

# José Bento Ayres Pereira

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CONTACT INFORMATION	Computer Science Department St. Mary's Hall, 2nd floor S., Boston College, Chestnut Hill, MA 02467	office: +001 617 552 1780 e-mail: jose.bento@bc.edu
RESEARCH INTERESTS	Machine-learning, probabilistic graphical models, distributed and parallel optimization algorithms. Applications to multi-robot control, computer vision/graphics, biology.	
EDUCATION	<b>Boston College</b> , Chestnut Hill, Massachusetts, USA <i>Assistant Professor</i>	<b>2014 – present</b>
	<b>Disney Research Boston</b> , Cambridge, Massachusetts, USA <i>Post Doctoral Researcher</i>	<b>2012 – 2014</b>
	<ul style="list-style-type: none"><li>• Advisor: Jonathan Yeddida</li></ul>	
	<b>Stanford University</b> , Stanford, California, USA <i>Doctor of Philosophy</i>	<b>2008 – 2012</b>
	<ul style="list-style-type: none"><li>• Principal advisor: Professor Andrea Montanari</li><li>• Co-advisor: Professor Iain Johnstone</li></ul>	
	<i>Master's Program</i>	<b>2006 – 2008</b>
	<b>Porto University</b> , Porto, Portugal <i>Engineering Degree</i>	<b>2001 – 2006</b>
GRANTS, HONORS AND AWARDS	Amazon Machine Learning Award, “Distributed Large Scale Optimization”, (\$75k), 2018 NSF-IIS, “Design and Computation of Scalable Graph Distances in Metric Spaces: A Unified Multi-scale Interpretable Perspective”, (PI, 37.5%, \$1.6M), 2017–Present NIH-NIAID, “Predicting the Emergence of Antibiotic Resistance through Multi-omics Approaches and Immune System-Surveillance”, (PI, 22.5%, \$10M) , 2016–Present Disney Inventor Award, “Method and Device for 3-Weight Message-Passing Optimization Scheme”, 2014 RecSys-CAMRa Challenge winner, “Identifying users from their rating patterns”, 2011 SIGWEB DocEng Best paper award, “Probabilistic document model”, 2011 Doctoral Fellowship from Fundação para a Ciência e Tecnologia, Portugal, 2007-2010 Stanford University, Electrical Engineering, Departmental Fellowship, 2006 - 2007 Prize Infineon Technologies (top graduating student class of 2006), 2006 Porto University Engineering merit scholarship award (top 10 students), 2002-2006	
JOURNAL PUBLICATIONS	J. Bento, R. Furmaniak, S. Ray, “On the complexity of the weighted fused Lasso, ”, <i>IEEE Letters in Signal Processing</i> , 2018. G. França, J. Bento, “Markov chain lifting and distributed ADMM”, <i>IEEE Letters in Signal Processing</i> , 2017. T. van Opijnen, S. Dedrick, J. Bento, “Strain dependent genetic networks for antibiotic-sensitivity in a bacterial pathogen with a large pan-genome”, <i>Plos Pathogens</i> , 2016. N. Ben-Zvi, J. Bento, M. Mahler, J. Hodgins, A. Shamir, “Line-Drawing Video Stylization”, <i>Computer Graphics Forum</i> , 2015. J. Bento, M. Ibrahim, “Support Recovery for the Drift Coefficient of High-Dimensional Diffusions”, <i>IEEE Transactions on Information Theory</i> , 2013.	

