Yohan Chatelain

Computer Scientist

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Professional Summary

Experienced Computer Scientist with a focus on **High-Performance Computing (HPC)**, **low-level optimization**, **numerical instabilities** and **Artificial Intelligence (AI)**. Skilled in **teaching** (4 courses), **mentoring** (6 Bs to PhD), and **publishing** (15 papers). Enhanced computational tool efficiency and performance, **achieving significant speed** and **resource optimization**. Developed solutions for HPC and Python-based scientific computing, **prioritizing reliability** and **numerical stability**.

Work Experience

Concordia University, Postdoctoral fellow

Jun 2020 - Present | Montreal, QC, Canada

Engaged in advanced research, student mentorship, and development of high-efficiency tools in high-performance computing.

- **Co-led** works on **CNN** numerical analysis in **bioinformatics** and **neuroimaging**, proving strong numerical stability at inference.
- **Co-led** works on **precision reduction** (from 64 bits to 8 bits) in **data stream classification** with F1 score improvement (+15%).
- **Co-authored** a study that highlighted the crucial role of numerical stability in **MRI tumor segmentation deep learning** reproducibility.
- **Co-authored** a study to replicate **machine learning models** from prior work to **predict Parkinson's disease progression.**
- **Designed** a unified C/C++ interface for **top-tier numerical analysis tools** as part of France's National Research Agency (€600k).
- **Led the creation** of the open-source tool, **PyTracer**, designed for **tracing numerical instabilities** in Python programs.
- **Maintained open-source ecosystem Fuzzy** for evaluating numerical errors' impact with scientific Python through **Docker**.
- **Authored significantdigit** Python package designed for rigorous **statistical analysis of Stochastic Arithmetic** calculations.

Intel, Software Engineer Intern

Jan 2019 - Jul 2019 | Hillsboro, OR, USA

Part of the Numerics US team (MKL, IML, VML) to enhance Intel's numerical computing performance and reliability.

- **Modernized Intel Mathematical Library (IML) by optimizing 50% of its functions** and implemented **continuous integration** for test validation, bolstering mathematical library quality.

Paris-Saclay University, PhD student

Oct 2016 - Mar 2020 | Versailles, France

Conducted innovative research and tool development in high-performance computing, focusing on computational reduction.

- **Engineered** compiler backend tool to simulate reduced floating-point formats. **Achieving up to 67% reduction** in communication volume, **conserving energy** and **cutting execution time** when applied to a parallel fluid mechanics solver.
- **Led the development of** VeriTracer for **visualizing numerical instabilities** in clang-supported languages, integrated in a **Java IDE**.
- **Maintained** Verificarlo, **optimized backends** with **x2 for the speed** and wrote **compilation passes** with LLVM.
- **Construction** of an energetic prediction model in the HPC context
- **Developped** a novel **multi-threaded capture (ptrace)** feature in C, **x2 experiment scalability and improving memory replay.**

Education

- PhD's Degree in Computer Science — Dec 2019, Paris-Saclay University
- Master's Degree in High Performance Computing — Sep 2016, Paris-Saclay University
- Bachelor's Degree in Computer Science — Jul 2014, Paris-Saclay University

Skills

- C, C++, Python, FORTRAN, x86, OCaml, Java, Rust, Shell, Bash
- NumPy, SciPy, Pandas, TensorFlow, PyTorch
- BLAS, LAPACK, OpenMP, MPI, MKL, OneApi, CUDA, LLVM, Clang, Linux kernel

Languages

- French (Native)
- English (Professional)

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