



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
- Developed a novel multi-threaded capture (ptrace) feature in C, x2 experiment scalability and improving memory replay.

Education

- PhD's Degree in Computer Science
- Master's Degree in High Performance Computing
- Bachelor's Degree in Computer Science

Dec 2019, Paris-Saclay University
Sep 2016, Paris-Saclay University
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)



yohan-chatelain



yohanchatelain.github.io



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