

Chih-Jen Lin

- PERSONAL DATA

1. Address: Department of Computer Science and Information Engineering, National Taiwan University, Taipei 106, Taiwan
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3. E-mail: cjlin@csie.ntu.edu.tw
4. Homepage: <http://www.csie.ntu.edu.tw/~cjlin>

- EDUCATION AND CURRENT POSITION:

1. Distinguished professor, Department of Computer Science and Information Engineering, National Taiwan University, Taipei 106, Taiwan, 2011–present
2. Adjunct distinguished professor, Graduate Institute of Networking and Multimedia, National Taiwan University, Taipei 106, Taiwan, August 2011–present
3. Adjunct distinguished professor, Graduate Institute of Industrial Engineering, National Taiwan University, Taipei 106, Taiwan, August 2011–present
4. Ph.D., Industrial & Operations Engineering, University of Michigan, September 1995 – May 1998.
5. M.S.E., Industrial & Operations Engineering, University of Michigan, September 1995–December 1996.
6. B.S., Mathematics, National Taiwan University, October 1989–June 1993.

- RESEARCH INTERESTS:

1. Machine learning: support vector machines, large-scale data classification, and applications
2. Large-scale optimization and its applications

- JOURNAL PAPERS:

- [1] Hsiang-Fu Yu, Cho-Jui Hsieh, Kai-Wei Chang, and Chih-Jen Lin. Large linear classification when data cannot fit in memory. *ACM Transactions on Knowledge Discovery from Data*, 2011. URL http://www.csie.ntu.edu.tw/~cjlin/papers/kdd_disk_decomposition.pdf. To appear.
- [2] Chih-Chung Chang and Chih-Jen Lin. LIBSVM: A library for support vector machines. *ACM Transactions on Intelligent Systems and Technology*, 2:27:1–27:27, 2011. Software available at <http://www.csie.ntu.edu.tw/~cjlin/libsvm>.

- [3] Wen-Yen Chen, Yangqiu Song, Hongjie Bai, Chih-Jen Lin, and Edward Y. Chang. Parallel spectral clustering in distributed systems. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 33(3):568–586, 2011.
- [4] Ruby C. Weng and Chih-Jen Lin. A Bayesian approximation method for online ranking. *Journal of Machine Learning Research*, 12:267–300, 2011. URL http://www.csie.ntu.edu.tw/~cjlin/papers/online_ranking/online_journal.pdf.
- [5] Hsiang-Fu Yu, Fang-Lan Huang, and Chih-Jen Lin. Dual coordinate descent methods for logistic regression and maximum entropy models. *Machine Learning*, 85(1-2):41–75, October 2011. URL http://www.csie.ntu.edu.tw/~cjlin/papers/maxent_dual.pdf.
- [6] Guo-Xun Yuan, Kai-Wei Chang, Cho-Jui Hsieh, and Chih-Jen Lin. A comparison of optimization methods and software for large-scale l1-regularized linear classification. *Journal of Machine Learning Research*, 11:3183–3234, 2010. URL <http://www.csie.ntu.edu.tw/~cjlin/papers/l1.pdf>.
- [7] Yin-Wen Chang, Cho-Jui Hsieh, Kai-Wei Chang, Michael Ringgaard, and Chih-Jen Lin. Training and testing low-degree polynomial data mappings via linear SVM. *Journal of Machine Learning Research*, 11:1471–1490, 2010. URL http://www.csie.ntu.edu.tw/~cjlin/papers/lowpoly_journal.pdf.
- [8] Fang-Lan Huang, Cho-Jui Hsieh, Kai-Wei Chang, and Chih-Jen Lin. Iterative scaling and coordinate descent methods for maximum entropy. *Journal of Machine Learning Research*, 11:815–848, 2010. URL http://www.csie.ntu.edu.tw/~cjlin/papers/maxent_journal.pdf.
- [9] Chih-Jen Lin, Stefano Lucidi, Laura Palagi, Arnaldo Risi, and Marco Sciandrone. Decomposition algorithm model for singly linearly constrained problems subject to lower and upper bounds. *Journal of Optimization Theory and Applications*, 141:107–126, 2009.
- [10] Tzu-Kuo Huang, Chih-Jen Lin, and Ruby C. Weng. Ranking individuals by group comparisons. *Journal of Machine Learning Research*, 9:2187–2216, 2008. URL <http://www.csie.ntu.edu.tw/~cjlin/papers/genBTexp/genBTexp-jmlr.pdf>.
- [11] Rong-En Fan, Kai-Wei Chang, Cho-Jui Hsieh, Xiang-Rui Wang, and Chih-Jen Lin. LIBLINEAR: A library for large linear classification. *Journal of Machine Learning Research*, 9:1871–1874, 2008. URL <http://www.csie.ntu.edu.tw/~cjlin/papers/liblinear.pdf>.

