Yohan Chatelain | Curriculum Vitae

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Professional Experiences

University of Concordia — **Montreal, Canada**
Postdoctoral researcher, *Big Data Infrastructures for neuroimaging laboratory* — *September 2020 – now*
Headed by: Tristan GLATARD

Tracing numerical instabilities for reproducible Big Data analyses in neuroimaging
- Design a monitoring method to identify unstable elements in a neuroimaging data analysis pipeline
- Design a fine-grained aggregation method to stabilize pipeline elements
- Improve performance of monitoring methods

University of Versailles Saint-Quentin-en-Yvelines (UVSQ) — **Versailles, France**
PhD candidate, *Computer Science* — *October 2016 – December 2019*

Tools for debugging and optimizing floating-points computations in HPC
PhD advisor: Professor William JALBY
PhD co-supervisor: Assistant Professor Pablo DE OLIVEIRA CASTRO

Intel Corporation — **Hillsboro, Oregon**
Software Engineer, *Numerics US team* — *January 2019 – July 2019*

Software development
- Development of mathematical functions
- Code modernization for ensuring quality standards
- Setting up continuous integration for validation tests suite

University of Versailles Saint-Quentin-en-Yvelines (UVSQ) — **Versailles, France**
Research Internship, *Supervisor: Pablo DE OLIVEIRA CASTRO* — *April 2016 – September 2016*

Building an energetic prediction model
- Construction of an energetic prediction model in the HPC context
- Characterization of applications by a piecewise method by using CERE tool
- Development of a new parallel capture for shared memory system into CERE tool

Laboratory Exascale Computing Research (ECR) — **Bruyères-le-Châtel, France**
Research Internship, *Supervisor: Pablo DE OLIVEIRA CASTRO* — *May 2015 – September 2015*

Codelets specialization based on value profiling in CERE tool
- Implementation of an automatic functions specializer in LLVM
- Implementation of a value profiling method
- Characterization of speedups gained with specialization

Laboratoire de Recherche Informatique (LRI) — **Gif-Sur-Yvette, France**
Research Internship, *Supervisor: Jean-Christophe FILLIÂTRE* — *May 2014 – June 2014*

Implementation of a program termination criterion in OCaml

Teaching Assistant

Compilers — **UVSQ**
Teaching assistant: bachelor level (72h) — *2018–2019*

Advanced Algorithms — **UVSQ**
Teaching assistant: bachelor level (72h) — *2016–2018*

Parallel Architectures — **UVSQ**
Teaching assistant: master level (40h) — *2016–2017*

Supervision

- **Master level** — **Concordia University - Big Data lab**
  Inés Gonzalez Pepe — *September 2021 – September 2023*
  Co-supervisor: Tristan GLATARD (50%)
  Subject: "Numerical stability of deep learning in bioinformatics"
- **Undergraduate level** — **Concordia University - Big Data lab**
  Nigel YONG — *May 2021 – June 2021*
  Co-supervisor: Tristan GLATARD (50%)
  Subject: "Optimizing PyTracer"
- **Undergraduate level** — **Concordia University - Big Data lab**
  Marc VICUNA — *January 2021 – May 2021*
  Co-supervisor: Martin KHANNOUZ (33%), Tristan GLATARD (33%)
  Subject: "Reducing numerical precision preserves classification accuracy in Mondrian Forests"
- **Master level** — **UVSQ - ECR**
  Damien THENOT — *June 2018 – September 2018*
  Co-supervisor: Pablo DE OLIVEIRA CASTRO (50%)
  Subject: "Development of an IDE in Java for Veritracer"

Education

Academic Qualifications

- **University of Versailles Saint-Quentin-en-Yvelines (UVSQ) - Paris Saclay** — **Versailles, France**
  PhD, Computer Science — *2016–2019*
- **University of Versailles Saint-Quentin-en-Yvelines (UVSQ)** — **Versailles, France**
  Master's degree, High Performance Computing and Simulation — *2014–2016*
- **University Paris-Sud XI (U-PSUD)** — **Orsay, France**
  Bachelor's degree, Computer Science — *2010–2014*

Technical skills

- **Programming Languages:** C, C++, Python, Fortran, Bash, LaTeX, Assembly, OCaml
- **Production Tools:** Emacs, Make, Git, LLVM/Clang, GCC

Research

Peer-reviewed publications in journals

- **Piecewise holistic autotuning of parallel programs with CERE**
  Mihail Popov, Chadi Akel, Yohan Chatelain, William Jalby, and Pablo de Oliveira Castro, Concurrency and Computation: Practice and Experience, vol. 29, Aug 2017.

