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Objective

Tenure-track Assistant Professor at a research university

Research Interests

Machine Learning, Data Mining, Bioinformatics, Signal/Image Processing, Artificial Intelligence

Education

Ph.D., Electrical Engineering, Xidian University, China	1999
MS, Electrical Engineering, Hunan University, China	1993
BS, Electrical Engineering, Hunan University, China	1990

Publications

Machine Learning

1. **X. Liao**, H. Li, and L. Carin, "Quadratically Gated Mixture of Experts for Incomplete Data Classification", appearing in *The 24rd International Conference on Machine Learning (ICML)*, 2007 [acceptance rate = 152/522]
2. D. Williams, **X. Liao**, Y. Xue, L. Carin, B. Krishnapuram, "On Classification with Incomplete Data", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 29(3):427-436, March 2007
3. Y. Xue, **X. Liao**, L. Carin, and B. Krishnapuram, "Multi-Task Learning for Classification with Dirichlet Process Priors", *Journal of Machine Learning Research (JMLR)*, 8:35-63, Jan, 2007
4. Q. Liu, **X. Liao**, and L. Carin, "Learning Classifiers on a Partially Labeled Data Manifold", *Proceedings of IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2007 [acceptance rate = 1344/2912]
5. **X. Liao**, Y. Zhang, L. Carin, "Plan-in-advance Active Learning of Classifiers", appearing in A. Hero et al. (Edt), *Foundations and Applications of Sensor Management*, Springer, 2006
6. H. Li, **X. Liao**, and L. Carin, "A Reward-Directed Bayesian Classifier", *Proceedings of IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2006 [acceptance rate = 1465/3045]
7. **X. Liao**, L. Carin, "Radial Basis Function Network for Multi-task Learning", In Y.Weiss, B. Scholkopf, and J. Platt, editors, *Advances in Neural Information Processing Systems 18*, MIT Press, Cambridge, MA, 2006 [acceptance rate = 206/753]
8. **X. Liao**, Y. Xue, L. Carin, "Logistic Regression with an Auxiliary Data Source", In Luc De Raedt and StefanWrobel, editors, *Proceedings of the 22nd International Machine Learning Conference*, ACM Press, 2005 [acceptance rate = 62/491]
9. D. Williams, **X. Liao**, Y. Xue, L. Carin, "Incomplete-Data Classification using Logistic Regression", In Luc De Raedt and StefanWrobel, editors, *Proceedings of the 22nd International Machine Learning Conference*, ACM Press, 2005 [acceptance rate = 62/491]
10. Y. Xue, **X. Liao**, L. Carin, B. Krishnapuram, "Learning multiple classifiers with Dirichlet process mixture priors", *NIPS Workshop on Open Problems and Challenges for Nonparametric Bayesian Methods in Machine Learning*, 2005

11. S. Ji, **X. Liao**, L. Carin, "Adaptive Multi-Aspect Target Classification and Detection with Hidden Markov Models", *IEEE Sensors Journal*, 5(5):1035-1042, 2005
12. **X. Liao**, L. Carin, "Application of the Theory of Optimal Experiments to Adaptive Electromagnetic-Induction Sensing of Buried Targets", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 26(8):961-972, 2004
13. Y. Zhang, **X. Liao**, L. Carin, "Detection of Buried Targets via Active Selection of Labeled Data: Application to Sensing Subsurface UXO", *IEEE Transactions on Geoscience and Remote Sensing*, 42(11):2535-2543, 2004
14. **X. Liao**, H. Li, B. Krishnapuram, "An M-ary KMP Classifier for Multi-aspect Target Classification", *Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Vol. 2, pp. 61-64, 2004
15. Y. Zhang, **X. Liao**, E. Dura, L. Carin, "Active Selection of Labeled Data for Target Detection", *Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Vol. 5, pp. 465-468, 2004
16. S. Ji, **X. Liao**, L. Carin, "Adaptive Multi-Aspect Target Classification and Detection with Hidden Markov Models", *Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Vol. 2, pp. 125-128, 2004

