

# Wei Dai (David)

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CONTACT INFORMATION	Machine Learning Department, Carnegie Mellon University Homepage: <a href="http://www.cs.cmu.edu/~wdai">http://www.cs.cmu.edu/~wdai</a>	Email: <a href="mailto:wdai@cs.cmu.edu">wdai@cs.cmu.edu</a>
RESEARCH INTERESTS	Large-scale machine learning; Parallel machine learning algorithms and theory; Deep learning	
EDUCATION	<b>Carnegie Mellon University</b> , Pittsburgh, PA <i>Ph.D. Candidate in Machine Learning</i> <b>2012 – Present</b> <ul style="list-style-type: none"><li>• Research Advisor: Eric P. Xing</li><li>• Expected graduation date: Aug 2017</li></ul> <i>M.Sc. in Machine Learning</i> <b>2012 – 2016</b> <b>California Institute of Technology</b> , Pasadena, CA <i>B.Sc. with Honor in Computer Science</i> <b>2010 – 2012</b> <ul style="list-style-type: none"><li>• Research Advisor: Andreas Krause</li></ul> <b>Wesleyan University</b> , Middletown, CT <i>B.A. with High Honor in Physics and Mathematics</i> <b>2007 – 2010</b> <ul style="list-style-type: none"><li>• Research Advisor: Francis W. Starr</li></ul>	
EMPLOYEMENT	<b>Bosch Research</b> , Pittsburgh, PA <i>Research Intern</i> <b>May 2016 – Aug 2016</b> <ul style="list-style-type: none"><li>• Used Tensorflow on a GPU cluster to train state-of-the-art convolutional neural networks for environmental sound analysis. Our work is under submission to ICASSP 2017.</li></ul> <b>Facebook</b> , Menlo Park, CA <i>Software Engineering Intern</i> <b>May 2015 – Aug 2015</b> <ul style="list-style-type: none"><li>• Developed a distributed machine learning backend for large-scale logistic regression solved by LBFSGS using Petuum parameter server.</li><li>• Benchmarked Petuum against Facebook's internal system and open source Vowpal Wabbit; showed that Petuum achieves high system throughput and produces comparable to better models.</li></ul> <b>Google</b> , Pittsburgh, PA <i>Software Engineering Intern</i> <b>May 2013 – August 2013</b> <ul style="list-style-type: none"><li>• Contributed to the Ad Quality backend; developed a hyperparameter tuning framework to optimize SmartAds training system with convex and non-convex optimization algorithms; built a web frontend for other teams to interface with the framework.</li></ul> <b>LinkedIn</b> , Mountain View, CA <i>Software Developer Intern</i> <b>June 2012 – August 2012</b> <ul style="list-style-type: none"><li>• Implemented several background tasks in the payment backend using Java, Oracle SQL, Python, and Spring Framework.</li></ul> <b>OpenX</b> , Pasadena, CA <i>Software Developer Intern</i> <b>April 2012 – June 2012</b> <ul style="list-style-type: none"><li>• Simulated a large number of users to load-test several internal servers using Erlang and Tsung; developed Tsung modules to enable Thrift protocols.</li></ul> <b>Caltech Computer Science Department</b> , Pasadena, CA	

*Research Assistant*

**June 2011 – September 2011**

- Contributed to the Community Seismic Network project which applies machine learning to detect earthquakes using smartphones.
- Applied *coreset* to training Gaussian mixture model using smartphone acceleration sensor data.

*Teaching Assistant*

**March 2011 – March 2012**

- Held weekly Office Hour and grade students' work for Computer Language Shop on C programming language.

**Argus Information & Advisory LLC**, White Plains, NY

*Summer Analyst Intern*

**June 2010 – August 2010**

- Benchmarked U.S. credit card issuers' performance and provided customer management strategies based on account-level data analysis using MySQL.
- Developed Microsoft Power Point VBA to streamline the presentation production.

**Wesleyan University Physics Department**, Middletown, CT

*Research Assistant*

**January, 2008 – May 2010**

- Simulated, using a computer cluster, a system of nano-particles modified by multiple single strand DNA that exhibits versatile properties with promising future applications.
- Published two papers on Langmuir and Soft Matter.

*Teaching Assistant*

**September 2008 – May 2009**

- Oversaw weekly introductory physics lab.
- Conducted weekly problem solving sessions for math course: Vectors and Matrices.

**Wesleyan University, Office of Residential Life**, Middletown, CT

*Residential Advisor*

**September 2009 – May 2010**

- Fostered diverse community in school dormitories by engaging residents in community activities and creating a safe and supportive residential environment.

**Wesleyan University, Scientific Computing and Informatics Center**, Middletown, CT

*Tutor*

**September 2009 – May 2010**

- Provided tutoring for scientific programming such as C, Python, Mathematica, and computer graphing. Also helped students with the university computer cluster.

**Wesleyan University, Instructional Media Service**, Middletown, CT

*Computer Lab Consultant*

**August 2007 – May 2010**

- Oversaw the school computer lab and assisted students with technical problems. Set up video and audio equipments for campus events.

**Wesleyan University, East Asian Studies Department**, Middletown, CT

*Research Assistant*

**August 2009 – May 2010**

- Translated and organized historical Chinese documents for research purposes.

SELECTED  
PUBLICATIONS

A. Harlap, H. Cui, **W. Dai**, J. Wei, G. R. Ganger, P. B. Gibbons, G. A. Gibson, E. P. Xing  
"Addressing the Straggler Problem for Iterative Convergent Parallel ML"  
*ACM Symposium on Cloud Computing (SoCC)*, 2016.

**W. Dai\***, C. Dai\*, S. Qu, J. Li, S. Das

“Very Deep Convolutional Neural Networks for Raw Waveforms”  
*Under submission*, 2016.

