Chih-Jen Lin

- PERSONAL DATA

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- EDUCATION AND CURRENT POSITION:

1. Associate Professor, Department of Computer Science and Information Engineering, National Taiwan University, Taipei 106, Taiwan, 2002–present
2. Adjunct Associate Professor, Graduate Institute of Industrial Engineering, National Taiwan University, Taipei 106, Taiwan, August 2002–present
3. Ph.D., Industrial & Operations Engineering, University of Michigan, September 1995 – May 1998.
4. M.S.E., Industrial & Operations Engineering, University of Michigan, September 1995– December 1996.
5. B.S., Mathematics, National Taiwan University, October 1989–June 1993.

- RESEARCH INTERESTS:

1. Machine learning: support vector machines and applications on data mining and bioinformatics
2. Scientific computing: large-scale optimization and its applications
3. Operations Research

- JOURNAL PAPERS:

[1] Ming-Wei Chang and Chih-Jen Lin. Leave-one-out bounds for support vector regression model selection. *Neural Computation*, 17:1188–1222, 2005.

[2] 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.

[3] 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.

[4] 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.

[5] 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.

[6] 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.

[7] 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.

[8] 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.

[9] S. Sathiya Keerthi and Chih-Jen Lin. Asymptotic behaviors of support vector machines with Gaussian kernel. *Neural Computation*, 15(7):1667–1689, 2003.

[10] Kuan-Min Lin and Chih-Jen Lin. A study on reduced support vector machines. *IEEE Transactions on Neural Networks*, 14(6):1449–1559, 2003.

[11] 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.

[12] Chih-Jen Lin. A formal analysis of stopping criteria of decomposition methods for support vector machines. *IEEE Transactions on Neural Networks*, 13(5):1045–1052, 2002.

[13] Chih-Jen Lin. Asymptotic convergence of an SMO algorithm without any assumptions. *IEEE Transactions on Neural Networks*, 13(1):248–250, 2002.

[14] Chih-Chung Chang and Chih-Jen Lin. Training ν-support vector regression: Theory and algorithms. *Neural Computation*, 14(8):1959–1977, 2002.

[15] 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.

[16] 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.

[17] Chih-Wei Hsu and Chih-Jen Lin. A simple decomposition method for support vector machines. *Machine Learning*, 46:291–314, 2002.

[18] Chih-Jen Lin. On the convergence of the decomposition method for support vector machines. *IEEE Transactions on Neural Networks*, 12(6):1288–1298, 2001.

[19] Jinn-Moon Yang, Jorng-Tzong Horng, Chih-Jen Lin, and Cheng-Yan Kao. Optical coating design using the family competition evolutionaty algorithm. *Evolutionary Computation*, 9(4):421–444, 2001.

[20] Chih-Chung Chang and Chih-Jen Lin. Training ν-support vector classifiers: Theory and algorithms. *Neural Computation*, 13(9):2119–2147, 2001.

[21] Chih-Jen Lin. Formulations of support vector machines: a note from an optimization point of view. *Neural Computation*, 13(2):307–317, 2001.

[22] 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.

[23] Soon-Yi Wu, Shu-Cherng Fang, and Chih-Jen Lin. Solving the general capacity problem. *Annals of Operations Research*, 103:193–211, 2001.

[24] 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.

[25] Chih-Jen Lin and Romesh Saigal. An incomplete Cholesky factorization for dense matrices. *BIT*, 40:536–558, 2000.

[26] Chih-Jen Lin and Jorge J. Moré. Newton's method for large-scale bound constrained problems. *SIAM Journal on Optimization*, 9:1100–1127, 1999.

[27] Chih-Jen Lin and Jorge J. Moré. Incomplete Cholesky factorizations with limited memory. *SIAM J. Sci. Comput.*, 21:24–45, 1999.

[28] 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.

[29] 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.

[30] Chih-Jen Lin, Soon-Yi Wu, and Shu-Cherng Fang. On the parametric linear semi–infinite optimization. *Applied Mathematics Letter*, 9:89–96, 1996.

[31] 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.

[32] 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] 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.

[2] 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.

[3] 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.

[4] 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*, 2002.