- [12] Kai-Wei Chang, Cho-Jui Hsieh, and Chih-Jen Lin. Coordinate descent method for large-scale L2-loss linear SVM. *Journal of Machine Learning Research*, 9:1369–1398, 2008. URL <http://www.csie.ntu.edu.tw/~cjlin/papers/cdl2.pdf>.
- [13] Chih-Jen Lin, Ruby C. Weng, and S. Sathiya Keerthi. Trust region Newton method for large-scale logistic regression. *Journal of Machine Learning Research*, 9:627–650, 2008. URL <http://www.csie.ntu.edu.tw/~cjlin/papers/logistic.pdf>.
- [14] Hsuan-Tien Lin, Chih-Jen Lin, and Ruby C. Weng. A note on Platt’s probabilistic outputs for support vector machines. *Machine Learning*, 68:267–276, 2007. URL <http://www.csie.ntu.edu.tw/~cjlin/papers/plattprob.pdf>.
- [15] Chih-Jen Lin. On the convergence of multiplicative update algorithms for non-negative matrix factorization. *IEEE Transactions on Neural Networks*, 18(6):1589–1596, 2007. URL <http://www.csie.ntu.edu.tw/~cjlin/papers/multconv.pdf>.
- [16] Chih-Jen Lin. Projected gradient methods for non-negative matrix factorization. *Neural Computation*, 19:2756–2779, 2007. URL <http://www.csie.ntu.edu.tw/~cjlin/papers/pgradnmf.pdf>.
- [17] Tzu-Kuo Huang, Ruby C. Weng, and Chih-Jen Lin. Generalized Bradley-Terry models and multi-class probability estimates. *Journal of Machine Learning Research*, 7:85–115, 2006. URL <http://www.csie.ntu.edu.tw/~cjlin/papers/generalBT.pdf>.
- [18] Pai-Hsuen Chen, Rong-En Fan, and Chih-Jen Lin. A study on SMO-type decomposition methods for support vector machines. *IEEE Transactions on Neural Networks*, 17:893–908, July 2006. URL <http://www.csie.ntu.edu.tw/~cjlin/papers/generalSMO.pdf>.
- [19] Rong-En Fan, Pai-Hsuen Chen, and Chih-Jen Lin. Working set selection using second order information for training SVM. *Journal of Machine Learning Research*, 6:1889–1918, 2005. URL <http://www.csie.ntu.edu.tw/~cjlin/papers/quadworkset.pdf>.
- [20] Ming-Wei Chang and Chih-Jen Lin. Leave-one-out bounds for support vector regression model selection. *Neural Computation*, 17(5):1188–1222, 2005.
- [21] Pai-Hsuen Chen, Chih-Jen Lin, and Bernhard Schölkopf. A tutorial on ν -support vector machines. *Applied Stochastic Models in Business and Industry*, 21:111–136, 2005. URL <http://www.csie.ntu.edu.tw/~cjlin/papers/nusvmtutorial.pdf>.
- [22] Ting-Fan Wu, Chih-Jen Lin, and Ruby C. Weng. Probability estimates for multi-class classification by pairwise coupling. *Journal of Machine Learning Research*, 5:975–1005, 2004. URL <http://www.csie.ntu.edu.tw/~cjlin/papers/svmprob/svmprob.pdf>.

- [23] Bo-Juen Chen, Ming-Wei Chang, and Chih-Jen Lin. Load forecasting using support vector machines: A study on EUNITE competition 2001. *IEEE Transactions on Power Systems*, 19(4):1821–1830, November 2004.
- [24] Wei-Chun Kao, Kai-Min Chung, Chia-Liang Sun, and Chih-Jen Lin. Decomposition methods for linear support vector machines. *Neural Computation*, 16(8):1689–1704, 2004. URL <http://www.csie.ntu.edu.tw/~cjlin/papers/linear.pdf>.
- [25] Ming-Wei Chang, Chih-Jen Lin, and Ruby C. Weng. Analysis of switching dynamics with competing support vector machines. *IEEE Transactions on Neural Networks*, 15(3):720–727, 2004.
- [26] Chin-Sheng Yu, Chih-Jen Lin, and Jen-Kang Hwang. Predicting subcellular localization of proteins for Gram-negative bacteria by support vector machines based on n -peptide compositions. *Protein Science*, 13:1402–1406, 2004.
- [27] Kai-Min Chung, Wei-Chun Kao, Chia-Liang Sun, Li-Lun Wang, and Chih-Jen Lin. Radius margin bounds for support vector machines with the RBF kernel. *Neural Computation*, 15:2643–2681, 2003.
- [28] S. Sathiya Keerthi and Chih-Jen Lin. Asymptotic behaviors of support vector machines with Gaussian kernel. *Neural Computation*, 15(7):1667–1689, 2003.
- [29] Kuan-Min Lin and Chih-Jen Lin. A study on reduced support vector machines. *IEEE Transactions on Neural Networks*, 14(6):1449–1559, 2003. URL <http://www.csie.ntu.edu.tw/~cjlin/papers/rsvmTEX.pdf>.
- [30] Chin-Sheng Yu, Jung-Ying Wang, Jinn-Moon Yang, Ping-Chiang Lyu, Chih-Jen Lin, and Jen-Kang Hwang. Fine-grained protein fold assignment by support vector machines using generalize n peptide coding schemes and jury voting from multiple-parameter sets. *Proteins*, 50:531–536, 2003.
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- [33] Chih-Chung Chang and Chih-Jen Lin. Training ν -support vector regression: Theory and algorithms. *Neural Computation*, 14(8):1959–1977, 2002.

- [34] Shuo-Peng Liao, Hsuan-Tien Lin, and Chih-Jen Lin. A note on the decomposition methods for support vector regression. *Neural Computation*, 14:1267–1281, 2002.
- [35] Chih-Wei Hsu and Chih-Jen Lin. A comparison of methods for multi-class support vector machines. *IEEE Transactions on Neural Networks*, 13(2):415–425, 2002.
- [36] Chih-Wei Hsu and Chih-Jen Lin. A simple decomposition method for support vector machines. *Machine Learning*, 46:291–314, 2002.
- [37] Chih-Jen Lin. On the convergence of the decomposition method for support vector machines. *IEEE Transactions on Neural Networks*, 12(6):1288–1298, 2001. URL <http://www.csie.ntu.edu.tw/~cjlin/papers/conv.ps.gz>.
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- [39] Chih-Chung Chang and Chih-Jen Lin. Training ν -support vector classifiers: Theory and algorithms. *Neural Computation*, 13(9):2119–2147, 2001.
- [40] Chih-Jen Lin. Formulations of support vector machines: a note from an optimization point of view. *Neural Computation*, 13(2):307–317, 2001.
- [41] Shu-Cherng Fang, Chih-Jen Lin, and Soon-Yi Wu. Solving quadratic semi-infinite programming problems by using relaxed cutting plane scheme. *Journal of Computational and Applied Mathematics*, 129:89–104, 2001.
- [42] Soon-Yi Wu, Shu-Cherng Fang, and Chih-Jen Lin. Solving the general capacity problem. *Annals of Operations Research*, 103:193–211, 2001.
- [43] Chih-Chung Chang, Chih-Wei Hsu, and Chih-Jen Lin. The analysis of decomposition methods for support vector machines. *IEEE Transactions on Neural Networks*, 11(4):1003–1008, 2000.
- [44] Chih-Jen Lin and Romesh Saigal. An incomplete Cholesky factorization for dense matrices. *BIT*, 40:536–558, 2000.
- [45] Chih-Jen Lin and Jorge J. Moré. Newton’s method for large-scale bound constrained problems. *SIAM Journal on Optimization*, 9:1100–1127, 1999.
- [46] Chih-Jen Lin and Jorge J. Moré. Incomplete Cholesky factorizations with limited memory. *SIAM J. Sci. Comput.*, 21:24–45, 1999.

