Xinhua Zhang

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Degrees

July 2010 **Ph.D. in Computer Science** (with specialization in Machine Learning)
Australian National University (ANU), Canberra, Australia
Thesis: Graphical Models: Modeling, Optimisation, and Hilbert Space Embedding
Advisors: Professors S.V.N. Vishwanathan, Alex Smola

April 2006 **M.Sc. in Computer Science**
National University of Singapore (NUS), Singapore
Thesis: Hyperparameter Learning for Graph Based Semi-supervised Learning
Advisor: Prof. Wee Sun Lee

July 2003 **B.E. in Computer Science and Engineering**
Shanghai Jiao Tong University (SJTU), Shanghai, China

Positions

Nov 2015 – present **Assistant Professor**
Department of Computer Science, University of Illinois at Chicago, Chicago, IL

July 2014 – Oct 2015 **Senior Researcher**
Oct 2012 – June 2014 **Researcher**
Machine Learning Research Group, National ICT Australia (NICTA)

Adjunct Research Fellow
Research School of Computer Science, The Australian National University
Canberra, Australia

Mar 2010 – Sept 2012 **Post-doctoral Research Fellow**
Alberta Innovates Center for Machine Learning (AICML), University of Alberta
Edmonton, Alberta, Canada
Mentor: Prof. Dale Schuurmans

Feb 2009 – Mar 2010 **Visiting Scholar**
Department of Statistics, Purdue University, West Lafayette, Indiana, USA
Supervisor: Prof. S. V. N. Vishwanathan

Sept 2008 – Nov 2008 **Intern**
Microsoft Research Cambridge
Topic: Bayesian online multilabel classification for text categorisation
Mentors: Thore Graepel and Ralf Herbrich

June 2005 – Mar 2006 **Research Assistant**
Singapore-MIT Alliance
Topic: Semi-supervised machine learning
Mentor: Prof. Wee Sun Lee

Publications

• Scholarly Book Chapters

[1] **Xinhua Zhang**. Seven articles: Support vector machines, kernel, regularization, empirical risk minimization, structural risk minimization, covariance matrix, Gaussian distribution. In Claude Sammut and Geoffrey Webb, editors, *Encyclopedia on Machine Learning*. Springer, 2010. **[Link]**.

• *Refereed* Journal Articles

[2] Yaoliang Yu, **Xinhua Zhang**, and Dale Schuurmans. Generalized conditional gradient for sparse estimation. *Journal of Machine Learning Research (JMLR)*, 2014. **[Code]** **[PDF]**
(*under review*, 67 pages, submitted on 29 August, 2014).

[3] **Xinhua Zhang**, Ankan Saha, and S. V. N. Vishwanathan. Accelerated training of max-margin Markov networks with kernels. *Journal of Theoretical Computer Science (TCS)*, 519:88–102, Jan 2014. **[PDF]**.

[4] **Xinhua Zhang**, Ankan Saha, and S. V. N. Vishwanathan. Smoothing multivariate performance measures. *Journal of Machine Learning Research (JMLR)*, 13:3589–3646, Dec 2012. **[Code]** **[PDF]**.

• *Refereed* Articles in Conference Proceedings

[5] Hao Cheng, Yaoliang Yu, **Xinhua Zhang**, Dale Schuurmans, and Eric Xing. Scalable and sound low-rank tensor learning. In *Proceedings of International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2016. **[PDF]**
(165 out of 537, 30.7% acceptance rate).

[6] Parameswaran Kamalaruban, Robert C Williamson, and **Xinhua Zhang**. Exp-concavity of proper composite losses. In *Conference on Computational Learning Theory (COLT)*, 2015. **[PDF]**
(70 out of 176, 41% acceptance rate).

[7] Ozlem Aslan, **Xinhua Zhang**, and Dale Schuurmans. Convex deep learning via normalized kernels. In *Proceedings of Neural Information Processing Systems (NIPS)*, 2014. **[PDF]**
(414 out of 1678, 24.7% acceptance rate).