[5] 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*, 2002.

[6] 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.

[7] 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.

[8] Chih-Chung Chang and Chih-Jen Lin. IJCNN 2001 challenge: Generalization ability and text decoding. In *Proceedings of IJCNN*. IEEE, 2001.

[9] 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.

[10] 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.

[11] 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.

[12] 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] 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.

[2] 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.

- PAPERS SUBMITTED

[1] 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 and Information Engineering, National Taiwan University, 2003.

- TECHNICAL REPORTS:

[1] 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.

[2] Chih-Jen Lin. *Study in Large-Scale optimization*. PhD thesis, University of Michigan, Ann Arbor, Michigan, 1998.

[3] 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.

[4] 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 50,000 downloads from April 2000 to May 2005.
   Used by several research papers and courses.
2. `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`)
   More then 10,000 downloads from February 2000 to May 2005.
3. `TRON`: a bound-constrained optimization software, released in May 1999. (with J. J. Moré)
   (`http://www.mcs.anl.gov/~more/tron`)
4. `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. "Report on NIPS 2003 Feature Selection Competition" NIPS workshop on feature selection competition, Canada, December 12, 2003.
  2. "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.
  3. "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.
  4. "Support vector machines for protein classification/prediction," invited talk in 8th Symposium on Recent Advances in Biophysics, Taipei, May 23, 2002.
  5. "Automatic model selection using the decomposition methods," NIPS workshop on kernel methods, Breckenridge, CO, December 1, 2000.
  6. "Newton's method for support vector machines." Talk in Sixth SIAM Conference on Optimization, Atlanta, May 1999.
  7. "Structural optimization and semidefinite programming," Talk in INFORMS Fall meeting, Seattle, October 1998.
  8. "Preconditioning dense linear systems from large-scale semidefinite programming problems," Talk in Fifth Copper Mountain Conference on Iterative Methods, Copper Mountain, Colorado, April, 1998.
  9. "Incomplete Cholesky factorizations with limited memory." Talk in Fourth Kalamazoo Symposium on Matrix Analysis & Applications, Kalamazoo, MI, October, 1997.
  10. "Newton's method for large bound-constrained optimization problems." Talk in International Symposium on Mathematical Programming, Lausanne, Switzerland , August, 1997.
  11. "An unconstrained convex programming approach for solving linear semi-infinite programming problems." Talk in International Symposium on Mathematical Programming, Lausanne, Switzerland , August, 1997.
  12. "An infeasible start predictor corrector method for semidefinite linear programming ." Talk in Fifth SIAM Optimization Conference, Victoria, British Columbia, Canada, May 1996.

- AWARDS AND RECOGNITION:

  1. Who's who in the world, 2005
  2. Research award for young researchers from Pan Wen-Yuan Foundation, Taiwan, 2003.

3. K. T. Li award for young researchers from ACM Taipei/Taiwan chapter, July, 2002 (one awarded per year for young computer scientists in Taiwan)
4. Young investigator award from Academia Sinica, Taiwan, May, 2002 (15 awarded per year in all research areas)
5. Winner of WCCI 2002 competition on sequence recognition (with master students Ming-Wei Chang and Bo-Juen Chen)
6. Winner the EUNITE 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).
7. Winner of IJCNN Challenge 2001. IJCNN is one of the major Neural Networks conferences (with master student Chih-Chung Chang).
8. 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)
9. Second prize of the student paper competition, Fifth Copper Mountain conference on iterative methods, 1998.
10. 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.
11. Prize for Outstanding Performance, National Mathematics Contest, R.O.C. 1989.

