










# Bruno Magalhaes

## Researcher/Engineer for High Performance Computing and Machine Learning

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 [brunomaga](#)    [brunomaga](#)    [ibrunomaga](#)    Lausanne, Switzerland    Portuguese  
 Native in Portuguese, fluent in English and French, proficient in Spanish and fair in Slovenian  
 Hobbies : waterpolo, skiing, cooking, travelling, cryptocurrency    Updated 08/12/2020



## Work Experience

- Oct 2020  
Sep 2019   **AI Resident, Microsoft Research , Cambridge (UK)**
- Improvement of load balancing of Exchange email servers by learning time series from user usage patterns. Used DNNs, RNNs, GRUs Encoder-Decoder w/ Attention Mech., and Bayesian Optimization (closed-form, Variational Inf., MCMC);
  - Graph Neural Networks for recommendation and insights on large-scale Meetings/Documents/Users/Emails graph;
  - Feature selection, outliers detection, and general data processing algorithms for Exabyte-scale ML datasets;
- [Python](#) [Pytorch](#) [Pandas](#) [Spark](#)
- Aug 2019  
Mar 2015   **Doctoral Assistant ▸ Postdoctoral Researcher, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland**
- Research, conceptualization, implementation and publication of new methods for asynchronous variable-step simulation of detailed spiking 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](#) [Message Passing Interface \(MPI\)](#)  [\$\LaTeX\$](#)  [Sundials CVODE](#) [Cray supercomputer](#) [Infiniband](#)
- 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++](#) [MPI](#) [Posix threads](#) [OpenMP](#) [IBM BlueGene/P and /Q supercomputers](#) [SGI supercomputer](#) [parallel IO \(MPI, HDF5\)](#)
- Feb 2011  
Sep 2009   **Junior Architect for IT infrastructures, Noble Group, Hong Kong, New York, São Paulo & London**
- Network design and configuration for a backup data centre for EU Power & Gas trading infrastructure, London, UK
  - Network configuration and infrastructure design for 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
- Oct 2008  
Mar 2007   **Analyst programmer, Investment Property Databank (MSCI Real Estate), London, UK**
- Development of web and windows apps (ASP .NET, C#) for real estate data warehousing and analytics

## 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 (awaiting decision)
  - Trained on cellular behavior and cognitive neuroscience, biological modeling, machine learning, NLP and Statistics
  - 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 *GPU-enabled steady-state solution of large Markov models* based on distributed, multi-core CPU and GPU (CUDA) 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 and first author unless mentioned otherwise**

- 2020   Fully-Asynchronous Fully-Implicit Variable-Order Variable-Timestep Simulation of Neural Networks, Proc. International Conference on Computational Science, Amsterdam, Holland (ICCS 2020)
- 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
- ongoing   (arXiv) Distributed Async. Execution Speeds and Scales Up Over 100x The Detection Of Contacts Between Detailed Neuron Morphologies
- ongoing   (arXiv) Efficient Distributed Transposition of Large-Scale Multigraphs And High-Cardinality Sparse Matrices