- [47] Shu-Cherng Fang, Soon-Yi Wu, and Chih-Jen Lin. Relaxed cutting plane method for solving linear semi-infinite programming problems. *Journal of Optimization Theory and Applications*, 99:759–779, 1998.
 - [48] Chih-Jen Lin, Soon-Yi Wu, and Shu-Cherng Fang. An unconstrained convex programming approach for solving linear semi-infinite programming problems. *SIAM Journal on Optimization*, 8(2), 1998.
 - [49] Chih-Jen Lin, Soon-Yi Wu, and Shu-Cherng Fang. On the parametric linear semi-infinite optimization. *Applied Mathematics Letter*, 9:89–96, 1996.
 - [50] Chih-Jen Lin, E. K. Yang, Shu-Cherng Fang, and Soon-Yi Wu. Implementation of an inexact approach to solving linear semi-infinite programming problems. *Journal of Computational and Applied Mathematics*, 61:87–103, 1995.
 - [51] Shu-Cherng Fang, Chih-Jen Lin, and Soon-Yi Wu. On solving convex quadratic semi-infinite programming problems. *Optimization*, 37:107–125, 1994.
- REFEREED CONFERENCE PAPERS
 - [1] Guo-Xun Yuan, Chia-Hua Ho, and Chih-Jen Lin. An improved GLMNET for l1-regularized logistic regression. In *Proceedings of the Seventeenth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*, pages 33–41, 2011.
 - [2] Chia-Hua Ho, Ming-Hen Tsai, and Chih-Jen Lin. Active learning and experimental design with SVMs. In *JMLR Workshop and Conference Proceedings: Workshop on Active Learning and Experimental Design*, volume 16, pages 71–84, 2011. URL <http://www.csie.ntu.edu.tw/~cjlin/papers/activelearning/activelearning.pdf>.
 - [3] Hsiang-Fu Yu, Cho-Jui Hsieh, Kai-Wei Chang, and Chih-Jen Lin. Large linear classification when data cannot fit in memory. In *Proceedings of the Sixteenth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*, 2010. URL http://www.csie.ntu.edu.tw/~cjlin/papers/kdd_disk_decomposition.pdf.
 - [4] Fang-Lan Huang, Cho-Jui Hsieh, Kai-Wei Chang, and Chih-Jen Lin. Iterative scaling and coordinate descent methods for maximum entropy. In *Proceedings of the 47th Annual Meeting of the Association of Computational Linguistics (ACL)*, 2009. Short paper.
 - [5] Yin-Wen Chang and Chih-Jen Lin. Feature ranking using linear svm. In *JMLR Workshop and Conference Proceedings: Causation and Prediction Challenge (WCCI 2008)*, volume 3, pages 53–64, 2008. URL <http://www.csie.ntu.edu.tw/~cjlin/papers/causality.pdf>.

- [6] Yangqiu Song, Wen-Yen Chen, Hongjie Bai, Chih-Jen Lin, and Edward Y. Chang. Parallel spectral clustering. In *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML/PKDD)*, 2008. URL <http://www.csie.ntu.edu.tw/~cjlin/papers/ecml08.pdf>.
- [7] S. Sathiya Keerthi, Sellamanickam Sundararajan, Kai-Wei Chang, Cho-Jui Hsieh, and Chih-Jen Lin. A sequential dual method for large scale multi-class linear SVMs. In *Proceedings of the Forteenth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*, 2008. URL http://www.csie.ntu.edu.tw/~cjlin/papers/sdm_kdd.pdf.
- [8] Cho-Jui Hsieh, Kai-Wei Chang, Chih-Jen Lin, S. Sathiya Keerthi, and Sellamanickam Sundararajan. A dual coordinate descent method for large-scale linear SVM. In *Proceedings of the Twenty Fifth International Conference on Machine Learning (ICML)*, 2008. URL <http://www.csie.ntu.edu.tw/~cjlin/papers/cddual.pdf>.
- [9] Chih-Jen Lin, Ruby C. Weng, and S. Sathiya Keerthi. Trust region Newton method for large-scale logistic regression. In *Proceedings of the 24th International Conference on Machine Learning (ICML)*, 2007. Software available at <http://www.csie.ntu.edu.tw/~cjlin/liblinear>.
- [10] Tzu-Kuo Huang, Chih-Jen Lin, and Ruby C. Weng. Ranking individuals by group comparisons. In *Proceedings of the Twenty Third International Conference on Machine Learning (ICML)*, 2006.
- [11] Pai-Hsuen Chen, Rong-En Fan, and Chih-Jen Lin. Training support vector machines via smo-type decomposition methods. In *Proceedings of the 16th International Conference on Algorithmic Learning Theory (ALT 2005)*, pages 45–62, 2005.
- [12] Tzu-Kuo Huang, Ruby C. Weng, and Chih-Jen Lin. A generalized Bradley-Terry model: From group competition to individual skill. In *Advances in Neural Information Processing Systems 17*. MIT Press, Cambridge, MA, 2005.
- [13] Ting-Fan Wu, Chih-Jen Lin, and Ruby C. Weng. Probability estimates for multi-class classification by pairwise coupling. In Sebastian Thrun, Lawrence Saul, and Bernhard Schölkopf, editors, *Advances in Neural Information Processing Systems 16*. MIT Press, Cambridge, MA, 2004.
- [14] Kai-Min Chung, Wei-Chun Kao, Tony Sun, and Chih-Jen Lin. Decomposition methods for linear support vector machines. In *Proceedings of ICASSP 2003*, pages 868–871, 2003.