Peer-reviewed publications in conferences

- **Reducing numerical precision preserves classification accuracy in Mondrian Forests**
  Marc Vicuna, Martin Khannouz, Gregory Kiar, Yohan Chatelain, Tristan Glatard.
  6th Workshop on Real-time Stream Analytics, Stream Mining, CER/CEP & Stream Data Management in Big Data, 2021.
- **Data Augmentation Through Monte Carlo Arithmetic Leads to More Generalizable Classification in Connectomics**
  Gregory Kiar, Yohan Chatelain, Ali Salari, Alan C. Evans, Tristan Glatard in Brain Networks. In Neurons, Behavior, Data Analysis and Theory, 2021.
- **Accurate simulation of operating system updates in neuroimaging using Monte-Carlo arithmetic**
  Ali Salari, Yohan Chatelain, Gregory Kiar, Tristan Glatard. In 2021 MICCAI workshop on Uncertainty for Safe Utilization of Machine Learning in Medical Imaging (UNSURE 2021).

- **Numerical Uncertainty in Analytical Pipelines Lead to Impactful Variability in Brain Networks**
  Gregory Kiar, Yohan Chatelain, Pablo de Oliveira Castro, Eric Petit, Ariel Rokem, Gaël Varoquaux, Bratislav Misic, Alan C. Evans, Tristan Glatard. In PLOS ONE (2021).
- **Automatic exploration of reduced floating-point representations in iterative methods**
  Yohan Chatelain, Eric Petit, Pablo de Oliveira Castro, Ghislain Lartigue, & David Defour (2019, August). In European Conference on Parallel Processing (Euro-Par) (pp. 481-494). Springer, Cham.
- **VeriTracer: Context-enriched tracer for floating-point arithmetic analysis**
  Yohan Chatelain, Pablo de Oliveira Castro, Eric Petit, David Defour, Jordan Bieder, and Marc Torrent. In 2018 IEEE 25th Symposium on Computer Arithmetic (ARITH) (pp. 61-68). IEEE.

Unpublished research reports

- **PyTracer: Automatically profiling numerical instabilities in Python**
  Yohan Chatelain, Nigel Yong, Gregory Kiar, Tristan Glatard. arXiv preprint arXiv:2112.11508. (2021)

Communications in international conferences (summary)

- **Fuzzy environments for the perturbation, evaluation, and application of numerical uncertainty via Monte Carlo Arithmetic in the scientific Python ecosystem**
  Gregory Kiar, Yohan Chatelain, Ali Salari, Eric Petit, Pablo de Oliveira Castro and Tristan Glatard. SciPy Conference, 2021.
- **Towards Abinit on ExaScale supercomputers: the challenge for electronic structure physicists**
  Jordan Bieder, Marc Torrent and Yohan Chatelain. APS Meeting Abstracts. 2018

Invited talks

- **IXPUG 2019**: Intel Extreme Performance Users Group, CERN, Geneva, Switzerland
- **IXPUG 2018**: Intel Extreme Performance Users Group, Intel Corporation, Hillsboro, OR, USA
- **ESTN 2018**: 8èmes École Thématique de Simulation Numérique, Cargèse, 2018
  Topic: "Numerical simulations validation and computational codes quality"
- **RAIM 2017**: 9èmes Rencontres «Arithmétique de l'Informatique Mathématique», Lyon, 2017
- **ABIDEV 2017**: The 8th ABINIT developers workshop, Frejus, 2017

Software

Productions

- **PyTracer**: PyTracer: Automatically profiling numerical instabilities in Python - GPL-3.0
  Open source project on GitHub: github.com/yohanchatelain/pytracer
- **VeriTracer**: A context-enriched tracer for floating-point arithmetic analysis - GPL-3.0
  Open source project on GitHub: github.com/verificarlo/verificarlo/tree/veritracer

Contributions

- **Fuzzy**: A fuzzy ecosystem for evaluating the effect of numerical error on computational tools - GPL-3.0
  Open source project on GitHub: github.com/verificarlo/fuzzy
- **Verificarlo**: A tool for automatic Montecarlo Arithmetic analysis - GPL-3.0
  Open source project on GitHub: github.com/verificarlo/verificarlo
- **CERE**: Codelet extractor and REplayer for piecewise benchmarking and optimization - GPL-3.0
  Open source project on GitHub: github.com/benchmark-subsetting/cere