- J. Bento, S. Ioannidis, “A Family of tractable graph distances”, *SIAM International Conference on Data Mining (SDM)*, 2018.
- S. Safavi, B. Joshi, G. França, J. Bento, “An explicit convergence rate for Nesterov’s method from SDP”, *IEEE International Symposium on Information Theory (ISIT)*, 2018.
- G. França, J. Bento, “ADMM and Random Walks on Graphs”, *Workshops In Advances in Neural Information Processing Systems (NIPS)*, 2017.
- J. J. Zhu, J. Bento, “Generative adversarial active learning”, *Workshops In Advances in Neural Information Processing Systems (NIPS)*, 2017.
- G. França, J. Bento, “Markov chain lifting and the distributed ADMM”, *Workshops In Advances in Neural Information Processing Systems (NIPS)*, 2016.
- G. França, J. Bento, “Tuning the over-relaxed ADMM”, *Workshops In Advances in Neural Information Processing Systems (NIPS)*, 2016.
- G. França, J. Bento, “An explicit rate bound for the over-relaxed ADMM”, *IEEE International Symposium on Information Theory (ISIT)*, 2016.
- N. Hao, A. Oghbaee, M. Rostami, N. Derbinsky, J. Bento, “Testing fine-grained parallelism for the ADMM on a factor-graph”, *Proc. of the Sixth IEEE Workshop on Parallel Computing and Optimization (IPDPS)*, 2016.
- C. Mathy, F. Gonda, D. Shmidt, N. Derbinsky, A. Alemi, J. Bento, F. Delle Fave, J. Yedidia, “SPARTA: Fast global planning of collision-avoiding robot trajectories”, *Workshops In Advances in Neural Information Processing Systems (NIPS)*, 2015.
- J. Bento, N. Derbinsky, C. Mathy, J. Yedidia, “Proximal operators for multi-agent path planning”, *Proceedings of the 29th National Conference on Artificial Intelligence (AAAI)*, 2015.
- J. Bento, N. Derbinsky, C. Mathy, J. Yedidia, “Proximal operators for multi-agent path planning”, *Proceedings of the 29th National Conference on Artificial Intelligence (AAAI)*, 2015.
- C. Mathy, N. Derbinsky, J. Bento, J. Yedidia, “The boundary forest algorithm for online supervised and unsupervised learning”, *Proceedings of the 29th National Conference on Artificial Intelligence (AAAI)*, 2015.
- D. Krishnan, B. Freeman, J. Bento, D. Zoran, “Shape and Illumination from Shading using the Generic Viewpoint Assumption”, *In Advances in Neural Information Processing Systems (NIPS)*, 2014.
- J. Bento, N. Derbinsky, J. Mora, J. Yedidia, “A message-passing algorithm for multi-agent trajectory planning”, *In Advances in Neural Information Processing Systems (NIPS)*, 2013.
- N. Derbinsky, J. Bento, J. Yedidia, “Methods for integrating knowledge with the Three-Weight optimization algorithm for hybrid cognitive processing”, *AAAI Fall Symposium on Integrated Cognition*, 2013.
- J. Bento, S. Ioannidis, S. Muthukrishnan, and J. Yan, “A time and space efficient algorithm for contextual linear bandits”, *Proceedings of the European Conference in Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML PKDD)*, 2013.
- N. Damera, J. Bento, “Ad insertion in automatically composed documents”, *Proceedings of the 12th ACM Symposium on Document Engineering (DocEng)*, 2012.
- J. Bento, N. Fawaz, A. Montanari, S. Ioannidis, “Identifying users from their rating patterns”, *Proceedings of the 5th ACM Conference on Recommender Systems (RecSys)*, 2011.
- N. Damera, J. Bento, E. O’Brien, “Probabilistic document model”, *Proceedings of the 11th ACM Symposium on Document Engineering (DocEng)*, 2011.
- J. Bento, M. Ibrahimi, A. Montanari, “Information theoretic limits on learning stochastic differential equations”, *IEEE International Symposium on Information Theory (ISIT)*, 2011.
- M. Bayati, J. Bento, A. Montanari, “The LASSO Risk: asymptotic results and real world examples”, *In Advances in Neural Information Processing Systems (NIPS)*, 2010.
- J. Bento, M. Ibrahimi, A. Montanari, “Learning networks of stochastic differential equations”, *In Advances in Neural Information Processing Systems (NIPS)*, 2010.

J. Bento, A. Montanari, “Which graphical models are difficult to learn?”, *In Advances in Neural Information Processing Systems (NIPS)*, 2009.

L. Yang, J. Bento, J.-C. Lachance, and B. O. Palsson, “Genome-scale estimation of cellular objectives”, *arXiv:1807.04245 [q-bio.QM]*, 2018.

S. Safavi, J. Bento, “ $n$ -metrics for multiple graph alignment”, *arXiv:1807.03368 [cs.DM]*, 2018.

G. França, J. Bento, “How is Distributed ADMM Affected by Network Topology?”, *arXiv:1710.00889 [stat.ML]*, 2017.

J. Bento, J. J. Zhu, “A metric for sets of trajectories that is practical and mathematically consistent”, *arXiv:1601.03094v1 [cs.CV]*, 2016.