- [15] Ming-Wei Chang, Chih-Jen Lin, and Ruby C. Weng. Adaptive deterministic annealing for two applications: competing SVR of switching dynamics and travelling salesman problems. In *Proceedings of ICONIP 2002*, pages 920–924, 2002.
 - [16] Kai-Min Chung, Wei-Chun Kao, Tony Sun, Li-Lun Wang, and Chih-Jen Lin. Radius margin bounds for support vector machines with the RBF kernel. In *Proceedings of ICONIP 2002*, pages 893–897, 2002.
 - [17] Ming-Wei Chang, Chih-Jen Lin, and Ruby C. Weng. Analysis of nonstationary time series using support vector machines. In Seong-Whan Lee and Alessandro Verri, editors, *Proceedings of SVM 2002*, Lecture Notes in Computer Science 2388, pages 160–170, New York, NY, USA, 2002. Springer-Verlag Inc.
 - [18] Ming-Wei Chang, Chih-Jen Lin, and Ruby C. Weng. Analysis of switching dynamics with competing support vector machines. In *Proceedings of IJCNN*, pages 2387–2392, 2002.
 - [19] Chih-Chung Chang and Chih-Jen Lin. IJCNN 2001 challenge: Generalization ability and text decoding. In *Proceedings of IJCNN*. IEEE, 2001.
 - [20] Shuo-Peng Liao, Hsuan-Tien Lin, and Chih-Jen Lin. A note on the decomposition methods for support vector regression. In *Proceedings of IJCNN*, 2001.
 - [21] Chih-Chung Chang, Chih-Wei Hsu, and Chih-Jen Lin. The analysis of decomposition methods for support vector machines. In *Workshop on Support Vector Machines, IJCAI99*, 1999.
 - [22] Chih-Jen Lin, Nestor Michelena, and Romesh Saigal. Topological fixture synthesis using semidefinite programming. In *Proceedings of the Third World Congress of Structural and Multidisciplinary Optimization (WCSMO-3)*, May 17-21 1999.
 - [23] Chih-Jen Lin. Preconditioning dense linear systems from large-scale semidefinite programming problems. In *Proceedings of the Fifth Copper Mountain conference on iterative methods*, 1998.
- BOOK CHAPTERS
 - [1] Léon Bottou and Chih-Jen Lin. Support vector machine solvers. In Léon Bottou, Olivier Chapelle, Dennis DeCoste, and Jason Weston, editors, *Large Scale Kernel Machines*, pages 301–320. MIT Press, Cambridge, MA., 2007. URL http://www.csie.ntu.edu.tw/~cjlin/papers/bottou_lin.pdf.

- [2] Yi-Wei Chen and Chih-Jen Lin. Combining SVMs with various feature selection strategies. In Isabelle Guyon, Steve Gunn, Masoud Nikravesh, and Lofti Zadeh, editors, *Feature extraction, foundations and applications*. Springer, 2006.
 - [3] Soon-Yi Wu, Shu-Cherng Fang, and Chih-Jen Lin. Analytic center based cutting plane method for linear semi-infinite programming. In M. Goberna and M. Lopez, editors, *Semi-infinite programming: recent advances*. Kluwer, 2001.
 - [4] Chih-Jen Lin, Shu-Cherng Fang, and Soon-Yi Wu. A dual affine scaling based algorithm for solving linear semi-infinite programming problems. In D. Z. Du and J. Sun, editors, *Advances in Optimization and Application*, pages 217–234. Kluwer Academic Publishers, 1994.
- TECHNICAL REPORTS:
 - [1] Chih-Wei Hsu, Chih-Chung Chang, and Chih-Jen Lin. A practical guide to support vector classification. Technical report, Department of Computer Science, National Taiwan University, 2003. URL <http://www.csie.ntu.edu.tw/~cjlin/papers/guide/guide.pdf>.
 - [2] Hsuan-Tien Lin and Chih-Jen Lin. A study on sigmoid kernels for SVM and the training of non-PSD kernels by SMO-type methods. Technical report, Department of Computer Science, National Taiwan University, 2003. URL <http://www.csie.ntu.edu.tw/~cjlin/papers/tanh.pdf>.
 - [3] Jen-Hao Lee and Chih-Jen Lin. Automatic model selection for support vector machines. Technical report, Department of Computer Science and Information Engineering, National Taiwan University, 2000.
 - [4] Chih-Jen Lin. *Study in Large-Scale optimization*. PhD thesis, University of Michigan, Ann Arbor, Michigan, 1998.
 - [5] Chih-Jen Lin and Romesh Saigal. A predictor corrector method for semi-definite linear programming. Technical report, Department of Industrial and Operations Engineering, University of Michigan, Ann Arbor, MI 48109-2117, 1995.
 - [6] Chih-Jen Lin and Romesh Saigal. An infeasible start predictor corrector method for semi-definite linear programming. Technical report, Department of Industrial and Operations Engineering, University of Michigan, Ann Arbor, MI 48109-2117, 1995.
 - SOFTWARE