[8] Changyou Chen, Jun Zhu, and **Xinhua Zhang**. Robust Bayesian max-margin clustering. In *Proceedings of Neural Information Processing Systems (NIPS)*, 2014. **[PDF]**
(414 out of 1678, 24.7% acceptance rate).

[9] Xianghang Liu, **Xinhua Zhang**, and Tiberio Caetano. Bayesian models for structured sparse estimation via set cover prior. In *European Conference on Machine Learning (ECML)*, 2014. **[PDF]**
(115 out of 483, 23.8% acceptance rate).

[10] Hengshuai Yao, Csaba Szepesvari, Bernardo Avila Pires, and **Xinhua Zhang**. Pseudo-MDPs and factored linear action models. In *Symposium on Adaptive Dynamic Programming and Reinforcement Learning (IEEE ADPRL)*, 2014. **[PDF]**.

[11] **Xinhua Zhang**, Wee Sun Lee, and Yee Whye Teh. Learning with invariance via linear functionals on reproducing kernel Hilbert space. In *Proceedings of Neural Information Processing Systems (NIPS)*, 2013. **[PDF]**
(**spotlight**, 52 out of 1420, 3.7% acceptance rate for oral presentation).

[12] **Xinhua Zhang**, Yaoliang Yu, and Dale Schuurmans. Polar operators for structured sparse estimation. In *Proceedings of Neural Information Processing Systems (NIPS)*, 2013. **[Code]** **[PDF]**
(360 out of 1420, 25.4% acceptance rate).

[13] Ozlem Aslan, Hao Cheng, **Xinhua Zhang**, and Dale Schuurmans. Convex two-layer modeling. In *Proceedings of Neural Information Processing Systems (NIPS)*, 2013. **[PDF]**
(**spotlight**, 52 out of 1420, 3.7% acceptance rate for oral presentation).

[14] Hao Cheng, **Xinhua Zhang**, and Dale Schuurmans. Convex relaxations of Bregman divergence clustering. In *Proceedings of Conference on Uncertainty in Artificial Intelligence (UAI)*, 2013. **[PDF]**
(73 out of 233, 31.3% acceptance rate).

[15] Martha White, Yaoliang Yu, **Xinhua Zhang**, and Dale Schuurmans. Convex multi-view subspace learning. In *Proceedings of Neural Information Processing Systems (NIPS)*, 2012. **[Code]** **[PDF]**
(370 out of 1467, 25.2% acceptance rate).

[16] **Xinhua Zhang**, Yaoliang Yu, and Dale Schuurmans. Accelerated training for matrix-norm regularization: A boosting approach. In *Proceedings of Neural Information Processing Systems (NIPS)*, 2012. **[PDF]**
(370 out of 1467, 25.2% acceptance rate).

[17] Yaoliang Yu, James Neufeld, Ryan Kiros, **Xinhua Zhang**, and Dale Schuurmans. Regularizers versus losses for nonlinear dimensionality reduction. In *Proceedings of International Conference on Machine Learning (ICML)*, 2012. **[PDF]**
(242 out of 890, 27.1% acceptance rate).

[18] Yi Shi, **Xinhua Zhang**, Xiaoping Liao, Guohui Lin, and Dale Schuurmans. Protein-chemical interaction prediction via kernelized sparse learning SVM. In *Pacific Symposium on Biocomputing (PSB)*, 2013. **[PDF]**
(*Asia-Pacific*).

[19] Yi Shi, Xiaoping Liao, **Xinhua Zhang**, Guohui Lin, and Dale Schuurmans. Sparse learning based linear coherent bi-clustering. In *Workshop on Algorithms in Bioinformatics (WABI)*, 2012. **[PDF]**
(35 out of 92, 38% acceptance rate).

[20] **Xinhua Zhang**, Ankan Saha, and S. V. N. Vishwanathan. Smoothing multivariate performance measures. In *Proceedings of Conference on Uncertainty in Artificial Intelligence (UAI)*, 2011. **[PDF]**
(96 out of 285, 33.7% acceptance rate).

