Lucas Berry

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EDUCATION

McGill University Montreal, QC
Doctorate of Philosophy: Computer Science Expected December 2024
Advisor: David Meger
Areas of Study: Uncertainty Estimation, Normalizing Flows, Diffusion Models
Research Projects:

- Safe Reinforcement Learning for Autonomous Driving
- Expressive Aleatoric Normalizing Flow Ensembles Models with Accurate Epistemic Uncertainty
- Pairwise Distances to Estimate Epistemic Uncertainty for Probabilistic Ensembles
- Epistemic Uncertainty Estimation for Image Generation for Diffusion Models

Concordia University Montreal, QC
Masters of Arts: Mathematics December 2016
Advisor: Jose Garrido
Areas of Study: Machine Learning, Hidden Markov Models, Actuarial Science
Thesis: Hybrid Hidden Markov Model and Generalized Linear Model for Auto Insurance Premiums

University of British Columbia Vancouver, BC
Bachelors of Arts: Mathematics Major, Psychology Minor April 2013
Average in Math Courses 83% (A-)

WORK EXPERIENCE

Birds of Color Algorithms (Algorithmic Trading Startup) Montreal, QC
Founding Partner Jun 2019 – 2024

- Utilized proficiency in Machine Learning to train neural network models for NHL betting, resulting in a notable 2.13% profit in 2023 and a sustained increase of 6.79% in 2024.
- Engineered automated systems employing Beautiful Soup, Selenium and Pandas to systematically collect and clean NHL statistics, amassing a dataset spanning 15 years and encompassing over 18,000 games.
- Created a semi-automated notification system, promptly alerting users to opportune betting scenarios via email, and logging bets following user execution.
- Leveraged expertise in reinforcement learning to build a robust pipeline for stock trading, leveraging 20 years of historical stock data. Successfully trained a reinforcement learning agent to buy and hold Google stock.
- Successfully managed and recruited a team of two individuals, organized meetings twice a week to coordinate collaborative efforts, formulated impactful business strategies, and outlined a roadmap for the business's future development.

McGill University (Department of Family Medicine) Montreal, QC
Research Assistant Apr 2017 – May 2022

- Built an application that facilitated the analysis of statistical outcomes in 3+3 phase 1 drug trials. This user-friendly platform empowered practitioners by integrating a Bayesian framework, allowing seamless incorporation of prior beliefs.
- Successfully fine-tuned a pre-trained language model (XLNet) to develop a robust fake news predictive model. Our model secured 13th place out of 300 competing teams in a nationwide competition (Fact or Fake News?).
- Created a predictive model to ascertain the presence of Idiopathic Pulmonary Fibrosis from a combination of covariates and CT scans. We competed in an international competition securing the 22nd position out of 2,097 competing teams.

Black Eagle Algorithms S.E.N.C. (Cryptocurrency Arbitrage) Montreal, QC
Founding Partner Sep 2018 – Jun 2019

- Constructed a comprehensive codebase that systematically queried the APIs of 10 prominent cryptocurrency exchanges at five-minute intervals, generating an expansive database (over 440 billion lines).
- Leveraged this extensive dataset to conduct in-depth statistical analyses, successfully identifying and isolating lucrative arbitrage opportunities within the cryptocurrency market.
- Built a fully automated trading algorithm capable of executing trades on various cryptocurrency exchanges. Returning a 4% profit monthly for 10 months until market conditions shifted unfavorably due to bankruptcy of a cryptocurrency exchange.

Concordia University & HEC Montreal (Department of Mathematics) Montreal, QC
Course Lecturer Sep 2015 – May 2016

- Effectively taught classes of over 70 students (Introduction to Statistics, Calculus 1) by encouraging questions and explaining concepts differently to cater to various learning styles.
- Provided individualized help before and after class, in addition to office hours, to help relieve math anxiety.

RESEARCH PAPERS

- **Lucas Berry** and David Meger. Normalizing Flow Ensembles for Rich Aleatoric and Epistemic Uncertainty Modeling. Proceedings of the AAAI Conference on Artificial Intelligence, 37(6):6806–6814, 2023.
- **Lucas Berry** and David Meger. Efficient Epistemic Uncertainty Estimation in Regression Ensemble Models Using Pairwise-Distance Estimators. *In Review* at Neural Information Processing Systems (NeurIPS) 2024.
- **Lucas Berry**, Axel Brando and David Meger. Shedding Light on Large Generative Networks: Estimating Epistemic Uncertainty in Diffusion Models. *Accepted* to Conference on Uncertainty in Artificial Intelligence (UAI) 2024.
- Faraz Lotfi, Khalil Virji, Farnoosh Faraji, **Lucas Berry**, Andrew Holliday, David Meger and Gregory Dudek. Uncertainty-aware hybrid paradigm of nonlinear MPC and model-based RL for offroad navigation: Exploration of transformers in the predictive model. *Accepted* to International Conference on Robotics and Automation (ICRA) 2024.

COMMUNITY INVOLVEMENT

Mentor (Tyndale St. Georges & UBC) Jan 2012 – Jan 2017

- Assisted high school students with their math homework by systematically breaking down complex problems into more manageable and comprehensible components.
- Cultivated strong connections with students by aligning mathematical concepts with their interests and effectively communicating in their preferred language (English or French).

President (Math & Stat Graduate Student Association, Concordia) Sep 2014 – Sep 2015

- Built a more integrated community within the department by organizing events that featured graduate students and faculty.
- Effectively managed expenditures to adhere to the fiscal budget while strategically optimizing spending.

ADDITIONAL

Coding Skills: Python (Numpy, Pytorch, Matplotlib, Pandas, Scipy), Web Scraping (Beautiful Soup, Selenium), R, Matlab, Julia
Languages: Fluent in English, Conversational Proficiency in French
Certifications: Passed 3 Actuarial Exams (P, FM, MFE)
Reviewer: NeurIPS (2023, 2024), ICML (2023, 2024), CoRL (2018), IROS (2018, 2023), ICRA (2024)