Bruno Magalhaes

HPC engineer, computational neuroscientist, and AI enthusiast

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Author of 10+ publications on distributed and parallel computing, numerical methods and simulation.

Education

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

- Thesis *Asynchronous Simulation of Neuronal Activity* awarded distinction and proposed for the Neuroscience Doctoral School excellency award for the Top 8% doctoral students, and for the IBM award for outstanding research in computational sciences
- Visiting scholar at Center for Research in Extreme Scale Technologies, Indiana University (US), working with HPX developers on fine-tuning asynchronous processing of neural networks, Summers 2015-17

Sep 2009 – Oct 2008 — MSc Advanced Computing, Imperial College London, UK

- Thesis work 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/BEng) Systems Engineering and Computer Science, Univ. of Minho, Portugal

- Exchange student at the University of Maribor, Slovenia, 2005/2006. Finished degree with A (Top 10%)

Work Experience

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

- I researched, conceptualized, implemented and published my research work on how asynchronous runtime systems and variable step methods accelerate the simulation of detailed neural networks on networks of highly-heterogeneous compute nodes
- Technologies : HPX for Parallax runtime system; global memory addressing; asynchronous communication; remote procedure calls, concurrency and threading; dynamic load-balancing; distributed computation graphs, tree-parallelism and task scheduling; vectorization and cache-optimization;
- Core courses : Neuroscience - cellular mechanisms, Neuroscience - behavior and cognition, Biological modeling of neural networks and Machine learning
- Teaching Assistant (400 hours) 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 — 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 | Posix threads