Paul Bertin

PhD candidate in Machine Learning

✉ paul.f.bertin@gmail.com
https://bertinus.github.io/
☎ +1 (514) 437-4658 / +33 (0) 676106782
Montréal, CANADA

CURRENT RESEARCH:

- developing structured models of cell dynamics at genome scale.
- The purpose of this project is to provide biological insight into genetic interactions from single-cell transcriptomic data.

EARLIER IN MY PHD:

- Led the development of a lab-in-the-loop approach for guiding drug combination screening assays (validated prospectively).
- Explored the applicability of causal inference methods to transcriptomic data.

EDUCATION

SEPTEMBER 2019 – PRESENT

PhD in Machine Learning

Mila, Université de Montréal

Interests : Lab-in-the-loop, Transcriptomics, Single-cell, Causality
Supervised by Yoshua Bengio

SEPTEMBER 2017 – AUGUST 2018

Mathématiques Vision Apprentissage

Ecole Normale Supérieure Paris-Saclay

Majors : Probability, Optimization
Minors : Differential Geometry, Topology

SEPTEMBER 2014 – AUGUST 2018

Master of Science

Ecole polytechnique Paris

Majors : Applied Mathematics, Computer Science
Minors : Physics, Biology

SEPTEMBER 2012 – JUNE 2014

Preparatory courses

Lycée Louis Le Grand

Majors : Mathematics, Physics
Minors : Engineering Science, English

EXPERIENCE

OCTOBER 2023 – MAY 2024

Visiting Researcher

Helmholtz Institute, Munich

Completed the development and validation of a structured model of cell dynamics at genome scale on single-cell data.
Visited Fabian Theis' lab.

OCTOBER 2020 – APRIL 2022

Project lead – Mila

Recover initiative

Collaboration between Mila, Relation Therapeutics & Scripps Research, funded by the Gates Foundation.

Acted as the primary liaison with other stakeholders, ensuring smooth communication, deliverable alignment, and milestone execution. Oversaw project planning and joint research objectives.

SEPTEMBER 2018 – JUNE 2019

Researcher

Montréal Institute for Learning Algorithms, Montréal

Development of a web based system for diagnosing chest X-ray images.
Analysis of Gene Interaction Graphs as prior knowledge for ML models.
Supervised by Joseph Paul Cohen.

APRIL 2018 – AUGUST 2018

Research Intern

Aramis Team, Inria, Paris

Tackled the analysis of graphs embedded into 3D space in order to study the variability and plasticity of vessel networks in the adult mouse brain.
Supervised by Stanley Durrleman

APRIL 2017 – AUGUST 2017

Deep Learning Research Intern

National Institute of Informatics, Tokyo

Deep Learning for Medical Image Analysis (design and implementation). Classified cancerous and healthy cells in histopathology images.
Supervised by Benjamin Renoust

Besides Research

Winter 2025

Entrepreneurs Cohort

Mila Entrepreneurship Lab

Completed the Winter 2025 Cohort program, which included training workshops and a final pitch presentation in front of entrepreneurs and investors.

October 2020 – Present

Science Reviewer

MUHC Research Ethics Board

Reviews on a monthly basis research proposals related to artificial intelligence for the Research Ethics Board of the McGill University Health Center (MUHC).

August 2015

Volunteer

X-Microfinance, Guatemala

Traveled to Guatemala with a group of students to grant microcredits to farmers and entrepreneurs with limited resources.

November 2014 – March 2015

Navy Officer on the Supply Ship "La Somme"

Marine Nationale, Brest, France

Part of the engine department. Trained to be security coordinator during fire simulations onboard.

Publications & Projects

2025

A scalable gene network model of regulatory dynamics in single cells

P Bertin, JD Viviano, A Tejada-Lapuerta, ..., FJ Theis, Y Bengio (preprint)

2025

Causal machine learning for single-cell genomics

P Bertin*, A Tejada-Lapuerta*, S Bauer, H Aliee, Y Bengio, FJ Theis (Nature Genetics)

2023

RECOVER identifies synergistic drug combinations in vitro through sequential model optimization

Bertin, J Rector-Brooks, D Sharma, ..., JP Taylor-King, Y Bengio (Cell Reports Methods)

2023

DEUP: Direct Epistemic Uncertainty Prediction

S Lahlou, M Jain, H Nekoei, VI Butoi, P Bertin, ..., Y Bengio (TMLR)

2022

TorchXRayVision: A library of chest X-ray datasets and models

JP Cohen, JD Viviano, P Bertin, ..., H Bertrand (PMLR)

2020

Mapping the fine-scale organization and plasticity of the brain vasculature

C Kirst, S Skriabine, A Vieites-Prado, T Topilko, P Bertin, ..., N Renier (Cell)

2019

Analysis of gene interaction graphs for biasing machine learning models

P Bertin, M Hashir, M Weiss, G Boucher, V Frappier, JP Cohen (MLCB)

Teaching

2020 and 2021

AI4Genomics Bootcamp instructor

Instructor for two consecutive years in the AI for Genomics Bootcamp supported by Mila and IVADO.

- Designed and delivered a 3-hour lecture: *Challenges of Machine Learning for Transcriptomics* [slides]
- Supervised and evaluated student projects throughout the 12-week program.

Communication skills

French	Native speaker
English	Proficient
Spanish	Advanced

Software skills

Good level	Python, PyTorch, Java, Tensorflow
Intermediate	C++, git, HTML, bash, LaTeX

Outside the Lab

- Improvisation theater.
- Climbing (top rope, lead, sometimes bouldering), running.
- Discovering hidden corners of the city.