- ACADEMIC SERVICES

1. Editorial Services
   - Associate Editor, *IEEE Transactions on Neural Networks*, 2005–
   - Guest editor: special issue on Support Vector Machines, *Neurocomputing*
   - Guest associate editor for several regular papers: *Journal of Informations Science and Engineering*
2. Referees of the following journals
   - *SIAM Journal on Matrix Analysis and Applications*
   - *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 Signal Processing*

- *IEEE Signal Processing Letters*
- *Journal of Machine Learning Research*
- *Machine Learning*
- *Neural Computation*
- *Neurocomputing*
- *Bioinformatics*
- *BMC Bioinformatics*
- *Theory of Computing Systems*
- *Neural Processing Letters*
- *IIE Transactions*
- *Annals of the Institute of Statistical Mathematics*
- *IEEE Transactions on Systems, Man, and Cybernetics*
- *IEEE Transactions on Semiconductor Manufacturing*
- *IEEE Transactions on Antennas and Propagation*
- *Statistics and Computing*
- *Communications in Statistics*
- *Pattern Recognition Letters*
- *Knowledge and Information Systems*
- *Computational Optimization and its Applications*
- *INFORMS Journal on Computing*
- *Journal of Global Optimization*
- *Optimization*
- *Internet Electronic Journal of Molecular Design*
- *International Journal of Operations and Quantitative Management*
- *Journal of Information Science and Engineering*
- *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. Referees of several book chapters
4. Referees of the following conferences
   - Neural Information Processing Systems (NIPS), 2003, 2004
   - Conference on Learning Theory (COLT), 2003
   - International Joint Conference on Neural Networks (IJCNN), 2003, 2004, 2005
   - First Asia-Pacific Bioinformatics Conference, Australia, 2003

- The Seventh Pacific Rim International Conference on Artificial Intelligence, (PRICAI-02)

5. Conference planning and administration
   - Program Committee member:
     International conference on neural information processing (ICONIP 2004), India
     International Workshop on Pattern Recognition with Support Vector Machines (SVM2002), Canada
   - Fourth Asia-Pacific Conference on Industrial Engineering and Management Systems
   - Special session organizer, ICONIP 2002, Singapore
   - Member of Penal: Medical Informatics Symposium, Taiwan, 2001
6. Board of governors, Taiwanese Bioinformatics Society. item Thesis External Reviewers:
   - National University of Singapore: Chu Wei (Ph.D. 2003), Kaibo Duan (Ph.D. 2003)
   - Chinese University of Hongkong: Wan Zhang (M. Phil. 2003)

- PROFESSIONAL EXPERIENCE:

1. Assistant Professor, Department of Computer Science and Information Engineering, National Taiwan University, Taipei 106, Taiwan, August 1998–2002.
2. Adjunct Assistant Professor, Graduate Institute of Industrial Engineering, National Taiwan University, Taipei 106, Taiwan, August 2001–August 2002.
3. Visiting Scientist, Mathematics and Computer Science division, Argonne National Laboratory, January 1999–February 1999, May 1999–August 1999.
4. Research Associate, Mathematics and Computer Science division, Argonne National Laboratory, January 1997–April 1997, September 1997–September 1998.
5. Wallace J. Givens Research Associate, Mathematics and Computer Science division, Argonne National Laboratory, May 1996–August 1996 and May 1997–August 1997.
6. Research Assistant, Department of Industrial and Operations Engineering, University of Michigan, September 1995–August 1998.
7. Teaching Assistant, Department of Industrial and Operations Engineering, University of Michigan, September 1996–December 1996.
8. Second Lieutenant, R.O.C. Army, July 1993 – May 1995.

- TALKS IN ACADEMIC INSTITUTES AND INDUSTRY

  - International:

    1. CWI (Dutch National Research Institute for Mathematics and Computer Science), February 9, 2004

2. Department of Electronics and Computer Science, University of Southampton, February 2-6, 2004 (two talks)
3. Department of Computer Science, University of Essex, January 22, 2004
4. Department of Statistics and Probability Theory, Vienna University of Technology, September 4, 2003
5. Fraunhofer Institute for Computer Architecture and Software Technology, Germany, August 18, 2003
6. Department of Computer Science, University of Essex, August 13, 2003
7. University of Freiburg, Germany, July 15, 2003
8. Max Planck Institute of Biological Cybernetics, Germany, July 9, 2003
9. University of Tuebingen, Germany, July 8, 2003
10. KXEN Corporation, Suresnes, France, February 17, 2003
11. Max Planck Institute of Informatics (Computer Science), Germany, February 10-16, 2003 (two talks)
12. Max Planck Institute of Biological Cybernetics, Germany, January 12-February 10, 2003 (three talks)
13. Department of Electrical and Computer Engineering, University of Michigan-Dearborn, August 27, 2002
14. Siemens Corporate Research, Princeton, New Jersey, August 21, 2002
15. Department of Computer Science, Binghamton University, August 19, 2002
16. Merck research Lab., New Jersey, August 16, 2002
17. Agilent Inc., Colorado, July 31, 2001
18. Ford Research Lab., Michigan, July 24, 2001
19. Department of Electrical Engineering, Ohio State University, August 29, 2000.