1. LIBSVM: an integrated software for support vector classification and regression, released April 2000. (with C.-C. Chang)
(<http://www.csie.ntu.edu.tw/~cjlin/libsvm>)
More then 250,000 downloads from April 2000 to June 2011.
More than 7,000 Google Scholar citations (up to June 2011).
2. LIBLINEAR: a library for large linear classification, released April 2007. (with my research group)
(<http://www.csie.ntu.edu.tw/~cjlin/liblinear>)
More then 20,000 downloads from April 2007 to April 2011.
3. BSVM: a decomposition method for large-scale support vector machines, released February 2000. (with C.-W. Hsu)
(<http://www.csie.ntu.edu.tw/~cjlin/bsvm>)
4. TRON: a bound-constrained optimization software, released in May 1999. (with J. J. Moré)
(<http://www.mcs.anl.gov/~more/tron>)
5. ICFS: an incomplete Cholesky factorization for sparse matrices, released August 1998. (with J. J. Moré)
(<http://www.mcs.anl.gov/~more/icf>)

- OTHER CONFERENCE PRESENTATIONS

1. “Support vector machines and kernel methods,” invited tutorial at Asian Conference on Machine Learning, Tokyo, Japan, November 8, 2010
2. “Support vector machines and kernel methods,” plenary talk at International Workshop on Recent Trends in Learning, Computation, and Finance, Pohang, Korea, August 30, 2010.
3. “Training support vector machines: status and challenges,” invited speaker at ICML 2008 Workshop on Large Scale Learning Challenge.
4. “Training support vector machines: status and challenges,” invited speaker at Google Machine Learning Summit, May 2008.
5. “Support vector machines,” invited tutorial speaker at Machine Learning Summer School (MLSS), Taipei, July 2006.
6. “Training linear and non-linear SVMs,” invited talk at Workshop on Mathematics and Medical Diagnosis, Erice, Italy, July 2006.
7. “Support vector machines for data classification,” invited tutorial at ICONIP 2005, Taiwan, October 30, 2005.

8. "Optimization issues in training support vector machines," the 16th international conference on Algorithmic Learning Theory, Singapore, October 9, 2005 (invited talk).
9. "Support Vector Machines for Data Classification," XXXVI Annual Conference of the Italian Operational Research Society, Camerino, Italy, September 8, 2005 (invited plenary talk).
10. "Generalized Bradley-Terry model and multi-class probability estimates," ISI (International Statistical Institute) 2005, Australia, April 6, 2005 (talk in an invited session).
11. "Report on NIPS 2003 Feature Selection Competition," NIPS workshop on feature selection competition, Canada, December 12, 2003.
12. "Optimization techniques for data mining and machine learning," invited talk in Workshop on Optimization and Control, National Cheng Kung University, Tainan, Taiwan, January 6, 2003.
13. "Support vector machines for time series segmentation," invited talk in the 2002 Taipei International Statistical Symposium and Bernoulli Society EAPR Conference, Taipei, July 7-10, 2002.
14. "Support vector machines for protein classification/prediction," invited talk at the 8th Symposium on Recent Advances in Biophysics, Taipei, May 23, 2002.
15. "Automatic model selection using the decomposition methods," NIPS workshop on kernel methods, Breckenridge, CO, December 1, 2000.
16. "Newton's method for support vector machines." Talk at the Sixth SIAM Conference on Optimization, Atlanta, May 1999.
17. "Structural optimization and semidefinite programming," Talk at INFORMS Fall meeting, Seattle, October 1998.
18. "Preconditioning dense linear systems from large-scale semidefinite programming problems," Talk at the Fifth Copper Mountain Conference on Iterative Methods, Copper Mountain, Colorado, April, 1998.
19. "Incomplete Cholesky factorizations with limited memory." Talk at the Fourth Kalamazoo Symposium on Matrix Analysis & Applications, Kalamazoo, MI, October, 1997.
20. "Newton's method for large bound-constrained optimization problems." Talk at International Symposium on Mathematical Programming, Lausanne, Switzerland, August, 1997.
21. "An unconstrained convex programming approach for solving linear semi-infinite programming problems." Talk at International Symposium on Mathematical Programming, Lausanne, Switzerland, August, 1997.

22. “An infeasible start predictor corrector method for semidefinite linear programming .”
Talk at Fifth SIAM Optimization Conference, Victoria, British Columbia, Canada, May 1996.

- AWARDS AND RECOGNITION:

1. ACM Distinguished Scientist, 2011
2. NTU EECS Academic Excellence Award, NTU College of EECS, 2011.
3. IEEE fellow (class of 2011) for contributions to support vector machine algorithms and software.
4. Ten outstanding young persons of Taiwan, 2011
5. Best research paper award, ACM KDD 2010 (with students Hsiang-Fu Yu, Cho-Jui Hsieh, and Kai-Wei Chang).
6. Member of the NTU team to win the first prize of KDD cup 2010.
<https://pslcdatashop.web.cmu.edu/KDDCup/results.jsp>
7. Distinguished Scholar Research Project, National Science Council, Taiwan, 2009–2012.
8. Supervising students Chia-Hua Ho and Ming-Hen Tsai to win the 2nd place of Active Learning Challenge 2010.
<http://www.causality.inf.ethz.ch/activelearning.php>
9. Member of the NTU team to win the 3rd place of KDD cup 2009 (extended track) .
10. Winner of ICML 2008 large-scale learning challenge (linear SVM track; with students Hsiang-Fu Yu, Cho-Jui Hsieh, and Kai-Wei Chang).
<http://largescale.first.fraunhofer.de/summary/>
11. Supervising student Yin-Wen Chang to win WCCI 2008 Causation and Prediction challenge.
<http://www.causality.inf.ethz.ch/home.php>
12. Outstanding Research Award, National Science Council, Taiwan, 2007 and 2010.
13. Ta-You Wu Memorial Award, National Science Council, Taiwan, 2006.
14. Fu Ssu-Nien Award of National Taiwan University, 2005
15. Research award for young researchers from Pan Wen-Yuan Foundation, Taiwan, 2003.
16. K. T. Li award for young researchers from ACM Taipei/Taiwan chapter, July, 2002 (one awarded per year for young computer scientists in Taiwan)
17. Young investigator award from Academia Sinica, Taiwan, May, 2002 (15 awarded per year in all research areas)