Planning under Uncertainty

17. S. Ji, R. Parr, H. Li, **X. Liao**, and L. Carin, "Point-Based Policy Iteration", appearing in *the Twenty-Second National Conference on Artificial Intelligence (AAAI)*, 2007 [acceptance rate = 253/921]
18. H. Li, **X. Liao**, and L. Carin, "Incremental Least Squares Policy Iteration for POMDPs", *the Twenty-First National Conference on Artificial Intelligence (AAAI)*, 2006 [acceptance rate = 236/774]
19. H. Li, **X. Liao**, and L. Carin, ""Region-Based Value Iteration for Partially Observable Markov Decision Processes", *the 23rd International Conference on Machine Learning (ICML)*, 2006 [acceptance rate = 140/700]
20. H. Li, L. He, **X. Liao**, S. Ji, L. Carin, "Region-Based Value Iteration and Its Application to Robot Navigation in a Minefield", *NIPS Workshop on Machine Learning Based Robotics in Unstructured Environments*, 2005

Bioinformatics

21. **X. Liao**, L. Carin, "ICA with Multiple Quadratic Constraints", *Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2003, Vol. 5, p.p. 313-316, 2003
22. Q. Liu, B. Krishnapuram, P. Pratapa, **X. Liao**, A. Hartemink, L. Carin, "Identification of Differentially Expressed Proteins Using MALDI-TOF Mass Spectra", *Conference Record of the Thirty-Eighth Asilomar Conference on Signals, Systems and Computers*, 2003
23. **X. Liao**, N. Dasgupta, S. M. Lin, L. Carin, "ICA and PLS modeling for functional analysis and drug sensitivity for DNA microarray signals", *Proceedings of IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, Vol. 4, p.p.3880-3883, 2002
24. **X. Liao**, L. Carin, "Constrained Independent Component Analysis of DNA Microarray Signals", *Proceedings of Workshop on Genomic Signal Processing and Statistics (GENSIPS)*, Raleigh, NC, October 11-13, 2002
25. S. M. Lin, **X. Liao**, P. McConnell, K. Vata, L. Carin, P. Goldschmidt "Using Functional Genomic Units to Corroborate User Experiments with the Rosetta Compendium", in SM Lin and KF Johnson (Edt) *Methods of Microarray Data Analysis II*, Kluwer Academic, pp. 123-138, 2002

Data Mining and Signal Processing

26. D. Williams, C. Wang, **X. Liao**, L. Carin, "Classification of Unexploded Ordnance with Incomplete Multi-Sensor Multi-resolution Data", appearing in *IEEE Transactions on Geoscience and Remote Sensing*, 2007
27. J.R. Stack, R. Arrieta, **X. Liao**, L. Carin, "A Kernel Machine Framework for Feature Optimization in Multi-frequency Sonar Imagery", *OCEANS 2006*, Sept. 2006, Pages 1-6
28. E. Dura, Y. Zhang, **X. Liao**, G. Dobeck, L. Carin, "Active Learning for Detection of Mine-Like Objects in Side-Scan Sonar Imagery", *IEEE Journal of Oceanic Engineering*, 3(2):360-371, 2005
29. M. Nishimoto, **X. Liao**, L. Carin, "Target Identification from Multi-Aspect High-Range-Resolution Radar Signatures Using a Hidden Markov Model", *IEICE Trans. Electron.*, Vol. E87-C, No. 10, pp.1706-1714, 2004
30. **X. Liao**, P. Runkle, L. Carin, "Identification of Ground Targets From Sequential High-Range-Resolution Radar Signatures", *IEEE Transactions on Aerospace and Electronic Systems*, 38(4):1230-1242, 2002
31. **X. Liao**, L. Carin, "A New Algorithm for Independent Component Analysis With or Without Constraints", *Proceedings of the Second IEEE Sensor Array and Multichannel (SAM) Signal Processing Workshop*, pp.413-417, 2002
32. M. Nishimoto, **X. Liao**, L. Carin, "Target Identification from Multi-Aspect High-Range-Resolution Radar Signatures Using Hidden Markov Model", *4th Asia-Pacific Engineering Research Forum on Microwaves and Electromagnetic Theory*, Fukuoka, Japan, November 16-17, 2002
33. **X. Liao**, Z. Bao, "Radar Target Recognition Based on Parameterized High Resolution Range Profiles", in Jun Shen, P S P Wang, and Tianxu Zhang (Edt), *Multispectral Image Processing and Pattern Recognition*, World Scientific, Singapore, January, 2001
34. **X. Liao**, P. Runkle, Y. Jiao, L. Carin, "Identification of ground targets from sequential HRR radar signatures", *Proceedings of IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, Vol.5, p.p. 2897 -2900, 2001
35. **X. Liao**, Z. Bao, "Signal Reconstruction from Accumulation of Bispectral Radial Slices", *Optical Engineering*, 39(8):2065-2074, 2000
36. **X. Liao**, Z. Bao, "Radar Target Recognition Based on Parameterized High Resolution Range Profiles", *International Journal of Pattern Recognition and Artificial Intelligence*, 14(7):979-986, 2000
37. **X. Liao**, Z. Bao, M. Xing, "On the Aspect Sensitivity of High Resolution Range Profiles and Its Reduction Methods", *Record of the IEEE 2000 International Radar Conference*, p.p.310-315, 2000
38. **X. Liao**, Z. Bao, "System Reconstruction from Accumulation of Polyspectra", *Electronics Letters*, 35(15):1229-1230, 1999
39. **X. Liao**, Z. Bao, "Circularly integrated Bispectra—Novel Shift Invariant Features For High-Resolution Radar Target Recognition", *Electronics Letters*, 34(19):1879-1880, 1998
40. **X. Liao**, Z. Bao, "Radar Target Recognition using Superresolution Range Profiles as Features", *Proceedings of SPIE*, Vol. 3545, pp.397-400, 1998
41. **X. Liao**, Z. Bao, "Two New Categories of Shift-Invariant Features of High-Resolution Radar Range Profiles", *Proceedings of Fourth International Conference on Signal Processing (ICSP)*, pp.1485-1488, 1998

