repaired ourselves a 1989 Renault 4L. Participated in the 4L Trophy to Morocco.
Co-founded an association at EPFL to support other adventure projects.
- 2006–2016 **Scouts and Guides of France** · Volunteer
Hiked and camped in France and Europe. Organized 2 weeks summer camps for 30 kids.