



# Bruno Magalhaes

## Research Engineer for Machine Learning and High Performance Computing

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🇵🇹 Portuguese    languages : Portuguese, English, French, Spanish; fair in Slovenian

🏠 Lausanne, Switzerland    hobbies : waterpolo, skiing, cooking, travelling, cryptocurrency

📄 short resume, for more details visit <https://brunomaga.github.io>    updated 27/10/2021



## Work Experience

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|----------------------|---|
| present<br>Sep 2019  | <b>AI Resident » AI Researcher, Microsoft Research, Cambridge (UK)</b> <ul style="list-style-type: none"><li>as AI researcher, 2021-present : distributed computer vision models for object recognition and classification on 3D glass for Project Silica; full-stack development of large scalable pipelines for Machine Learning on the cloud (AzureML);</li><li>as AI Resident, 2019-20 : development (PyTorch) of ML models to improve load balancing of email servers from user logs and time series on distributed databases, using DNNs, RNNs, GRU Encoder-Decoders, and Bayesian Optimization; development of a recommendation system using Graph Neural Nets on a petabyte-scale graph of meetings, documents, emails and users;</li></ul>     |
| Aug 2019<br>Mar 2015 | <b>PhD candidate » postdoctoral researcher, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland</b> <ul style="list-style-type: none"><li>Research, development (C, C++) and publication of new methods for asynchronous variable-step simulation of detailed spiking neural networks on Cray and SGI supercomputers with over 10K compute nodes;</li><li>Technologies : asynchronous runtime systems (HPX-5), computation and communication; global memory addressing; distributed task scheduling, concurrency and threading; dynamic load-balancing; vectorization and cache optimization;</li><li>Teaching assistant for Unsupervised and reinforcement learning, Project in neuroinformatics and <i>In silico</i> neuroscience.</li></ul> |
| Feb 2015<br>Mar 2011 | <b>Research Engineer for High Performance Computing, Blue Brain Project, EPFL, Lausanne, Switzerland</b> <ul style="list-style-type: none"><li>Research, development (C, C++, MPI, OpenMP) and publication of methods 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 SGI and IBM BlueGene supercomputers with 16K compute nodes;</li></ul>   |
| Feb 2011<br>Sep 2009 | <b>Junior Architect for IT infrastructures, Noble Group, Hong Kong, New York, São Paulo &amp; London</b> <ul style="list-style-type: none"><li>Network design and configuration for a backup data centre for EU Power &amp; Gas trading infrastructure, London, UK</li><li>Network configuration and infrastructure design for a port and warehouse for coffee and soy beans, Santos, Brazil</li><li>Implementation of a web-based software for metals and coffee trading, New York, USA</li></ul>  |
| Oct 2008<br>Mar 2007 | <b>Analyst programmer, Investment Property Databank (now MSCI Real Estate), London, UK</b> <ul style="list-style-type: none"><li>Development of a search engine and web/windows app (C++, C#, .NET) for efficient storage and analytics of financial data</li></ul>   |

## Education

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|----------------------|---|
| Jun 2019<br>Mar 2015 | <b>PhD Computational Neuroscience, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland</b> <ul style="list-style-type: none"><li>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)</li><li>Trained on cellular behavior and cognitive neuroscience, biological modeling, machine learning, NLP and Statistics</li><li>Visiting researcher at the Center for Research in Extreme Scale Technologies at Indiana University (US), Summers 2015-17</li></ul> |
| Sep 2009<br>Oct 2008 | <b>MSc Advanced Computing, Imperial College London, UK</b> <ul style="list-style-type: none"><li>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.</li></ul>   |
| Jul 2007<br>Oct 2002 | <b>Licenciatura (5-year BSc) Systems Engineering and Computer Science, University of Minho, Portugal</b> <ul style="list-style-type: none"><li>Exchange student at the University of Maribor, Slovenia, 2005/2006. Finished degree with A (Top 10%)</li></ul>   |

## 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 (ICCS 2020), Amsterdam, Holland              |
| 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)              |
| on hold | Distributed Asynchronous Execution Speeds and Scales Up Over 100x The Detection Of Contacts Between Detailed Neuron Morphologies   |