Y. Wang, V. Sadhanala, **W. Dai**, W. Neiswanger, S. Sra, E. P. Xing  
“Parallel and Distributed Block-Coordinate Frank-Wolfe Algorithms”  
*International Conference of Machine Learning (ICML)*, 2016.

J. K. Kim, Q. Ho, S. Lee, X. Zheng, **W. Dai**, G. Gibson, E. P. Xing.  
“STRADS: A Distributed Framework for Scheduled Model Parallel Machine Learning”  
*European Conference on Computer Systems (EuroSys)*, 2016.

Y. Zhou, Y. Yu, **W. Dai**, Y. Liang, E. P. Xing  
“On Convergence of Model Parallel Proximal Gradient Algorithm for Stale Synchronous Parallel System”  
*Artificial Intelligence and Statistics (AISTATS)*, 2016.

E. P. Xing, Q. Ho, P. Xie, **W. Dai**  
“Strategies and Principles of Distributed Machine Learning on Big Data”  
*Engineering, Volume:2*, pp. 179 - 95, 2016.

J. Wei, **W. Dai**, A. Qiao, H. Cui, Q. Ho, G. R. Ganger, P. B. Gibbons, G. A. Gibson, E. P. Xing  
“Managed Communication and Consistency for Fast Data-Parallel Iterative Analytics”  
*ACM Symposium on Cloud Computing (SoCC)*, 2015. [**Best Paper**]

E. P. Xing, Q. Ho, **W. Dai**, J. K. Kim, J. Wei, S. Lee, X. Zheng, P. Xie, A. Kumar, Y. Yu  
“Petuum: A New Platform for Distributed Machine Learning on Big Data”  
*Knowledge Discovery and Data Mining (KDD)*, 2015. [Oral Presentation]

J. Yuan, F. Gao, Q. Ho, **W. Dai**, J. Wei, X. Zheng, E. P. Xing, T. Liu, and W. Ma  
“LightLDA: Big Topic Models on Modest Compute Cluster”  
*International World Wide Web Conference (WWW)*, 2015. [Oral Presentation]

**W. Dai**, A. Kumar, J. Wei, Q. Ho, G. Gibson, E. P. Xing  
“Analysis of High-Performance Distributed ML at Scale through Parameter Server Consistency Models”  
*AAAI Conference on Artificial Intelligence (AAAI)*, 2015. [Oral Presentation]

H. Cui, A. Tumanov, J. Wei, L. Xu, **W. Dai**, J. Haber-Kucharsky, Q. Ho, G. R. Ganger, P. B. Gibbons, G. A. Gibson, E. P. Xing  
“Exploiting Iterative-ness for Parallel ML Computations”  
*Symposium on Cloud Computing (SoCC)*, 2014.

H. Cui, J. Cipar, Q. Ho, J. K. Kim, S. Lee, A. Kumar, J. Wei, **W. Dai**, G. R. Ganger, P. B. Gibbons, G. A. Gibson, E. P. Xing  
“Exploiting Bounded Staleness to Speed Up Big Data Analytics”  
*Annual Technical Conference (ATC)*, 2014.

**W. Dai**, J. Wei, X. Zheng, J. K. Kim, S. Lee, J. Yin, Q. Ho, E. P. Xing  
“Petuum: A Framework for Iterative-Convergent Distributed ML”  
*NIPS, Big Learning Workshop*, 2013.

**W. Dai**, S. K. Kumar, F. W. Starr  
“Universal two-step crystallization of DNA-Functionalized Nanoparticles”  
*Soft Matter*, Vol. 6, pp. 6130-6135, 2010.

**W. Dai**, C. W. Hsu, F. Sciortino, F. W. Starr  
“Valency Dependence of Polymorphism and Polyamorphism in DNA-Functionalized Nanoparticles”  
*Langmuir*, Vol. 26, pp. 3601-3608, 2010.

**W. Dai**  
“Effect of Valency on the Dynamics and Thermodynamics of DNA-linked Nanoparticles Materials”

*Bachelor of Arts Honor Thesis: Wesleyan University, 2010.*

INVITED AND  
CONTRIBUTED  
TALKS

*AAAI Conference on Artificial Intelligence*, January 2015. Title: Analysis of High-Performance Distributed ML at Scale through Parameter Server Consistency Models

*Carnegie Mellon Univ.*, 2015 Spring: Invited guest lecturer for 10-605 Machine Learning with Large Datasets on Parameter Server. Title: Parameter Server and Stuff that Makes Large-scale Machine Learning Work.

*California Institute of Technology*: Summer Undergraduate Research Fellowship Seminar Day, October 2011. Title: A Smartphone that Learns: Toward Adaptive Earthquake Detection on Smartphones. (Advanced to final round in Peripall Speaking Competition.)

*American Physical Society*, March 2010 in Seattle, USA. Title: Phase Behavior of DNA-Functionalized Nanoparticles: Dependence on Number and Orientation of Attached DNA strands.

AWARDS AND  
HONORS

Best Paper Award, ACM Symposium on Cloud Computing (SoCC), 2015.

High Honors from Wesleyan University Physics Department: Awarded for my undergraduate honor thesis work, 2010.

Phi Beta Kappa Admission: A selective academic honor society for distinguished students at the nation's institutions of higher learning, 2010.

Student Prizes at Wesleyan University: Bertman Prize (Physics), Karl Van Dyke Prize (Physics), 2010; Sherman Prize (Mathematics), 2007.

Freeman Asian Scholarship: A four-year full scholarship awarded to two students per country from eleven Asian countries for outstanding scholastic and leadership achievements, 2007.

PROGRAMMING

C/C++, Python, Matlab, Java, Linux,  $\text{\LaTeX} 2_{\epsilon}$