












Bruno Magalhaes

Research Engineer for High Performance Computing and Machine Learning

 short resume, for more details visit <https://brunomaga.github.io>  Updated 09/12/2020
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 Portuguese  Native in Portuguese; Fluent in English, French, Spanish; fair in Slovenian
 Lausanne, Switzerland  Hobbies : waterpolo, skiing, cooking, travelling, cryptocurrency



Work Experience

- Oct 2020 | AI Resident, Microsoft Research , Cambridge (UK)
Sep 2019
 > Improvement of load balancing of email servers by learning time series from user usage patterns. Used DNNs, RNNs, GRUs Encoder-Decoder w/ Attention Mech., and Bayesian Optimization (closed-form, Variational Inf., MCMC);
 > Recommendation system using Graph Neural Nets on very large Meetings/Documents/Users/Emails graph;
 > Feature selection, outliers detection, and distributed data processing algorithms for exabyte-scale ML datasets;
 Python Pytorch Pandas Spark
- Aug 2019 | PhD candidate, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland
Mar 2015
 > Research, conceptualization, implementation and publication of new methods for asynchronous variable-step simulation of detailed spiking neural networks on large (>10K) networks of highly-heterogeneous compute nodes;
 > Technologies : asynchronous runtime systems (HPX), 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.
 C C++ Python HPX-5 Message Passing Interface (MPI) LaTeX Sundials CVODE Cray supercomputer Infiniband
- Feb 2015 | Research Engineer for High Performance Computing, Blue Brain Project, EPFL, Lausanne, Switzerland
Mar 2011
 > Creation and implementation 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 extremely large supercomputers with over 16K compute nodes;
 C C++ MPI Posix threads OpenMP IBM BlueGene/P and /Q supercomputers SGI supercomputer parallel IO (MPI, HDF5)
- Feb 2011 | Junior Architect for IT infrastructures, Noble Group, Hong Kong, New York, São Paulo & London
Sep 2009
 > 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 | Analyst programmer, Investment Property Databank (MSCI Real Estate), London, UK
Mar 2007
 > Development of a search engine and web/windows app (C++, C#, .NET) for efficient storage and analytics of financial data

Education

- Jun 2019 | PhD Computational Neuroscience, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland
Mar 2015
 > 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 | MSc Advanced Computing, Imperial College London, UK
Oct 2008
 > 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 | Licenciatura (5-year BSc) Systems Engineering and Computer Science, University of Minho, Portugal
Oct 2002
 > 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)
- 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
- ongoing Efficient Distributed Transposition of Large-Scale Multigraphs And High-Cardinality Sparse Matrices