Daniel Severo

For more information: https://dsevero.com

ABOUT ME

My goal is to develop algorithms for generative modelling under resource constraints. Information Theory establishes fundamental limits on learning and compression, but it does not account for computational and memory constraints. Our work on optimally compressing sets/multisets under these constraints has led to new algorithms for storing large graphs with millions of nodes and edges in feasible time (quasi-linear in the number of edges), while simultaneously outperforming current state-of-the-art ad hoc methods. I have 5 years of industry experience applying machine learning to real-world problems, as well as open-source contributions to large projects such as dask/Dask and facebookresearch/NeuralCompression.

EDUCATION

University of Toronto
Electrical & Computer Engineering
- Doctor of Philosophy (Ph.D.) — Started Fall 2020
- Undergraduate Exchange Program (1 year) — 2013 - 2014

Federal University of Santa Catarina, Brazil — 2010 - 2015
Bachelor of Science in Electronics Engineering
First Class Honours, top 1% of graduates.

RESEARCH EXPERIENCE

Meta AI (FAIR Labs) — New York, Fall 2023
Research Scientist Intern with Matthew Muckley

Google AI — Toronto, Jan/2022 - Jan/2023
Student Researcher with Lucas Theis and Johannes Ballé

Meta AI (FAIR Labs) — New York, Summer 2021
Research Scientist Intern with Karen Ullrich

Vector Institute for AI — Toronto, 2020 - Current
Student Researcher with Alireza Makhzani

FIRST AUTHOR PUBLICATIONS

(Preprint) Severo, et al. "The Unreasonable Effectiveness of Linear Prediction as a Perceptual Metric." - https://arxiv.org/abs/2310.05986

(ICML 2023) Severo, et al. "Random Edge Coding: One-Shot Bits-Back Coding of Large Labeled Graphs." - https://arxiv.org/abs/2305.09705

(JSAIT 2023) Severo, et al. "Compressing Multisets with Large Alphabets using Bits-Back Coding." **Best Paper Award at NeurIPS DGM Workshop 2021.** - https://arxiv.org/abs/2107.09202

(ICML 2021) Ruan*, Ullrich*, Severo*, et al. "Improving Lossless Compression Rates via Monte Carlo Bits-Back Coding.". **Long Talk (top 15% of accepted papers).** - https://arxiv.org/abs/2102.11086

(BSC 2021) Severo, et al. "Regularized Classification-Aware Quantization." - https://arxiv.org/abs/2107.09716

OTHER PUBLICATIONS

(ICML 2023 Workshop) Kunze, Severo, Zani, van de Meent, Townsend. "Entropy Coding of Unordered Data Structures.". **Oral (top 12% of accepted papers).** - https://openreview.net/forum?id=PggJ9CbEN7

(ICML 2023) Neklyudov, Brekelmans, Severo, Makhzani. "Action Matching: A Variational Method for Learning Stochastic Dynamics from Samples.". - https://arxiv.org/abs/2210.06662

(NICC 2023) Guimarães, Ruther, Pinto, Severo, et al. "A Simplified BRADEN Scale for the Risk of Developing Pressure Injuries.". - https://onlinelibrary.wiley.com/doi/abs/10.1111/nicc.12923

(ICASSP 2022) Domanovitz, Severo, Khisti, Yu. "Data-Driven Optimization for Zero-Delay Lossy Source Coding with Side Information.". - https://ieeexplore.ieee.org/document/9747823

(BRACIS 2020) Reys, Silva, Severo, et al. "Predicting Multiple ICD-10 Codes from Brazilian-Portuguese Clinical Notes.". - https://arxiv.org/abs/2008.01515

AWARDS

Finalist for the Meta Research PhD Fellowship 2023
The Meta Research PhD Fellowship program awards PhD candidates conducting research on the cusp of emerging topics across computer science, engineering, and behavioral science. Over 3200 applicants, 62 finalists (top 2%), and 17 award winners.

Vector Scholarship in AI Recipient 2020-21 2020
The Vector Scholarship in AI supports the recruitment of top students to AI-related master's programs in Ontario and is valued at $17,500.
https://vectorinstitute.ai/aimasters

NSERC Applied Research Rapid Response to COVID-19 Grant 2020
Our project titled "Canadian Hospital Simulator For Management of COVID19 Cases and Contact Tracing" was awarded $75,000.00.
https://www.nserc-crsng.gc.ca/Innovate-Innover/CCI-COVID_eng.asp

Virtual Design Challenge Winner 2019
Won 1st place at the VDC hosted by The University of British Columbia with my paper *Proof of Novelty*. Received a cash prize of $3,000.
https://github.com/dsevero/Proof-of-Novelty

Student Merit Award and Medal 2015
Graduated with the highest GPA ever obtained (at the time) for my major. Elected "Best Student" by the faculty of Electrical & Electronics Engineering at the Federal University of Santa Catarina.

Science Without Borders Scholarship 2013
Awarded a full scholarship that covered tuition, transportation, necessary materials and living costs to study 2 academic semesters at the University of Toronto.

ACADEMIC SERVICES

Conference and Workshop Organization

- (ICML 2023) Neural Compression: From Information Theory to Applications `https://neuralcompression.github.io/`

Reviewer

- IEEE International Symposium on Information Theory (ISIT)
- Neural Information Processing Systems (NeurIPS)
- Transactions on Machine Learning Research (TMLR)
- International Conference on Machine Learning (ICML)

Invited Talks and Panels

- (NeurIPS, 2022) Panelist - Data Compression with Machine Learning Tutorial `https://neuralcompression.github.io/tutorial`

TEACHING EXPERIENCE

Federal University of Santa Catarina - *Teaching Assistant*

- Communications Theory — Fall and Winter 2015
- Introduction to Electronics — Fall and Winter 2013
- Single-Variable Calculus — Fall 2010

CERTI Foundation - *Programming Instructor* — 2010 - 2013

OPEN SOURCE CONTRIBUTIONS

Craystack

- `https://github.com/j-towns/craystack/pulls?q=author:dsevero`

Neural Compression

- `https://github.com/facebookresearch/NeuralCompression`

Dask & Dask-ML

- `https://github.com/dask/dask/pulls?q=author:dsevero`
- `https://github.com/dask/dask-ml/pulls?q=author:dsevero`

OTHER PROFESSIONAL EXPERIENCE

3778 Healthcare - *Machine Learning Engineer* — 2018 - 2020

Linx Impulse - *Head of Data Science* — 2016 - 2018

CERTI Foundation - Research Engineer — 2015 - 2016

Wavetech Technology - *Embedded Systems Intern* — 2015

CERTI Foundation - Electrical Engineering Intern — 2010 - 2013

WEG Industries - *Electrical Engineering Intern* — Summers 2011 and 2012