

Bruno Magalhaes

Research Engineer for High Performance Computing and Machine Learning

✉ brunomaga@gmail.com  [brunomaga](#)  [brunomaga](#)  [brunomaga](#)  [ibrunomaga](#)

🇵🇹 Portuguese  Native in Portuguese; Fluent in English, French, Spanish; fair in Slovenian

🏠 Lausanne, Switzerland ❤️ Hobbies : waterpolo, skiing, cooking, travelling, cryptocurrency

📄 [short resume, for more details visit https://brunomaga.github.io](https://brunomaga.github.io) 📅 Updated 14/12/2020



Work Experience

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| Oct 2020
Sep 2019 | AI Resident, Microsoft Research , Cambridge (UK) <ul style="list-style-type: none">➢ Improvement of load balancing of 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);➢ Recommendation system using Graph Neural Nets on very large Meetings/Documents/Users/Emails graph;➢ Feature selection, outliers detection, and distributed data processing algorithms for exabyte-scale ML datasets; <div>Python Pytorch Pandas Spark</div> |
| Aug 2019
Mar 2015 | PhD candidate, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland <ul style="list-style-type: none">➢ Research, conceptualization, implementation and publication of new methods for asynchronous variable-step simulation of detailed spiking neural networks on large (>10K) 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 <i>In silico</i> neuroscience. <div>C C++ Python HPX-5 Message Passing Interface (MPI) LaTeX Sundials CVODE Cray supercomputer Infiniband</div> |
| Feb 2015
Mar 2011 | Research Engineer for High Performance Computing, Blue Brain Project, EPFL, Lausanne, Switzerland <ul style="list-style-type: none">➢ Creation and implementation of algorithms for parallel/distributed volumetric spatial decomposition, load balancing, spatial indexing, sorting, I/O, sparse matrix transpose, and graph navigation, that underlie an efficient storage and processing of neural networks on extremely large supercomputers with over 16K compute nodes; <div>C C++ MPI Posix threads OpenMP IBM BlueGene/P and /Q supercomputers SGI supercomputer parallel IO (MPI, HDF5)</div> |
| Feb 2011
Sep 2009 | Junior Architect for IT infrastructures, Noble Group, Hong Kong, New York, São Paulo & London <ul style="list-style-type: none">➢ 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 <ul style="list-style-type: none">➢ Development of a search engine and web/windows app (C++, C#, .NET) for efficient storage and analytics of financial data |

Education

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| Jun 2019
Mar 2015 | PhD Computational Neuroscience, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland <ul style="list-style-type: none">➢ Thesis <i>Asynchronous Simulation of Neuronal Activity</i> 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 researcher 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 <ul style="list-style-type: none">➢ Final project <i>GPU-enabled steady-state solution of large Markov models</i> 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 <ul style="list-style-type: none">➢ 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

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| 2020 | Fully-Asynchronous Fully-Implicit Variable-Order Variable-Timestep Simulation of Neural Networks, Proc. International Conference on Computational Science, Amsterdam, Holland (ICCS 2020) |
| 2020 | Efficient Distributed Transposition of Large-Scale Multigraphs And High-Cardinality Sparse Matrices, arXiv |
| 2019 | Asynchronous SIMD-Enabled Branch-Parallelism of Morphologically-Detailed Neuron Models, Frontiers in Neuroinformatics |
| 2019 | Asynchronous Simulation of Neuronal Activity, EPFL Scientific publications (PhD thesis) |
| 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 | Magalhaes et al., 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 | GPU-enabled steady-state solution of large Markov models, Proc. International Workshop on the Numerical Solution of Markov Chains (NSMC 2010), Williamsburg, Virginia (MSc final project) |
| ongoing | Distributed Async. Execution Speeds and Scales Up Over 100x The Detection Of Contacts Between Detailed Neuron Morphologies |