Bruno Magalhaes

PhD Neuroscience candidate with Computer Science background

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Lausanne CH Native in Portuguese, fluent in English and French, fair in Spanish and Slovenian

Education

ongoing – Mar 2015 — PhD Neuroscience, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland
- Title : Large-scale Asynchronous Simulation of Neuronal Activity
- Teaching Assistant (400 hours) for Unsupervised and reinforcement learning in neural networks, Projects in neuroinformatics and *In silico* neuroscience
- Visiting scholar at Center for Research in Extreme Scale Tech., Indiana University (US), Summers 2015-17

C | C++ | Python | HPX-5 | MPI | LaTeX | tensorflow | google test | TCLAP | Sundials CVODEs API | IBM BlueGene/Q

Sep 2009 – Oct 2008 — MSc Advanced Computing, Imperial College London, UK
- Final thesis on multi-core CPU, GPU and parallel computation of large Markov models in heterogeneous networks, awarded distinction and published at NSMC'10. Finished degree with Merit.

C | NVIDIA CUDA | Message Passing Interface (MPI) | Posix threads | Java

Jul 2007 – Oct 2002 — BEng (5 year programme) Systems Engineering and Computer Science, University of Minho, Portugal
- Exchange student at the University of Maribor, Slovenia, 2005/2006. Finished degree with final grade A.

Work Experience

Feb 2015 – Mar 2011 — Scientific Assistant and HPC Engineer, The 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 infra-structures, Noble Group, Worldwide
- 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 software for data query and warehousing

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

Sep 2005 – Jan 2005 — Software developer (part-time), Department of Physics, University of Minho, Portugal
- Development of parallel algorithms for analysis of collisions of particles, in collaboration with CERN

Fortran | Message Passing Interface (MPI) | C

Publications

peer reviewed ; first author unless mentioned otherwise

- **in preparation** — An Efficient Algorithm for The Distributed Transpose Of Large-Scale Graphs And Sparse Matrices With High-Cardinality Cell Structures
- **in preparation** — Distributed Asynchronous Execution Model Speeds and Scales Up Over Hundredfold The Detection Of Contacts Between Detailed Neuron Morphologies
- **submitted** — Fully Implicit, Fully Asynchronous, Variable Order, Variable Timestep Simulation of Detailed Neural Networks
- **submitted** — Asynchronous SIMD-Enabled Branch-Parallelism of Morphologically-Detailed Neuron Models
- **submitted** — 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. 6th International Workshop on the Numerical Solution of Markov Chains (NSMC 2010), Williamsburg, Virginia