Bruno Magalhaes

Research Engineer for Machine Learning and High Performance Computing

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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 Updated 18/01/2021

Work Experience

present – Sep 2019 — AI Resident » AI researcher (postdoc), Microsoft Research , Cambridge (UK)
- (as AI researcher) working on Project Silica, developing computer vision for object detection and recognition, ML-driven discovery and optimization of new physical processes, hardware/software co-optimization and RL control;
- (as AI Resident) Improvement of load balancing of email servers by learning time series from pattern in user logs, using DNNs, RNNs, GRU Encoder-Decoders, and Bayesian Optimization (closed-form, Variational Inf., MCMC); and development of a recommendation system using Graph Neural Nets on a trillion-edge graph of meetings, documents, emails and users;

Aug 2019 – Mar 2015 — PhD candidate » postdoctoral researcher, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland
- Research, conceptualization, implementation (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, concurrency and threading; dynamic load-balancing; vectorization and cache optimization;
- Teaching assistant for Unsupervised and reinforcement learning, Project in neuroinformatics and *In silico* neuroscience.

Feb 2015 – Mar 2011 — Research Engineer for High Performance Computing, Blue Brain Project, EPFL, Lausanne, Switzerland
- Design of and development (C,C++, MPI, OpenMP) 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 SGI and IBM BlueGene supercomputers with over 16K compute nodes;

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 (now MSCI Real Estate), London, UK
- Development of a search engine and web/windows app (C++, C#, .NET) for efficient storage and analytics of financial data

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 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
- 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)
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