N. Derbinsky, J. Bento, V. Elser, J. Yedidia, “An improved three-weight message-passing algorithm”, *arXiv:1305.1961 [cs.AI]*, 2013.

J. Bento, “Learning graphical models, fundamental limits and efficient algorithms”, *PhD Dissertation*, 2012.

J. Bento, A. Montanari, “On the trade-off between complexity and correlation decay in structural learning algorithms”, *arXiv:1110.1769 [stat.ML]*, 2011.

“Graph Metric Spaces”, *ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, London*, August 2018.

“Networks and large-scale optimization”, *Open Data Science Conference, Boston*, May 2018.

“An improved explicit rate bound for Nesterov’s accelerated method”, *Coordinated Science Laboratory, University of Illinois, Urbana Champaign*, March 2018.

“ADMM and Random Walks on Graphs”, *School of Electrical and Computer Engineering, Purdue University*, March 2018.

“ADMM and Random Walks on Graphs”, *Coordinated Science Laboratory, University of Illinois, Urbana Champaign*, October 2017.

“An improved rate bound on Nesterov’s scheme using IQC”, *Electrical and Computer Engineering, Tufts University*, October 2017.

“Phylogenetic Tree Inference from Time Series Data”, *School of Engineering, Porto University*, July 2017.

“Markov chain lifting and the distributed ADMM”, *Information Theory and Applications Workshop, San Diego*, February 2017.

“Markov chain lifting and the distributed ADMM”, *NIPS OPT Workshop, Barcelona*, December 2016.

“A metric for sets of trajectories”, *Disney Research, Pittsburg*, July 2016.

“An explicit rate bound for the over-relaxed ADMM”, *ISIT, Barcelona*, July 2016.

“Testing fine-grained parallelism for the ADMM on a factor-graph”, *GPU Technology Conference*, April 2016

“A metric for sets of trajectories”, *B-Spiral, Northeastern University*, March 2016.

“An explicit rate bound for the over-relaxed ADMM”, *School of Engineering, Porto University*, February 2016.

“Learning stochastic differential equations”, *NIPS 2015 Workshop on Modeling and inference for dynamics on complex interaction networks: joining up machine learning and statistical physics, Montréal*, December 2015.

“Variations on the Alternating Direction Method of Multipliers”, *Graphical Models, Statistical Inference, and Algorithms workshop, University of Minnesota*, May 2015.

“Towards understanding the Boundary Forest algorithm”, *New England Machine Learning Day, Microsoft Research, Cambridge*, May 2015.

“Towards understanding the Boundary Forest Algorithm”, *School of Science, Porto University*, May 2015.

“A metric for sets of trajectories”, *School of Engineering, Porto University*, January 2015.

“The Three-Weight Algorithm: a method for large scale distributed optimization”, *Department of Electrical and Computer Engineering, Texas A&M University*, March 2014.

“The Three-Weight Algorithm: a method for large scale distributed optimization”, *Center for Information and Systems Engineering, Boston University*, January 2014.

“Message-passing algorithms for general-purpose optimization based on ADMM”, *Information System Lab. Colloquium, Stanford University*, August 2013.

“Improved message-passing algorithm incorporating uncertainty information”, *New England Machine Learning Day, Microsoft Research, Cambridge*, May 2013.

“Algorithms and fundamental limits in learning stochastic differential equations”, *Electrical and Computer Engineering Department, Boston University*, April 2013.

“A time and space efficient algorithm for contextual linear bandits”, *School of Science, Porto University*, January 2013.

“Which graphical models are difficult to learn?”, *Information Theory and Applications Workshop*, February 2012.

“Learning stochastic differential equations”, *Coordinated Sciences Laboratory, University of Illinois UC*, October 2011.

“Learning graphical models: results and challenges”, *ECE Back To Basics Colloquium, Porto University*, September 2011.