– Domestic:

1. Department of Computer Science, National Chi-Nan University, September 24, 2004
2. Institute of Information Science, Academia Sinica, April 15, 2004
3. Department of Statistics, National Chiao Tung University, April 9, 2004
4. Computer and Communications Research Laboratories, Industrial Technology Research Institute, February 27 and March 3, 2004 (8 hours)
5. Computer and Communications Research Laboratories, Industrial Technology Research Institute, November 18, 2003
6. Department of Information Management, Chaoyang University of Technology, November 4, 2003
7. Graduate Institute of Industrial Engineering, National Taiwan University, April 23, 2003

8. Department Mathematics, National Taiwan University, March 10, 2003
9. Department of Information and Computer Engineering, Chung Yuan Christian University, December 16, 2002
10. Department of Statistics, Feng Chia University, November 1, 2002
11. Department of Statistics, National Chengche University, October 14, 2002
12. Asian BioInnovations Corporation, Taipei, June 14, 2002
13. Graduate Program in Bioinformatics, National Yang Ming University, March 29, 2002
14. Department of Information Science and Management, Providence University, March 22, 2002
15. Department of Computer Science and Information Engineering, National Taiwan University of Science and Technology, March 11, 2002
16. Institute of Statistical Science, Academia Sinica, January 16, 2002
17. Department Mathematics, National Taiwan University, January 5, 2002
18. Institute of Computer Science and Information Engineering, Chang Gung University, December 4, 2001.
19. Graduate Institute of Medical Informatics, Taipei Medical University, November 22, 2001.
20. Department of Information Management, National Taichung Institute of Technology, October 23, 2001.
21. Graduate Institute of Industrial Engineering, National Taiwan University, October 3, 2001
22. Department of Information Management, National Taiwan University of Science and Technology, September 27, 2001
23. Department of Biological Science and Technology, National Chiao Tung University, September 26, 2001
24. Institute of Information Science, Academia Sinica, August 28-29, 2001
25. Department Computer Science and Information Engineering, National Cheng-Kung University, May 25, 2001
26. Department of Information and Computer Education, National Taiwan Normal University, April 9, 2001
27. Institute of Statistical Science, Academia Sinica, February 19, 2001
28. Department Computer Science and Information Engineering, National Central University, January 17, 2001
29. Division of Biostatistics and Bioinformatics, National Health Research Institutes, December 6, 2000
30. Institute of Biochemistry, National Yang-Ming University, June 5, 2000

31. Department Computer Science and Information Engineering, National Chung Cheng University, May 22, 2000
32. Institute of Information Science, Academia Sinica, November 19, 1999
33. Department of Computer Science, National Tsing Hua University, June 2, 1999
34. Department Computer Science and Information Engineering, National Taiwan University, March 5, 1999
35. Department of Industrial Engineering, National Tsing Hua University, December 24, 1998
36. Department Computer Science and Information Engineering, National Taiwan University, December 26, 1997
37. Department Mathematics, National Cheng-Kung University, December 19, 1997
38. Institute of Information Management, National Chi-Nan University, December 18, 1997
39. Department of Industrial Engineering, National Tsing Hua University, December 17, 1997
40. 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)
4. Statistical learning theory (Fall 1999, Fall 2000, Fall 2001, Fall 2002, Fall 2003, Fall 2004)
5. Data mining and machine learning (Fall 2001, Fall 2002, Winter 2004, Winter 2005)
6. Introduction to the theory of computation (Fall 2003, Fall 2004)

- MEMBERSHIPS: IEEE, SIAM, Mathematical Programming Society, ACM SIGKDD, IICM.