Research Experiences

Postdoctoral Research Associate
Department of Electrical and Computer Engineering
Duke University, Durham, NC — April 2000 — present

- ❑ Worked in the areas of data mining and data analysis, bioinformatics, machine learning, planning under uncertainty, computer vision, etc.
- ❑ Invented numerous methods and algorithms in the above areas, examples including quadratically constrained ICA, plan-in-advance active learning, migratory logistic regression, multitask RBF networks, policy embedded in model, belief projection and migration, logistic regression for incomplete data, neighborhood-based classification, etc.
- ❑ Processed real data from various modalities, including DNA micro-arrays for gene expression analysis, mass spectrometers for protein analysis, medical modalities, high range resolution (HRR) radar, ground-penetrating radar (GPR), electromagnetic induction (EMI), side-scan sonar, etc.

Research Assistant
National Key Laboratory for Radar Signal Processing
Xidian University, China — September 1995 — March 2000

- ❑ Worked in the areas of radar imaging and target recognition, array signal processing, and statistical signal processing.
- ❑ Invented the methods and algorithms: accumulated bispectral radial slices, accumulated polyspectra, circularly integrated bispectrum, generalized-weighted-normalized-correlation.
- ❑ Discovered the equation for HRR angular correlation.

Research Member
Institute of Intelligent Instrumentation
Hunan University, China — May 1993 — August 1995

- ❑ Worked on software development for industrial applications.

Research Assistant
Department of Electrical Engineering
Hunan University, China — September 1990 — April 1993

- ❑ Studied hybrid expert systems based on production rules and neural computation.

Teaching Experiences

Department of Electrical Engineering, Hunan University, China

- ✎ Teaching assistant of the undergraduate course *Electronic Circuits Design* (Spring 1992)
- ✎ Lecturer; instructed three undergraduate courses:
  - ❑ *Signal Analysis* (Fall 1993, Fall 1994)
  - ❑ *Principles of Microprocessors* (Spring 1994)
  - ❑ *Measurement and Instrumentation* (Spring 1995)

National Key Laboratory for Radar Signal Processing, Xidian University, China

- ✎ Teaching assistant of the graduate course *Stochastic Processes* (Fall 1998)

Industrial Experiences

Worked on an industrially-contracted project "a universal sensor interface". Developed a graphics toolbox for the PP40 micro-plotter, in assembly language of single chip microprocessors. Developed an instrument-specific BASIC interpreter in C.	1993—1994
Worked for Changsha Cigarette Factory on a computer-aided monitoring and management system.	Summer 1991

Memberships

Senior Member of IEEE (since January 2004)

Professional Services

Reviewer of Optimal Engineering, IEEE Transaction on Aerospace and Electronic Systems, IEEE/ACM Transactions on Computational Biology and Bioinformatics

Co-organisor of the ICAPS Workshop "POMDPs, Classification and Regression: Relationships and Joint Utilization", June 7, 2006, UK
Workshop Homepage

Awards

SERDP Project of the Year Award (Co-performer), 2005
Official Announcement

Computer Skills

Hardware: Z80, Intel 8031/8051, Intel 80x86

Programming Languages: C/C++, Pascal, Matlab, Assembly, Fortran, BASIC, Java

Operating Systems: Windows NT/2000/XP, Linux/UNIX

Tools: MS Office, LaTex, HTML

References

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Prof. David Dunson
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