ericjonas

machine learning for scientific measurement and instrumentation

about

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programming

Python (numpy)
C++17 (Boost)
VHDL
Matlab, Java, Javascript

interests

Machine learning for scientific measurement and instrumentation

I'm interested in the application of machine learning and scalable computation to systems which measure and learn about the world, including microscopy, chemical sensing, neuroscience, spectroscopy, and photography. Research areas include sparse and low-rank recovery, compressive sensing, nonparametric Bayesian modeling, Markov-chain Monte Carlo techniques, architectures for probabilistic inference, high-throughput data acquisition for neuroscience, and incorporation of prior information in underconstrained problems.

education

2013 **Ph.D.** in Neuroscience — MIT, Cambridge, MA
Stochastic Architectures for Probabilistic Computation
Advisors: Matthew Wilson and Josh Tenenbaum

2009 **M.Eng.** Electrical Engineering And Computer Science — MIT, Cambridge, MA
Real-time analog acquisition of electrophysiological signals with Soma
Advisor: Matthew Wilson

2005 **B.Sc.** Electrical Engineering and Computer Science — MIT, Cambridge, MA
Focus on low-level systems architecture and digital signal processing

2003 **B.Sc.** Brain and Cognitive Sciences — MIT, Cambridge, MA
Systems level neuroscience, learning and memory

publications

papers and preprints

"Flare prediction using photospheric and coronal image data"
Eric Jonas, Monica G Bobra, Vaishaal Shankar, J Todd Hoeksema, Benjamin Recht
arXiv preprint arXiv:1708.01323 *(Aug. 2017).* https://arxiv.org/abs/1708.01323

"Could a Neuroscientist understand a Microprocessor? "
Eric Jonas, Konrad Kording
PLOS Computational Biology *(Jan. 2017).* 10.1371/journal.pcbi.1005268

"Crosscat: A fully bayesian nonparametric method for analyzing heterogeneous, high dimensional data"
Vikash Mansinghka, Patrick Shafto, Eric Jonas, Cap Petschulat, Max Gasner, Joshua B Tenenbaum
The Journal of Machine Learning Research *17.1 (2016) pp. 4760–4808. JMLR. org*

"Automatic discovery of cell types and microcircuitry from neural connectomics"
Eric Jonas, Konrad Kording
eLife *(Apr. 2015).* 10.7554/eLife.04250

"3D imaging in volumetric scattering media using phase-space measurements"
Hsiou-Yuan Liu, Eric Jonas, Lei Tian, Jingshan Zhong, Benjamin Recht, Laura Waller
Optics Express *23.11 (May 2015).* 10.1364/OE.23.014461

"Building fast Bayesian computing machines out of intentionally stochastic parts"
Eric Jonas, Vikash Mansinghka, Josh Tenenbaum

arXiv *(2014).* http://arxiv.org/abs/1402.4914

peer-reviewed conferences/proceedings

"Occupy the Cloud: Distributed Computing for the 99%"
Eric Jonas, Qifan Pu, Shivaram Venkataraman, Ion Stoica, Benjamin Recht
Proceedings of the Eigth ACM Symposium on Cloud Computing, 2017, Santa Clara, CA, USA

"Kernel Latent Space Models for understanding neural connectomes"
Eric Jonas, Srini Turaga
COSYNE 2016, 2016

"Towards machine learning on the Automata Processor"
Tommy Tracy II, Yao Fu, Indranil Roy, Eric Jonas, Paul Glendenning
International Conference on High Performance Computing, 2016

"Fast algorithm for 3D localization through scattering media: forward model and physics"
Hsiou-Yuan Liu, Eric Jonas, Jingshan Zhong, Ben Recht, Laura Waller
Computational Optical Sensing and Imaging, 2015

"Scaling Nonparametric Bayesian Inference via Subsample-Annealing"
Fritz Obermeyer, Jonathan Glidden, Eric Jonas
AISTATS 2014, 2013

"Cross-categorization : A method for discovering multiple overlapping clusterings"
Vikash Mansinghka, Eric Jonas, Cap Petschulat, Beau Cronin, Pat Shafto, Josh Tenenbaum
NIPS Workshop of Nonparametric Bayesian Statistics, 2009

"Exact and Approximate Sampling by Systematic Stochastic Search"
Vikash Mansinghka, Dan Roy, Eric Jonas, Josh Tenenbaum
Proceedings of the 12th International Conference on Artificial Intelligence and Statistics (AISTATS), 2009

patents

Combinational Stochastic Logic
V. K. Mansinghka, E. M. Jonas
US Application No. 12/397,754; Pub. No. US 2009/0228238 A1, March 4, 2009