18. Winner of WCCI 2002 competition on sequence recognition (with master students Ming-Wei Chang and Bo-Juen Chen)
19. Winner the EUNITE 2001 world wide competition (18 research groups) on electricity load prediction (<http://neuron-ai.tuke.sk/competition>). EUNITE is the European Network of Excellence on Intelligent Technology for smart adaptive systems (with master students Ming-Wei Chang and Bo-Juen Chen).
20. Winner of IJCNN Challenge 2001. IJCNN is one of the major Neural Networks conferences (with master student Chih-Chung Chang).
21. Winner of the OCR (Optical Character Recognition) competition organized by the University of Essex and the UK Post Office, December 2000. (with master student Chih-Chung Chang)
22. Second prize of the student paper competition, Fifth Copper Mountain conference on iterative methods, 1998.
23. Wallace J. Givens Research Associate (twice): competitive positions in Mathematics and Computer Science Division of Argonne National Laboratory which are intended to encourage graduate students who are beginning careers in computational science.
24. Prize for Outstanding Performance, National Mathematics Contest, R.O.C. 1989.

- ACADEMIC SERVICES

1. Editorial services

- Action editor, *Data Mining and Knowledge Discovery*, 2009–
- Associate editor, *IEEE Transactions on Neural Networks*, 2005–2010
- Associate editor, *Journal of Information Science and Engineering*, 2009–
- Guest editor: special issue on Support Vector Machines, *Neurocomputing*, 2003.

2. Reviewer for the following journals

- *Journal of Machine Learning Research*
- *Machine Learning*
- *Neural Computation*
- *SIAM Journal on Matrix Analysis and Applications*
- *SIAM Journal on Optimization*
- *IEEE Transactions on Neural Networks*
- *IEEE Transactions on Pattern Analysis and Machine Intelligence*
- *IEEE Transactions on Knowledge and Data Engineering*

- *IEEE Transactions on Fuzzy Systems*
- *IEEE Transactions on Image Processing*
- *IEEE Transactions on Signal Processing*
- *IEEE Signal Processing Letters*
- *IEEE Transactions on Evolutionary Computation*
- *IEEE Transactions on Systems, Man, and Cybernetics*
- *IEEE Transactions on Semiconductor Manufacturing*
- *IEEE Transactions on Antennas and Propagation*
- *IEEE Transactions on Automation Science and Engineering*
- *IEEE Transactions on Audio, Speech and Language Processing*
- *Biometrika*
- *Neurocomputing*
- *Bioinformatics*
- *BMC Bioinformatics*
- *Theory of Computing Systems*
- *Neural Processing Letters*
- *Signal Processing*
- *International Journal of Pattern Recognition and Artificial Intelligence (IJPRAI)*
- *Artificial Intelligence Review*
- *Pattern Analysis & Applications*
- *Computational Intelligence and Neuroscience*
- *IIE Transactions*
- *Annals of the Institute of Statistical Mathematics*
- *Journal of Statistical Planning and Inference*
- *Statistics and Computing*
- *Communications in Statistics*
- *Pattern Recognition*
- *Pattern Recognition Letters*
- *Knowledge and Information Systems*
- *Computational Optimization and its Applications*
- *INFORMS Journal on Computing*
- *Journal of Global Optimization*
- *Optimization*

- *Numerical Algorithms*
 - *Information Processing and Management*
 - *Internet Electronic Journal of Molecular Design*
 - *International Journal of Operations and Quantitative Management*
 - *International Journal of Computer Mathematics*
 - *Journal of Information Science and Engineering*
 - *Journal of Computer Science and Technology (JCST)*
 - *Journal of Formosan Medical Association*
 - *Journal of Chinese Institute of Industrial Engineers*
 - *Journal of the Chinese Institute of Engineers*
 - *Journal of the Chinese Institute of Electrical Engineering*
3. Reviewer for several book chapters
4. Conference chair, Area chair, or senior program committee member:
- Area chair, Neural Information Processing Systems (NIPS) 2007, 2010, 2011
 - Senior PC, IJCAI 2011 (IEAI track)
 - Senior PC, Asian Conference on Machine Learning (ACML) 2010
 - General Chair, Asian Conference on Machine Learning (ACML) 2011
5. Program committee member:
- ACM SIGKDD international conference on Knowledge discovery and data mining (KDD), Washington D.C. 2010, San Diego, 2011, Beijing, 2012
 - AI & Statistics 2010
 - NIPS Workshop on Optimization for Machine Learning (2008, 2009, 2010, 2011)
 - International Conference on Machine Learning (ICML), Helsinki 2008, Montreal 2009, Haifa 2010, Bellevue, WA 2011
 - European Conference on Machine Learning (ECML) and European Conference on Principles and Practice of Knowledge Discovery in Databases (PKDD), 2008, 2010, 2011
 - International Joint Conference on Neural Networks (IJCNN), Hong Kong 2008, San Jose, CA 2011
 - Pacific-Rim Conference on Multimedia (PCM), Hong Kong 2007, Bangkok, Thailand 2009, Shanghai, China 2010.
 - IEEE International Conference on Multimedia & Expo (ICME), Beijing 2007, Hannover 2008.

