

Bruno Magalhaes

High Performance Computing, Machine Learning and Simulation

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Lausanne, Switzerland [linkedin.com/in/brunomaga](#) [github.com/brunomaga](#)
Native in Portuguese, fluent in English and French, proficient in Spanish and fair in Slovenian
Hobbies : waterpolo, skiing, reading, travelling, cryptocurrency, guitar



Work Experience

- ongoing
Sep 2019 **AI Resident, Microsoft Research, Cambridge, UK**
 > DNNs and Bayesian Optimization (analytical gaussian posteriors, Variational Inference, Monte-Carlo)
 > Sequence-data learning for time prediction (RNNs, LSTMs, Transformers, Encoder-Decoders)
 > Feature selection and dimensionality reduction (PCA, PointNet)
- Aug 2019
Mar 2015 **Doctoral Assistant > Postdoctoral Researcher, École Polytechnique Fédérale de Lausanne, Switzerland**
 > Research, conceptualization, implementation and publication of new methods for asynchronous execution of the simulation of detailed neural networks on large networks of highly-heterogeneous compute nodes
 > Technologies : asynchronous runtime systems (HPX), computation and communication; global memory addressing; distributed task scheduling, concurrency and threading; dynamic load-balancing; vectorization and cache-optimization;
 > Teaching assistant for Unsupervised and reinforcement learning, Project in Neuroinformatics and *In silico* neuroscience.
 C C++ Python HPX-5 MPI \LaTeX tensorflow google test TCLAP Sundials CVODE
- Feb 2015
Mar 2011 **Research Engineer for High Performance Computing, Blue Brain Project, EPFL, Lausanne, Switzerland**
 > Parallel algorithms for spatial decomposition of neural networks
 > Parallel algorithms for distributed task-stealing programming models on neural networks
 > Parallel algorithms for synaptic map reconstruction via efficient distributed sparse matrix transposition
 > Efficient algorithms for distributed IO and spatial indexing of detailed neuron morphologies
 C C++ Message Passing Interface (MPI) OpenMP CMake IBM BlueGene/P and /Q parallel IO (MPI, HDF5)
- Feb 2011
Sep 2009 **Junior Architect for IT infrastructures, Noble Group, Hong Kong, New York, São Paulo & London**
 > Network design of a contingency data centre for all EU Power & Gas trading infrastructure, London, UK
 > Network and infrastructure design of a port and warehouse for coffee and soy beans, Santos, Brazil
 > Implementation of a web-based software for metals and coffee trading, New York, USA
 Cisco and 3Com network devices ASP.NET
- Oct 2008
Mar 2007 **Analyst programmer, Investment Property Databank (MSCI Real Estate), London, UK**
 > Development of web-based geographical systems and Windows apps for efficient real estate data handling and analytics
 C# Visual Basic F# ASP.NET MS SQL Server SSIS workflows google maps API javascript

Education

- Jun 2019
Mar 2015 **PhD Computational Neuroscience, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland**
 > Thesis *Asynchronous Simulation of Neuronal Activity* nominated for the EPFL doctoral school excellency award (TOP 8% doctorates) and for the IBM research award for the best thesis in computational sciences
 > Visiting scholar at the Center for Research in Extreme Scale Technologies at Indiana University (US), Summers 2015-17
- Sep 2009
Oct 2008 **MSc Advanced Computing, Imperial College London, UK**
 > Final project on *GPU-enabled steady-state solution of large Markov models* researching distributed, multi-core CPU and GPU computation of large Markov models awarded distinction and published at NSMC'10. Finished degree with Merit.
- Jul 2007
Oct 2002 **Licenciatura (5-year BSc) Systems Engineering and Computer Science, University of Minho, Portugal**
 > Exchange student at the University of Maribor, Slovenia, 2005/2006. Finished degree with A (Top 10%)

Publications peer-reviewed ; first author unless mentioned otherwise

- submitted Efficient Distributed Transposition of Large-Scale Multigraphs And High-Cardinality Sparse Matrices
- submitted Fully-Asynchronous Fully-Implicit Variable-Order Variable-Timestep Simulation of Neural Networks, PLOS Comp. Biology
- 2019 Asynchronous SIMD-Enabled Branch-Parallelism of Morphologically-Detailed Neuron Models, Frontiers in Neuroinformatics
- 2019 (PhD thesis) Asynchronous Simulation of Neuronal Activity, EPFL Scientific publications
- 2019 Fully-Asynchronous Cache-Efficient Simulation of Detailed Neural Networks, Proc. International Conference on Computational Science (ICCS 2019), Faro, Portugal
- 2019 Exploiting Implicit Flow Graph of System of ODEs to Accelerate the Simulation of Neural Networks, Proc. International Parallel & Distributed Processing Symposium (IPDPS 2019), Rio de Janeiro, Brazil
- 2016 An efficient parallel load-balancing strategy for orthogonal decomposition of geometrical data, Proc. International Super Computing (ISC 2016), Frankfurt, Germany
- 2015 (co-author) Reconstruction and Simulation of Neocortical Microcircuitry, Cell 163, 456–492.
- 2010 (MSc final project) GPU-enabled steady-state solution of large Markov models, Proc. International Workshop on the Numerical Solution of Markov Chains (NSMC 2010), Williamsburg, Virginia