Stereoscopic Wide Field of View Imaging System
E.F. Prechtl, R.J. Sedwick, E.M. Jonas
US 7982777, July 19, 2011

Configurable Circuitry for Solving Stochastic Problems
E. M. Jonas, V. K. Mansinghka
US Application No. 13/032,054; Pub. No. US 2011/0208676 A1, Feb 22, 2011

research reports

Stochastic Digital Circuits for Probabilistic Inference
Vikash Mansinghka, Eric Jonas, Josh Tenenbaum
Technical Report 2008-069, 2008

industry experience

Aug 2014 - Present — **Semiconductor Consulting** San Francisco, CA, CA — Postdoc with Ben Recht
Consulting and technical diligence for several semiconductor and venture capital firms (including Analog Devices, Micron Semiconductor, and SoftBank) on hardware and software for accelerating machine learning tasks.

Dec 2012- April 2014 — **Salesforce.com** San Francisco, CA — Chief Predictive Scientist
Lead the scientific and engineering team from Prior Knowledge following the acquisition by Salesforce.com, working with customers, product managers, and engineers to develop a predictive database and platform.

Aug 2011- Dec 2012 — **Prior Knowledge, Inc.** San Francisco, CA — Founder and CEO
Oversaw the development, launch, deployment and scaling of Veritable, the world's first predictive database. Managed a team of six engineers, raised funding, worked with early customers. Designed and implemented core back-end inference engine, TARDIS, and lead team that scaled it to billions of data points.

Teaching

Summer 2015 — **Instructor for ``DSP for Computer Scientists''** — Sole instructor
Developed curriculum for computer science graduate students, with a focus on using software-defined radio to teach basic concepts. Developed a system air2cloud.io enabling easy remote interfacing with software radio hardware, and associated curriculum.

2008 — **TA for MIT HST.165 Principles of Biomedical Imaging** — Instructors: Peter So and Alan Jasanoff
Tutorial and grading for microscopy, ultrasound, and MRI imaging

2005-2007 — **Head TA for MIT 9.02: Systems neuroscience laboratory** — Instructor: James DiCarlo
Developed Matlab-based curriculum for electrophysiology experiments, real-time software to run experiments, and prototype electrophysiological hardware.

Press

2017.01.21 — **Tests suggest the methods of neuroscience are left wanting** — The Economist

2017.02.16 — **With PyWren, AWS Lambda Finds an Unexpected Market in Scientific Computing** — The New Stack

2016.08.23 — **What Donkey Kong can tell us about how to study the brain** — Science News

2016.06.02 — **Can Neuroscience Understand Donkey Kong, Let Alone a Brain?** — The Atlantic

2012.11.23 — **Salesforce to predict the future with Prior Knowledge** — Venture Beat

2012.07.02 — **Prior Knowledge wants to be your data Oracle** — GigaOM

2012.09.11 — **Prior Knowledge builds a predictive database for developers** — TechCrunch

2013.08.11 — **Prior Knowledge becomes Salesforce skunk works project** — TechCrunch

Awards

Sept 2017	**Best Vision Paper Award**	ACM Symposium on Cloud Computing (SOCC'17)
Sept 2015	**DARPA Rising recipient**	Nominated by Matthew Hepburn of the Biological Technology Office
2007-2008	**Norman B Leventhal Presidential Fellowship**	MIT Office of the Provost
2006-2007	**Singleton Fellowship for Graduate Students**	

Invited Talks

Oct 2017	**Stanford - Stat 285**
Sept 2017	**SoCC - ACM Symposium on Cloud Computing**
March 2017	**Computational and Systems Neuroscience, 2017**
June 2016	**Google Deepmind**
Sept 2015	**DARPA Rising Session, St. Louis, MO**
Jan 2015	**Kavli Futures Symposium: Towards a Taxonomy of Cortical Computations**
May 2014	**Princeton Physics and Bioengineering**
May 2014	**2014 Workshop on Algorithms for Modern Massive Data Sets**

Speaking (non-academic)

Nov 2013	**How will Predictive Analytics Change Sales** Dreamforce 2013
July 2013	**Discovering Structure with Latent Variable Models** PyData Boston 2013
Sept 2012	**Prior Knowledge and the Predictive Database** TechCrunch Disrupt 2012
May 2012	**Peter Thiel's Startup School on Deep Thought** CS183 at Stanford