Joseph E. Gonzalez

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My research addresses the challenges of designing and building large-scale machine learning algorithms and systems. In particular, my thesis work focuses on large-scale structured machine learning using probabilistic graphical models (Markov Random Fields) that are capable of reasoning about billions of related random variables. The resulting algorithms and systems have achieved state-of-the-art performance in tasks ranging from predicting ad preferences in social networks to solving complex protein modeling tasks. As part of my thesis work I created GraphLab (<http://graphlab.org>), a framework that dramatically simplifies the design and implementation of high-performance large-scale machine learning systems.

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| **Education** |
| **Carnegie Mellon University** | Currently a 6th year PhD candidate in the Machine Learning Department advised by Carlos Guestrin. I will complete my PhD in August 2012. |
| **California Institute of Technology** | B.S. in Computer Science with Honors, GPA 3.8 |
| **Publications** |
| * Amr Ahmed, Mohamed Aly, Joseph Gonzalez, Shravan Narayanamurthy, and Alex Smola. “*Scalable inference in latent variable models.”* WSDM, 2012.
* Joseph Gonzalez, Yucheng Low, Arthur Gretton, and Carlos Guestrin. “*Parallel gibbs sampling: From colored fields to thin junction trees.”* AISTATS, 2011.
* Joseph Gonzalez, Yucheng Low, and Carlos Guestrin. Scalable Machine Learning, Chapter *“Parallel Inference on Large Factor Graphs.”* Cambridge U. Press, 2010.
* Y. Low, J. Gonzalez, A. Kyrola, D. Bickson C. Guestrin, J. Hellerstein. *“GraphLab: A New Parallel Framework for Machine Learning.”* UAI. 2010.
* J. Gonzalez, Y. Low, C. Guestrin, and D. OHallaron. *“Distributed Parallel Inference on Large Factor Graphs.”* UAI. 2009
* J. Gonzalez, Y. Low, and C. Guestrin. *“Residual Splash for Optimally Parallelizing Belief Propagation.”* AISTATS. 2009
* R. Chamberlain, J. Gonzalez, G. Gutt, E Tailor*. “New Line of Sight Algorithm Renders Superlative TINs Superfluous”* JPL Document D-32587, *Export-Controlled, U.S. Gov’t Only.*
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| **Awards and Fellowships** |
| * **AT&T Labs Fellowship** **(2007):** Graduate research stipend for 3 years.
* **NSF Graduate Research Fellowship (2007):** Graduate research stipend for 3 years.
* **NASA Space Act Award (2005):** Awarded for a sizeable contribution to space exploration.
* **NASA Inventions and Contributions Board Award (2005):** Awarded for the development of an innovative new technology that has made a sizeable contribution to space exploration.
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| **Work Experience** |
| **Work &****Research** | **Yahoo! Research (2011):** Extended the GraphLab abstraction to enable large-scale machine learning on natural graphs derived from social media and web-content. (Alex Smola: smola@yahoo-inc.com)**AT&T Labs Research (2007):** Developed models for statistically assessing DSL quality from limited noisy data.(Steven Phillips: phillips@research.att.com)**ADAPT Automated AdWords Auction Agent (Spring 2006):** Developed and implemented models for assessing word value in the Google AdWords market. (Alex Bäcker: alex@caltech.edu)**Microsoft Developer Internship (2005):** Worked with MSN Search team developing techniques to use behavioral information to identity search spam. (Greg Hullender: greghull@windows.microsoft.com)**Undirected Search Algorithms (2004):** Developed a new query-less search technology that uses prior reading interests to identify novel documents. (Alex Bäcker: alex@caltech.edu)**Efficient Line-of-Sight Evaluation (2003):** Developed a new algorithm for efficiently evaluating line-of-sight on digital elevation maps at JPL. (Robert Chamberlain: rgc@jpl.nasa.gov) |
| **Skills** | **Advanced C++ & Systems Experience:** All of my current high-performance code is written in C++ using for linux with Boost, Lapack, Google Performance Tools, MPICH2, and Pthreads.**Statistical Techniques:** Graphical models, statistical inference, nonparametric methods  |
| **Open Source****Software** | **GraphLab (C++):** A sophisticated API for building parallel and distributed Machine Learning systems on top of multicore and cloud architectures. <http://graphlab.org> **Parallel SplashBP & SplashGibbs (C++):** This library implements a collection of parallel statistical inference algorithms. <http://select.cs.cmu.edu/code/>  |