[21] **Xinhua Zhang**, Ankan Saha, and S. V. N. Vishwanathan. Accelerated training of max-margin Markov networks with kernels. In *Proceedings of International Conference on Algorithmic Learning Theory (ALT)*, 2011. **[PDF]**
(26 out of 65, 40.0% acceptance rate, 10% invited submission to Journal of Theoretical Computer Science).

[22] **Xinhua Zhang**, Yaoliang Yu, Martha White, Ruitong Huang, and Dale Schuurmans. Convex sparse coding, subspace learning, and semi-supervised extensions. In *Proceedings of National Conference on Artificial Intelligence (AAAI)*, 2011. **[PDF]**
(39 out of 975, 4% acceptance rate for oral *and* poster presentation).

[23] Ankan Saha, S.V.N. Vishwanathan, and **Xinhua Zhang**. New approximation algorithms for minimum enclosing convex shapes. In *ACM-SIAM Syposium on Discrete Algorithms (SODA)*, 2011. **[PDF]**
(136 out of 454, 30.0% acceptance rate).

[24] **Xinhua Zhang**, Ankan Saha, and S. V. N. Vishwanathan. Lower bounds on rate of convergence of cutting plane methods. In *Proceedings of Neural Information Processing Systems (NIPS)*, 2010. **[PDF]**
(293 out of 1219, 24.0% acceptance rate).

[25] **Xinhua Zhang**, Thore Graepel, and Ralf Herbrich. Bayesian online learning for multi-label and multivariate performance measures. In *Proceedings of International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2010. **[Code]** **[PDF]**
(125 out of 308, 40.6% acceptance rate).

[26] **Xinhua Zhang**, Le Song, Arthur Gretton, and Alex Smola. Kernel measures of independence for non-iid data. In *Proceedings of Neural Information Processing Systems (NIPS)*, 2008. **[PDF]**
(123 out of 1022, 12.0% acceptance rate for oral presentation).

[27] Le Song, **Xinhua Zhang**, Alex Smola, Arthur Gretton, and Bernhard Schölkopf. Tailoring density estimation via reproducing kernel moment matching. In *Proceedings of International Conference on Machine Learning (ICML)*, 2008. **[PDF]**
(155 out of 583, 26.5% acceptance rate).

[28] Li Cheng, S. V. N. Vishwanathan, and **Xinhua Zhang**. Consistent image analogies using semi-supervised learning. In *Proceedings of IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2008. **[PDF]**
(508 out of 1593, 32% acceptance rate).

[29] **Xinhua Zhang**, Douglas Aberdeen, and S. V. N. Vishwanathan. Conditional random fields for multi-

agent reinforcement learning. In *Proceedings of International Conference on Machine Learning (ICML)*, 2007. **[Code]** **[PDF]**
(**Best student paper award**, 152 out of 522, 29% acceptance rate).

[30] **Xinhua Zhang** and Wee Sun Lee. Hyperparameter learning for graph based semi-supervised learning algorithms. In *Proceedings of Neural Information Processing Systems (NIPS)*, 2006. **[Code]** **[PDF]**
(204 out of 833, 24.5% acceptance rate).

[31] **Xinhua Zhang** and Peter K K Loh. A fault-tolerant routing strategy for Fibonacci-class cubes. In *Asia-Pacific Computer Systems Architecture Conference (ACSAC)*, 2005. **[PDF]**.

• Others

[32] Yaoliang Yu, Hao Cheng, and **Xinhua Zhang**. Approximate low-rank tensor learning. In *Optimization Workshop (OPT) at Neural Information Processing Systems (NIPS)*, 2014. **[PDF]**
(*Refereed* workshop paper, *International*).

[33] Jiazhong Nie, Manfried Warmuth, S.V.N. Vishwanathan, and **Xinhua Zhang**. Lower bounds for boosting with Hadamard matrices. In *Conference on Computational Learning Theory (COLT)*, 2013. **[PDF]**
(*Refereed* open problem at a leading conference in theoretical machine learning).

