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Jacob Chmura

MACHINE LEARNING RESEARCHER | SOFTWARE ENGINEER

Results-driven ML engineer with over 4 years of professional experience at the forefront of AI innovation. Proven delivery of production-ready ML software and high-impact research in fast-paced trading environments. Passionate about crafting efficient, maintainable, and tested software.

Work Experience

- **ML Researcher** - Mila, Quebec AI Institute — 2024 — Present
  - · Developing a high-performance PyTorch library for accelerating training & inference workloads over temporal graphs, enhancing scalability for graph-based deep learning models
  - · Building a continual RLHF framework leveraging vLLM to automate preference generation with large-scale language models and assess plasticity of reinforcement learning algorithms in non-stationary environments
- **ML Software Engineer** - Royal Bank of Canada — 2022 — 2024
  - · Led R&D and deployment of a ML-powered smart order router system, optimizing exchange selection using real-time market features, resulting in 2B+ executed trades and $650K annual savings in transaction fees
  - · Architected a Cython-accelerated distributed feature store, streaming real-time features over ZMQ, providing low-latency price prediction signals for various models on the trading platform
  - · Designed a platform for managing the lifecycle of predictive models, integrating Apache Parquet with KDB databases, standardizing model evaluation and data versioning for the research team
- **ML Software Engineer, Intern** - Royal Bank of Canada — 2020 — 2021
  - · Designed and implemented a distributed multi-objective reinforcement learning algorithm which adjusts to client preferences and market conditions, resulting in 2 patents for algorithmic trading
  - · Automated simulation and stress-testing pipelines, ensuring production-ready models across market conditions
- **ML Researcher** - Vector AI Institute — 2019 — 2020
  - · Developed an information-theoretic dynamic programming algorithm in C that find optimal genome segmentations, reducing the number of mutations needed to differentiate cancer by 20%
  - · Enhanced interpretability of pre-trained tumor classification models by integrating DeepLIFT feature importance analysis, identifying biologically meaningful mutation topology patterns

Education

- **Master of Computer Science** - McGill University — Expected Sept 2026
  cgpa: 4.00
- **Honours Bachelor of Computer Science & Mathematics** - University of Toronto — 2022
  cgpa: 3.96

Skills

- Python, C++, C, Java, KDB, CUDA
- Pytorch, ZMQ, Protobuf, gRPC, Spark, Kafka, Redis, Cassandra, SQL
- Probability & Statistics, Deep Learning, Optimization, Graph Neural Networks, Reinforcement Learning
- Distributed Systems, Computer Architecture, Parallel Computing, Software Design, CI/CD

Patents & Publications

- Plausibility Vaccine: Injecting LLM Knowledge for Event Plausibility — McGill University, 2024
- Information-based Exploration for Sparse Markov Decision Processes — Royal Bank of Canada, 2023
- Multi-Objective Reinforcement Learning For Personalized Trading — Royal Bank of Canada, 2021
- Gradient Modulation for Multi-Objective Reinforcement Learning — Royal Bank of Canada, 2021
- Optimal Division of the Genome with Cancer Specific Mutation Topology — Vector AI Institute, 2020