Bruno Magalhaes

Research Engineer for High Performance Computing, Simulation & Machine Learning

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Native in Portuguese, fluent in English and French, proficient in Spanish and fair in Slovenian

Hobbies : waterpolo, skiing, reading, travelling, cooking, guitar

Work Experience

ongoing – Sep 2019 | AI Resident, Microsoft Research, Cambridge, UK

Aug 2019 – Mar 2015 | Doctoral Assistant ▷ Postdoctoral Researcher, École Polytechnique Fédérale de Lausanne, Switzerland

- Research, conceptualization and implementation of new methods for asynchronous execution of the simulation of detailed neural networks on large networks of highly-heterogeneous compute nodes
- Contributions focus on distributed micro-parallelism of individual neurons via branch- and graph-based parallelism, distributed fully-asynchronous execution models, and high-accuracy solutions via variable timestep interpolations
- Performed 400 hours of teaching assistant duties for Unsupervised and reinforcement learning in neural networks, Projects in neuroinformatics and *In silico* neuroscience

C | C++ | Python | HPX-5 | MPI | LaTeX | tensorflow | google test | TCLAP | Sundials CVODE

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
- Algorithms for the distributed spatial indexing of detailed neuron morphologies

C | C++ | Message Passing Interface (MPI) | OpenMP | CMake | IBM BlueGene/P and /Q | parallel IO (MPI, HDF5)

Feb 2011 – Sep 2009 | Junior Architect for IT infrastructures, Noble Group, Hong Kong, New York, São Paulo & London

- Network design of a contingency data centre for all EU Power & Gas trading infrastructure, London, UK
- Network and infrastructure design of 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

Cisco and 3Com network devices | ASP .NET

Oct 2008 – Mar 2007 | Analyst programmer, MSCI (former IPD - Investment Property Databank), London, UK

- Development of a web-based geographical system for real estate data search and analytics
- Development of algorithms for data warehousing and efficient search queries on heterogeneous data structures

C# | Visual Basic | F# | ASP .NET | MS SQL Server | SSIS | google maps API | javascript

Education

Jun 2019 – Mar 2015 | PhD Neuroscience, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland

- Thesis *Asynchronous Simulation of Neuronal Activity* nominated for the Neuroscience Doctoral School excellency award (TOP 8% students) and for the IBM research prize for the best thesis in computational sciences
- 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 on *GPU-enabled steady-state solution of large Markov models* researching distributed, multi-core CPU and GPU 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 ; first author unless mentioned otherwise

ongoing	Efficient Distributed Transposition of Large-Scale Multigraphs And High-Cardinality Sparse Matrices
ongoing	Distributed Asynchronous Execution Model Speeds and Scales Up Over Hundredfold The Detection Of Contacts Between Detailed Neuron Morphologies
submitted	Fully-Asynchronous Fully-Implicit Variable-Order Variable-Timestep Simulation of Neural Networks
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