



# 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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