

Bruno Magalhaes

Machine Learning and Distributed, Parallel, High Performance Computing

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🇵🇹 citizenship : 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 01/06/2022



📁 Work Experience

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| present
Sep 2019 | AI Resident » Researcher » Senior Research Engineer, Microsoft Research, Cambridge (UK) <ul style="list-style-type: none">> as Researcher and Sr. Research Eng., 2021-present : parallel-distributed computer vision models for object recognition and classification on 3D glass for Project Silica; full-stack development of large scalable ML pipelines on the cloud (AzureML);> as AI Resident, 2019-20 : end-to-end development of ML models (PyTorch) and pipelines for : (1) improving dynamic load balancing of users across email servers, learning time series of user logs on distributed databases, using DNNs, RNNs, GRU Encoder-Decoders, and Bayesian Optimization; (2) development of a recommendation system using Graph Neural Nets on a distributed petabyte-scale graph of meetings, documents, emails and users; |
| Aug 2019
Mar 2015 | PhD candidate » postdoctoral researcher, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland <ul style="list-style-type: none">> 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;> Technologies : asynchronous runtime systems (HPX-5), computation and communication; global memory addressing; distributed task scheduling and concurrency; dynamic load balancing; vectorization; cache optimization; mixed precision;> Teaching assistant for Unsupervised and reinforcement learning, Project in neuroinformatics and <i>In silico</i> neuroscience. |
| Feb 2015
Mar 2011 | Research Engineer for High Performance Computing, Blue Brain Project, EPFL, Lausanne, Switzerland <ul style="list-style-type: none">> 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; |
| 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 (now 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">> Summary : distributed-parallel optimization & simulation of large neural networks using asynchronous runtime systems;> 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)> 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 (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 |