- Asian Conference on Machine Learning (ACML), 2009
 - NIPS 2006 Workshop on Machine Learning Open Source Software.
 - ACM Multimedia Conference (ACM MM), Santa Barbara 2006
 - International Colloquium on Grammatical Inference (ICGI), Japan 2006
 - International workshops on Statistical Techniques in Pattern Recognition (SPR), Hong Kong 2006, Orlando, Florida, 2008, Turkey, 2010.
 - Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD), Singapore 2006, China 2007, Osaka, Japan 2008, Thailand 2009
 - International Conference on Neural Information Processing (ICONIP), India 2004, Hong Kong 2006
 - International Workshop on Pattern Recognition with Support Vector Machines (SVM2002), Canada
 - Fourth Asia-Pacific Conference on Industrial Engineering and Management Systems, 2002, Taiwan
6. Reviewer for the following conferences
- Neural Information Processing Systems (NIPS), 2003, 2004, 2005, 2006
 - Conference on Learning Theory (COLT), 2003, 2009
 - International Joint Conference on Neural Networks (IJCNN), 2003, 2004, 2005
 - IEEE International Conference on Multimedia & Expo (ICME), 2009
 - First Asia-Pacific Bioinformatics Conference, Australia, 2003
 - The Seventh Pacific Rim International Conference on Artificial Intelligence, (PRICAI-02)
7. Other conference planning and administration
- Special session organizer, ICONIP 2002, Singapore
8. Thesis External Reviewers:
- University of Iceland: Steinn Gudmundsson (Ph.D.)
 - University of Trento, Italy: Nicola Segata (Ph.D. 2009)
 - Jin Yu: Australian National University (Ph.D. 2009)
 - Ruhr-Universität Bochum: Tobias Glasmachers (Ph.D. 2008)
 - Hongkong University of Science and Techonology: Ivor Tsang (Ph.D. 2007)
 - National University of Singapore: Chu Wei (Ph.D. 2003), Kaibo Duan (Ph.D. 2003)
 - Chinese University of Hongkong: Wan Zhang (M. Phil. 2003)
9. Proposal Reviewers:

- Research Grants Council, Hong Kong, 2006, 2007, 2008, 2009, 2010
- American University of Beirut, 2009
- Czech Science Foundation, 2010

10. Other Services:

- IEEE CS society fellow evaluation committee member (2011)

• PROFESSIONAL EXPERIENCE:

1. Visiting scientist, Google Research China, February 2008 – September 2008.
2. Visiting scientist, Yahoo! Research, Burbank, California, August 2006 – February 2007.
3. Distinguished Professor (August 2011–present), Professor (August 2006–present), Associate Professor (August 2002–August 2006), Assistant Professor (August 1998–August 2002), Department of Computer Science and Information Engineering, National Taiwan University, Taipei 106, Taiwan.
4. Adjunct Associate Professor, Graduate Institute of Networking and Multimedia, National Taiwan University, Taipei 106, Taiwan, August 2004– August 2006
5. Adjunct Associate Professor (August 2002–August 2006), Adjunct Assistant Professor (August 2001–August 2002), Graduate Institute of Industrial Engineering, National Taiwan University, Taipei 106, Taiwan.
6. Visiting Scientist, Mathematics and Computer Science division, Argonne National Laboratory, January 1999–February 1999, May 1999–August 1999.
7. Research Associate, Mathematics and Computer Science division, Argonne National Laboratory, January 1997–April 1997, September 1997–September 1998.
8. Wallace J. Givens Research Associate, Mathematics and Computer Science division, Argonne National Laboratory, May 1996–August 1996 and May 1997–August 1997.
9. Research Assistant, Department of Industrial and Operations Engineering, University of Michigan, September 1995–August 1998.
10. Teaching Assistant, Department of Industrial and Operations Engineering, University of Michigan, September 1996–December 1996.
11. Second Lieutenant, R.O.C. Army, July 1993 – May 1995.

• TALKS IN ACADEMIC INSTITUTES AND INDUSTRY

- International:

1. NEC Labs, Cupertino, California, August 26, 2011

2. Adobe, California, August 25, 2011
3. eBay research, San Jose, California, December 7, 2010
4. Facebook, Palo Alto, California, December 6, 2010
5. Baidu, China, September 3, 2010
6. Google Research New York, July 29, 2010
7. Yahoo! Research, Santa Clara, California, July 23, 2010
8. China Agriculture University, October 16, 2009
9. Microsoft Research Asia, October 13, 2009
10. Department of Computer Science and Engineering, Hong Kong University of Science and Technology, February 5, 2009
11. Department of Computer Science and Technology, Tsinghua University, China, September 5, 2008
12. HP Labs China, June 26, 2008
13. IBM T. J. Watson Research Center, May 16, 2008
14. Department of Industrial and Operations Engineering, University of Michigan, August 15, 2007
15. Yahoo! Research, Santa Clara, California, February 20, 2007
16. NEC Labs, Princeton, New Jersey, February 15, 2007
17. Siemens Corporate Research, Princeton, New Jersey, February 14, 2007
18. AT&T Research, February 13, 2007
19. California Institute of Technology, November 14, 2006
20. School of Information and Computer Science, University of California, Irvine, November 6, 2006
21. Yahoo! Research, Burbank, California, August 30, 2006
22. Mathematics and computer science division, Argonne National Lab., June 23, 2006
23. Chinese University of Hong Kong, Hone Kong, December 12, 2005
24. Nanyang Technological University, Singapore, October 10, 2005
25. Università di Roma "La Sapienza" and Istituto di Analisi dei Sistemi ed Informatica del CNR, Italy, September 1-2, 2005 (a short course).
26. CWI (Dutch National Research Institute for Mathematics and Computer Science), February 9, 2004
27. Department of Electronics and Computer Science, University of Southampton, February 2-6, 2004 (two talks)
28. Department of Computer Science, University of Essex, January 22, 2004

