Alex Gittens

Contact Information	(626) 354-5374 gittens@icsi.berkeley.edu http://agittens.net
Objective	Placement in an research position that allows for the development and application of statistical and computational theory and tools to extract value from massive datasets
Citizenship	USA

Education

California Institute of Technology, Pasadena, California, USA

Ph.D., Applied and Computational Mathematics, June 2013
Thesis title: *Topics in randomized numerical linear algebra*

University of Houston, Houston, Texas, USA

B.S. in Electrical Engineering, 2006
Summa cum laude, emphasis on electromagnetics

B.S. in Mathematics, 2006
Summa cum laude, emphasis on mathematical signal processing

Professional Employment

International Computer Science Institute and Department of Statistics, UC Berkeley, Berkeley, California, USA

Postdoctoral Researcher   April 2015–present
Designing and analysing algorithms for robust distributed statistical analysis and machine learning on big data; working in conjuction with LBNL climatologists on extending linear and multilinear analytic techniques to $\mathcal{O}(10\text{Tb})$-scale three-dimensional climate fields; implementing a suite of classical and randomized linear algebra algorithms in Apache Spark.

eBay Research Laboratory, San Jose, California, USA

Research Scientist   October 2013–February 2015
Attacked the learning to rank problem for eBay's ecommerce search engine using randomized kernel methods; developed an algorithm for fitting polynomial kernel machines on large-scale datasets in linear time; applied ML techniques to NLP research: language modeling using continuous word embeddings and neural networks for modeling compositional semantics; and identified use cases for ML and NLP techniques throughout eBay and PayPal.

Selected Publications

C. Boutsidis, A. Gittens, and P. Kambadur. Spectral Clustering via the Power Method – Provably. International Conference on Machine Learning. 2015.

D. Kuang, A. Gittens, and R. Hamid. Hardware Compliant Approximate Image Codes. Conference on Computer Vision and Pattern Recognition. 2015.

A. Gittens and M. Mahoney. Revisiting the Nyström method for improved large-scale machine learning. Accepted to Journal of Machine Learning Research. 2015.

R. Hamid, Y. Xiao, A. Gittens, D. DeCoste. Compact Random Feature Maps. International Conference on Machine Learning. 2014.

C. Boutsidis and A. Gittens. Improved matrix algorithms via the Subsampled Randomized Hadamard Transform. *SIAM Journal on Matrix Analysis and Applications.* 2013.

R. Chen, A. Gittens, and J. Tropp. The masked sample covariance estimator: an analysis using matrix concentration inequalities. *Information and Inference.* 2012.

TECHNICAL REPORTS AND PREPRINTS

B. Liu, L. Jing, J. Li, J. Yu, A. Gittens, and M. Mahoney. Group Collaborative Representation for Image Set Classification. 2015. In preparation.

A. Gittens and J. Yang. Tensor machines for learning target-specific polynomial features. 2015. Under revision. arXiv:1504.01697

D. Kuang, A. Gittens, and R. Hamid. piCholesky: Polynomial Interpolation of Multiple Cholesky Factors for Efficient Approximate Cross-Validation. 2015. Under revision. arXiv:1404.0466

A. Gittens and J. Tropp. Tail bounds for all eigenvalues of a sum of random matrices. 2011. Technical report. arXiv:1104.4513

A. Gittens and J. Tropp. Error bounds for random matrix approximation schemes. 2009. Technical report. arXiv:0911.4108

TEACHING EXPERIENCE

California Institute of Technology, Pasadena, California, USA

Instructor   Fall terms 2008,2009,2012
Lectured and prepared homeworks and supplementary material for an introductory course on MATLAB and Mathematica

Teaching Assistant   2007–present
Assisted in teaching several first year graduate-level complex analysis, linear algebra, probability, real analysis, and functional analysis courses, including a year-long sequence of courses on numerical analysis including ODEs, PDEs, and numerical linear algebra

University of Houston, Houston, Texas, USA

Teaching Assistant   2003–2006
Assisted in teaching an undergraduate course on numerical methods tailored to engineering majors and covering root-finding, interpolation, ODEs, linear algebra

TALKS

"Randomized low-rank approximations, in theory and practice." 18th Conference of the International Linear Algebra Society, Providence, Rhode Island, June 2013.

"Estimation of sparse covariance matrices." Geometric Functional Analysis group meeting, University of Michigan, Ann Arbor, November 2011.

"Tail bounds for all eigenvalues of a sum of random matrices." Workshop on Signal Processing with Adaptive Sparse Structured Representations (SPARS), Edinburgh, UK, June 2011.

"Complexity measures for matrices, with an unexpected application to matrix completion." Applied Mathematics Department student colloquium at California Institute of Technology, February 2010.

"Random methods in linear algebra." Applied Mathematics Department student colloquium at California Institute of Technology, October 2009.

INTERNSHIPS	**eBay Research Lab**, San Jose, California, USA

Technical Intern, Machine Learning Group **Summer 2013**

- Investigated, empirically and theoretically, the performance of randomized explicit feature maps for employing polynomial kernel methods on massive datasets.
- Designed feature-selection algorithms for generating randomized explicit feature maps adapted to a known target.
- Applied randomized polynomial kernel methods (ridge and logistic regression and SVMs), with and without feature selection, to the eBay search ranking problem.

IBM Research, Yorktown Heights, New York, USA

Research Intern, Business Analytics and Mathematical Sciences Department **Summer 2012**

- Designed, implemented, and evaluated the performance of several models for estimating the probability of voluntary employee attrition
- Created an algorithm for regularized canonical correlation analysis of massive datasets
- Derived error bounds for spectral algorithms based on randomized methods for approximating the range space of matrices

Mathematics Department, University of Houston, Houston, Texas, USA

Research Assistant, Papadakis research group **2005–2006**

- Implemented a wavelet frame-based algorithm for semi-automated cardiac tissue segmentation

Lawrence Livermore National Laboratory, Livermore, California, USA

Electrical Engineering Intern, Adaptive Optics Group **Summer 2003**

- Simulated the effect of multiple propagations through the lasing medium upon the phase aberrations in the output beam
- Designed a control matrix for the deformable mirrors in the cavity of a heat capacity laser

PROFESSIONAL CONTRIBUTIONS	Reviewer for *SIAM Journal on Matrix Analysis and Applications*, *Advances in Computational Mathematics*, *Information Processing Letters*, *Neural Information Processing Systems*, and *AAAI Conference on Artificial Intelligence*.

SKILLS	Mathematical: linear algebra, functional analysis, probability, optimization Programming: MATLAB, Mathematica, R, Python, Java, C++, Scala, Spark Strong technical writing skills