#### PATENTS AND INVENTIONS

Method and Device For Three-Weight Message-Passing Optimization Scheme (US9639813 B2, Granted)

Method and Device For Three-Weight Message-Passing Optimization Scheme Using Splines (US20160217380A1, Patent pending)

Method and device for multi-agent path planning (US20170176994 A1, Patent pending)

Method and apparatus for contextual linear bandits (WO2013189261A1, Patent pending)

Method and apparatus for identifying users from rating patterns (WO2013025460A1, Patent pending)

A method of recommending items to a group of users (WO2013133879A1, Patent pending)

Parallel-automated document composition (US20120304042A1, Patent pending)

Automated document composition using clusters (US20140173397A1, Patent pending)

#### MENTORING EXPERIENCE

**Boston College**, Newton, Massachusetts, USA

*Senior-thesis student advisor*

**May 2018 – present**

Worked with Shikun Wang on distributed algorithms for graph matching.

*Post-doctoral advisor*

**January 2018 – present**

Worked with Dr. Sam Safavi on algorithms for graph matching and algorithms for predicting the emergence of antibiotic resistance.

*Post-doctoral advisor*

**September 2017 – June 2018**

Worked with Dr. Bei Jia on algorithms for predicting the emergence of antibiotic resistance.

*Post-doctoral advisor*

**September 2016 – Present**

Worked with Dr. Ray Suryendu on algorithms for predicting the emergence of antibiotic resistance.

*Thesis committee*

**December 2017**

Took part in the thesis committee of Ph.D. student Sam Safavi from Tufts University, being advised by Professor Usman Khan.

*Advisor for visiting Ph.D. students* **May 2017 – September 2017**  
Worked with Elaheh Noursadeghi, Sam Safavi and Tomislav Petrovic on information theory bounds for time-series reconstruction, accelerated optimization methods and bayesian inference algorithms for phylogenetic tree reconstruction.

*Thesis committee* **September 2016**  
Took part in the thesis committee of Ph.D. student Chenguang Xi from Tufts University, being advised by Professor Usman Khan.

*Post-doctoral advisor* **January 2016 – August 2017**  
Worked with Dr. J.J. Zhu on active learning, their application to biology and computer vision algorithms for evaluation of tracking performance.

*Advisor for visiting Ph.D. students* **May 2016 – September 2016**  
Worked with Mohammad Rostami, Bikash Joshi and Elaheh Noursadeghi on active learning, accelerated optimization methods and complexity bounds for learning time series.

*Post-doctoral advisor* **October 2015 – May 2016**  
Worked with Dr. Guilherme França on distributed optimization.

*Advisor for visiting Ph.D. students* **May 2015 – August 2015**  
Worked with AmirReza Oghbaee and Mohammad Rostami on optimal control and active learning using distributed algorithms.

*Post-doctoral advisor* **September 2014 – January 2015**  
Worked with Dr. Ning Hao on distributed optimization and artificial intelligence.

**Disney Research Boston**, Cambridge, Massachusetts, USA

*Intern advisor for Ph.D. student* **Summer 2013 and Summer 2014**  
Worked with Caglayan Dicle on computer vision (parallel) algorithms for multi-object tracking.

**Stanford University**, Stanford, California, USA

*Teaching assistant* **Fall 2007, Summer 2008**  
Teaching assistant for graduate course in statistical signal processing (EE278). Grading position for graduate course in stochastic processes (STATS 217/218).

INDUSTRY  
EXPERIENCE

**Technicolor Labs**, Palo Alto, California, USA

*Summer intern* **2011**  
Researched and implemented algorithms for identifying accounts used by multiple users in recommendation systems: Identified the problem as an important step in improving the accuracy of recommendation systems; Developed and compared in real data different algorithms for identifying users in a household from their rating patterns; Contributed for a project concerning recommendation for groups when feedback about their satisfaction is given and groups change over time; Co-Authored two patent application and two papers; Supervisor: stratis.ioannidis@technicolor.com.

**Hewlett Packard Labs**, Palo Alto, California, USA

*Summer intern* **2010**  
Researched and implemented algorithms for automated document composition based on mixed continuous/discrete Bayesian inference: Provided a clear understanding of the theory and computational tradeoffs underlying various HPLabs automated document composition algorithms; Derived fast parallel algorithms for implementation on GPU/server clusters; Implemented algorithm on GPU achieving a speedup of 2000x over reference MatLab implementation; Briefed and transferred knowledge to remote teams in China; Co-authored two patent applications and two papers; Supervisor: niranjan.damera-venkata@hp.com.

REFERENCES

Contact information provided upon request.