Andres Ross

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Programming skills: Julia, Python, Flux, Zygote, PyTorch, scikit-learn, Jupiter, NumPy, SciPy
Skills: Data Science, Statistics, Neural Networks, Optimization, ETL, French and Spanish

Education

MSc Applied Mathematics, 2022, GPA 4.0/4.0
University of British Columbia, Vancouver

- Courses: Advanced Machine Learning, Stochastic Differential Equations, Modern Control, Optimal Transport, Dynamical Systems, Numerical analysis.
- "International tuition award", "Faculty of applied science graduate award" and "Research Assistantship" in recognition of academic achievement and research potential.

Honors Math and Physics, 2020, GPA 3.66/4.0 (**First class honors**)
McGill University, Montreal

- Hugh M. Brock Scholarship awarded for academic standing and leadership in community.
- Montreal Hospital (meal assistance) & BeyondMe (mentorship for children with disabilities)

Experience

The Ottawa Hospital Research Institute, Ottawa
Researcher (05/2018) - (09/2018)

- Engineered from the ground up a **machine learning** algorithm that predicted with **84% accuracy** in real time, errors during liver cancer treatment using **Python**.
- Built a synchronous **ETL** pipeline from data acquisition to classification for 105 patients.
- Cleansed the datasets by **clustering** down to %5 samples and using **rolling statistics**.
- Designed 56 features to represent **time series data** from patient breathing that lead to 10% false negative rate using **statistical** and morphological (biological) techniques.

Research and Publications

University of British Columbia, Vancouver
Research student - Nonlinear Atomic Cluster Expansion models (05/2020) - (Present)

- Modeled **high dimensional data** for titanium to 0.05% accuracy through **data preprocessing** and **postprocessing** using both Python and Julia (ACE.jl).
- Extended ACE.jl to allow for >2 features using **functional programing** in Julia.
- Re-implemented ACE to allow for **automatic differentiation** using **PyTorch**.
- Redesigning the ACE pipeline as a **Neural Network** for increased flexibility.
- Developing ACEgnns.jl as an **AI** extension by coding custom **adjoints** and layers in **Julia**.

McGill University, Montreal
Research student - Modeling copper smelter dynamics (01/2019) - (05/2019)

- Re-engineered and published quantitative models for copper smelters using **Discrete event simulation** and **numerical analysis** on **Python**.
- Detected **anomaly events** with %0.002 accuracy using **Newton Iterations** and **RK4**.

McGill University, Montreal
Research student - Immune detection models (05/2017) - (09/2017)

- Proved that Mutual Information contracted feature space 1E06 times compared to other loss functions using the Fisher Information Matrix for an immunology model in **Python**.
- Identified principal biological features for **adversarial** examples in immune detection and reduced standard deviation of the feature spread by 70% using **SVD** and **PCA**.
- **Presented** my results at the Canadian undergraduate research conference.