29. Department of Statistics and Probability Theory, Vienna University of Technology, September 4, 2003
 30. Fraunhofer Institute for Computer Architecture and Software Technology, Germany, August 18, 2003
 31. Department of Computer Science, University of Essex, August 13, 2003
 32. University of Freiburg, Germany, July 15, 2003
 33. Max Planck Institute of Biological Cybernetics, Germany, July 9, 2003
 34. University of Tuebingen, Germany, July 8, 2003
 35. KXEN Corporation, Suresnes, France, February 17, 2003
 36. Max Planck Institute of Informatics (Computer Science), Germany, February 10-16, 2003 (two talks)
 37. Max Planck Institute of Biological Cybernetics, Germany, January 12-February 10, 2003 (three talks)
 38. Department of Electrical and Computer Engineering, University of Michigan-Dearborn, August 27, 2002
 39. Siemens Corporate Research, Princeton, New Jersey, August 21, 2002
 40. Department of Computer Science, Binghamton University, August 19, 2002
 41. Merck research Lab., New Jersey, August 16, 2002
 42. Agilent Inc., Colorado, July 31, 2001
 43. Ford Research Lab., Michigan, July 24, 2001
 44. Department of Electrical Engineering, Ohio State University, August 29, 2000.
- Domestic:
1. Department of Mathematics, National Taiwan University, October 17, 2011
 2. Department of Financial and Computational Mathematics, Providence University, September 22, 2011
 3. Department of Mathematics, National Taiwan Normal University, April 20, 2011
 4. Department of Applied Informatics, Fo Guang University, April 14, 2011
 5. Department of Information Management, National Taiwan University, February 25, 2011
 6. Institute of Information Science, Academia Sinica, February 16, 2011
 7. Department Computer Science and Information Engineering, Chaoyang University of Technology, October 29, 2010
 8. Graduate Institute of Communication Engineering, National Taiwan University, September 27, 2010

9. Department Computer Science and Information Engineering, National Central University, November 12, 2008
10. Department of Information Management, Chaoyang University of Technology, October 30, 2007
11. Department Computer Science and Information Engineering, National Cheng-Kung University, October 26, 2007
12. Department of Computer Science, National Chengchi University, November 10, 2005
13. Department of Computer Science, National Chi-Nan University, September 24, 2004
14. Institute of Information Science, Academia Sinica, April 15, 2004
15. Department of Statistics, National Chiao Tung University, April 9, 2004
16. Computer and Communications Research Laboratories, Industrial Technology Research Institute, February 27 and March 3, 2004 (8 hours)
17. Computer and Communications Research Laboratories, Industrial Technology Research Institute, November 18, 2003
18. Department of Information Management, Chaoyang University of Technology, November 4, 2003
19. Graduate Institute of Industrial Engineering, National Taiwan University, April 23, 2003
20. Department Mathematics, National Taiwan University, March 10, 2003
21. Department of Information and Computer Engineering, Chung Yuan Christian University, December 16, 2002
22. Department of Statistics, Feng Chia University, November 1, 2002
23. Department of Statistics, National Chengche University, October 14, 2002
24. Asian BioInnovations Corporation, Taipei, June 14, 2002
25. Graduate Program in Bioinformatics, National Yang Ming University, March 29, 2002
26. Department of Information Science and Management, Providence University, March 22, 2002
27. Department of Computer Science and Information Engineering, National Taiwan University of Science and Technology, March 11, 2002
28. Institute of Statistical Science, Academia Sinica, January 16, 2002
29. Department Mathematics, National Taiwan University, January 5, 2002
30. Institute of Computer Science and Information Engineering, Chang Gung University, December 4, 2001.

31. Graduate Institute of Medical Informatics, Taipei Medical University, November 22, 2001.
32. Department of Information Management, National Taichung Institute of Technology, October 23, 2001.
33. Graduate Institute of Industrial Engineering, National Taiwan University, October 3, 2001
34. Department of Information Management, National Taiwan University of Science and Technology, September 27, 2001
35. Department of Biological Science and Technology, National Chiao Tung University, September 26, 2001
36. Institute of Information Science, Academia Sinica, August 28-29, 2001
37. Department Computer Science and Information Engineering, National Cheng-Kung University, May 25, 2001
38. Department of Information and Computer Education, National Taiwan Normal University, April 9, 2001
39. Institute of Statistical Science, Academia Sinica, February 19, 2001
40. Department Computer Science and Information Engineering, National Central University, January 17, 2001
41. Division of Biostatistics and Bioinformatics, National Health Research Institutes, December 6, 2000
42. Institute of Biochemistry, National Yang-Ming University, June 5, 2000
43. Department Computer Science and Information Engineering, National Chung Cheng University, May 22, 2000
44. Institute of Information Science, Academia Sinica, November 19, 1999
45. Department of Computer Science, National Tsing Hua University, June 2, 1999
46. Department Computer Science and Information Engineering, National Taiwan University, March 5, 1999
47. Department of Industrial Engineering, National Tsing Hua University, December 24, 1998
48. Department Computer Science and Information Engineering, National Taiwan University, December 26, 1997
49. Department Mathematics, National Cheng-Kung University, December 19, 1997
50. Institute of Information Management, National Chi-Nan University, December 18, 1997

51. Department of Industrial Engineering, National Tsing Hua University, December 17, 1997
52. Department Mathematics, National Cheng-Kung University, May, 1997

- TEACHING EXPERIENCE

1. Operations Research (Fall 1998, Fall 1999, Fall 2000)
2. Scientific computing (Winter 1999, Winter 2000)
3. Numerical methods (Winter 2001, Winter 2002, Winter 2003, Winter 2009)
4. Statistical learning theory (Fall 1999, Fall 2000, Fall 2001, Fall 2002, Fall 2003, Fall 2004, Fall 2005)
5. Data mining and machine learning (Fall 2001, Fall 2002, Winter 2004, Winter 2005, Winter 2006, Winter 2007)
6. Introduction to the theory of computation (Fall 2003, Fall 2004, Fall 2005, Fall 2007, Fall 2008, Fall 2009)
7. Machine learning: theory and practice (Winter 2007, Winter 2010)

- MEMBERSHIPS: IEEE (fellow, class of 2011), ACM (distinguished scientist)