[34] **Xinhua Zhang**, Ankan Saha, and S. V. N. Vishwanathan. Regularized risk minimization by Nesterov's accelerated gradient methods: Algorithmic extensions and empirical studies. *Technical report: http://arxiv.org/abs/1011.0472*, 2011. **[PDF]**.

[35] **Xinhua Zhang**, Douglas Aberdeen, and S. V. N. Vishwanathan. Conditional random fields for multi-agent reinforcement learning. In *Learning Workshop (Snowbird)*, 2007. **[PDF]**
(*Refereed* workshop oral presentation paper, *International*, 22 out of 176, 12.5% acceptance rate).

[36] Peter K K Loh and **Xinhua Zhang**. A fault-tolerant routing strategy for Gaussian cube using Gaussian tree. In *International Conference on Parallel Processing Workshops*, 2003. **[PDF]**
(*Refereed* workshop oral presentation paper, *International*).

• Theses

[37] **Xinhua Zhang**. Graphical models: Modeling, optimization, and Hilbert space embedding. PhD Thesis, Department of Computer Science, Australian National University, 2010. **[PDF]**.

[38] **Xinhua Zhang**. Hyperparameter learning for graph based semi-supervised learning algorithms. Master's Thesis, Department of Computer Science, National University of Singapore, 2006. **[PDF]**.

Manuscript Reviews

Senior Program Committee Member / Area Chair for Leading Conferences:

2015	Neural Information Processing Systems (NIPS)
2016	AAAI Conference on Artificial Intelligence (AAAI)
2011, 2015	International Joint Conference on Artificial Intelligence (IJCAI)

Program Committee Member or Reviewer for Leading Conferences:

2011-2016	International Conference on Machine Learning (ICML)
2011-2016	Neural Information Processing Systems (NIPS)
2014-2016	Artificial Intelligence and Statistics (AISTATS)
2016	International Joint Conference on Artificial Intelligence (IJCAI)
2016	AAAI Conference on Artificial Intelligence (AAAI)
2014	Knowledge Discovery in Databases (KDD)
2013, 2014	Computer Vision and Pattern Recognition (CVPR)
2013	International Conference on Computer Vision (ICCV)
2012	European Conference on Computer Vision (ECCV)

Reviewer for journals

IEEE Transactions on Pattern Analysis and Machine Intelligence (IEEE-TPAMI)
Neurocomputing
Machine Learning Journal (MLJ)
Journal of Machine Learning Research (JMLR)
Journal of Artificial Intelligence Research (JAIR)
Neural Computation (NECO)
Theoretical Computer Science (TCS)
Artificial Intelligence Journal (AIJ)
IEEE Transactions on Signal Processing (IEEE-SP)
IEEE Transactions on Neural Networks and Learning Systems (IEEE-TNNLS)
Pattern Recognition (PR)
Transactions on Knowledge and Data Engineering (TKDE)
Statistics and Computing (STCO)

Teaching

- **Lecturing at the University of Illinois at Chicago, USA**

Fall 2016	Advanced Topics in Machine Learning (CS594) Joint undergraduate and postgraduate
Spring 2016	Artificial Intelligence I (CS411) Joint undergraduate and postgraduate

- **Lecturing at the Australian National University (ANU), Australia**

July – Oct 2015	Information Theory (COMP2610/6261) Joint undergraduate and postgraduate Co-lectured evenly with Aditya Menon and Mark Reid
July – Nov 2014	Advanced Topics in Statistical Machine Learning (COMP4680/8650) Joint undergraduate and postgraduate. Topic: Graphical Models Co-lectured evenly with Stephen Gould and Justin Domke
July – Nov 2013	Advanced Topics in Statistical Machine Learning (COMP4680/8650) Joint undergraduate and postgraduate. Topic: Convex Optimization Co-lectured evenly with Stephen Gould and Justin Domke

- **Guest Lecturing at Purdue University, USA**

Nov 2009	Statistical Learning Theory (STAT 598Y) **Two guest lectures**, joint undergraduate and postgraduate Topic: Large scale optimisation

- **Teaching Assistantship**

Sept – Dec 2009	STAT 598J Convex Analysis (postgraduate, Purdue University)
July – Nov 2007	COMP3620/6320 Artificial Intelligence (postgraduate, ANU)
Feb – May 2007	COMP8650 Advanced Topics in Statistical Machine Learning (postgraduate, ANU)
Sept – Dec 2002	Information Systems Management (undergraduate, Shanghai Jiao Tong University)

Supervision of Research Student

- **Ongoing**

Jan 2016 – present	**Vignesh Ganapathiraman** (PhD at University of Illinois at Chicago) **Topic**: Convex Relaxation for Deep Learning
Jan 2016 – present	**Zhan Shi** (PhD at University of Illinois at Chicago) **Topic**: Stochastic Optimization for Saddel-Point Problems

- **Graduated**

Jan 2013 – May 2014	**Xianghang Liu** (PhD at Univ. of New South Wales, de facto co-supervision) **Topic**: Bayesian sparse learning (one chapter of PhD thesis) **Current**: Research Engineer at Canon Information Systems Research Australia
Mar 2011 – Sept 2012	**Hao Cheng** (Master at University of Alberta, de facto co-supervision) **Topic**: Convex Bregman divergence clustering (whole Master thesis) **Current**: PhD student at University of Washington

- **Supervised in Australian National University until Oct 2015 (moving to US)**

May 2014 – present	**Kamal Parameswaran** (PhD at Australian National University, co-supervision) **Topic**: Sublinearity for machine learning
Oct 2012 – present	**Suvash Sedhain** (PhD at Australian National University, co-supervision) **Topic**: Social recommendation systems

- **Summer Scholar**

May – Aug 2014	**Thanard Kurutach** (Summer scholar from MIT, USA) **Topic**: Structured Modeling for Solar Prediction

Invited Talks

Mar 2015	Microsoft Research Redmond (Redmond, WA) Convex Deep Learning and Efficient Optimization
Sept 2014	Chinese University of Science and Technology (Hefei, China) Sublinearity for Machine Learning
August 2013	Tsinghua University (Beijing, China) Convex Subspace Learning and Efficient Optimization
July 2013	Environmental Analytics Showcase (Brisbane, Australia) Distributed Solar Prediction
Sept 2012	University of Alberta (Edmonton, Canada) Accelerated Training for Matrix-norm Regularization: A Boosting Approach
April 2012	Microsoft Research Cambridge (Cambridge, UK) Learning and Representing: a Jointly Optimal Approach
March 2012	Virginia Tech (Blacksburg, USA) Learning and Representing: a Jointly Optimal Approach
Feb 2012	Aalto University and University of Helsinki (Helsinki, Finland) Accelerated optimization for machine learning: A smoothing approach

Projects Participated

From January 2013 to June 2015, I have been part of the Distributed Solar Prediction project at National ICT Australia (NICTA). My major responsibility is to build machine learning models that accurately predict the power output of rooftop PV panels in a 5-30 minute horizon, via fusing heterogeneous data collected from a distributed network of data loggers and low-resolution all-sky cameras.

Awards and Honors

2015	Outstanding Program Committee member for AAAI 2015 (amongst seven awardees)
2007	Best student paper award at International Conference on Machine Learning (ICML)
2007	Microsoft Research Asia Fellowship (USD 6,000)
2009	ANU Vice Chancellor's Grant for visiting Purdue University (AUD 5,000)
2007, 2008	Travel grant from ICML to attend ICML 2007 (USD 1,200) and ICML 2008 (USD 1,600)
2010	Travel grant from NIPS to attend NIPS 2010 (USD 200)
2006 $\sim$ 2009	ANU-NICTA Tuition Scholarship, ANU-RSISE Stipend Scholarship (AUD 20,000 p.a.)