Rui M. Castro

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RESEARCH INTERESTS

- Statistical learning theory
- Network monitoring and tomography, wireless sensor networks
- Signal and image processing, pattern recognition
- Information theory and communications

EDUCATION

Rice University
Ph.D. - Electrical Engineering (Thesis Advisor: Robert D. Nowak), conferred January 2008
Thesis: "Active Learning and Adaptive Sampling for Non-Parametric Inference"

Instituto Superior Técnico, Portugal
Aerospace Engineer Degree (5 year *Licenciatura* degree), July 1998

EXPERIENCE

Columbia University, New York City
Electrical Engineering Department
Assistant Professor, 2008-Present

University of Wisconsin, Madison
ECE Department
Postdoctoral Fellow, 2007-2008
Conducting research on learning theory, network inference and pattern recognition applications

University of Wisconsin, Madison
ECE Department
Honorary Fellow, 2003-2007
Conducting research on statistical learning theory and pattern recognition applications

Rice University
ECE Department
Research assistant, 2000-2007
Conducting research on network tomography and topology inference problems

Rice University
ECE Department
Grader, 2001-2003
Grading assignments for Control systems, Random processes, Digital Signal Processing and Statistical Signal Processing

Lucent Technologies
Bell Labs Research
Math research center
Summer Intern, 2002
Working in statistical models for network traffic

Instituto de Telecomunicações, Portugal
Communication Theory and
Pattern Recognition Group
Research assistant, 1998-2000
Working in statistical signal processing for communications and navigation

Instituto Superior Tecnico, Portugal
Department of Mathematics,
Teaching assistant, 1997-2000
Taught linear algebra and real analysis to

Algebra and Analysis Unit

Instituto Superior Tecnico, Portugal
Department of Mechanics

undergraduate students

Young researcher, 1996-1997
Working on the project *Computational Dynamics of Articulate Human Motion*

HONORS and AWARDS

Graduate Student Mentor Award, University of Wisconsin - Madison, 2008
Rice Graduate Fellowship, 2000-2001
FCT (Portugal) Research fellowship, 1998-1999
PRODEP European undergraduate research grant, Spring 1998
IDMEC (Portugal) Young research fellowship 1996-1997

JOURNAL PUBLICATIONS

1. R. Castro and R. Nowak, "Minimax Bounds for Active Learning", IEEE Transactions on Information Theory, vol. 54, no. 5, pp. 2339–2353.
2. R. Castro, R. Willett and R. Nowak, "Faster Rates in Regression via Active Sampling", *in preparation.*
3. R. Castro, M. Coates, G. Liang, R. Nowak and B. Yu, "Network Tomography: Recent Developments", Statistical Science, vol. 19, no. 3, pp. 499–517, August 2004.
4. R. Castro, M. Coates and R. Nowak, "Likelihood Based Hierarchical Clustering", IEEE Transactions in Signal Processing, vol. 52, no. 8, pp. 2308–2321, August 2004.

BOOK CHAPTERS

1. R. Castro and R. Nowak, "Active Learning and Sampling", in *Foundations and Applications of Sensor Management*, A. Hero, D. Castanon, D. Cochran, and K. Kastella (Eds.), pp. 177–200 , Springer-Verlag, 2007.

INVITED PRESENTATIONS

1. "TBA", in *Challenges in Statistical Theory: Complex Data Structures and Algorithmic Optimization*, Mathematisches Forschungsinstitut Oberwolfach, August 2009. (by invitation only)
2. "Theory, Methods and Applications of Active Learning: A Tutorial", in *Machine Learning Summer School/Workshop 2009*, University of Chicago, June 2009. (presented together with Robert D. Nowak)
3. "Learning to Learn: Closing the loop between data analysis and aquisition", Distinguished Speaker, *Canadian Computer and Robot Vision Conference*, Kelowna, British Columbia, Canada, May 2009.
4. "Learning to Learn: Closing the loop between data analysis and aquisition", University of British Columbia, Vancouver, Canada, May 2009.
5. "Learning to Learn: An Introduction to Active Learning" and "Distilled Sensing: Discover What You Have Been Missing", *MITACS Fusion and Inference in Networks Workshop*, Bellairs Research Institute (McGill University), Barbados, March 2009.
6. "Learning to Learn: Active learning for level-set estimation and sparse reconstruction" *Statistics Seminar, University of California at Davis*, February 2009.
7. "Active Learning, and the Importance of Feedback", *Statistics Seminar, Université Rennes 2, Rennes, France*, April 2008.
8. "Active Learning, and the Importance of Feedback", *Statistics Seminar, Université Paris 5, Paris, France*, April 2008.
9. "Active Learning for Regression", *Colloquium on Multimodality and Related Topics, Paris, France*, March 2008.
10. "Active Learning and Adaptive Sampling", in *Meeting on Mathematical Statistics - Centre International de Recontres Mathématiques, Marseille, France*, December 2007.

11. "A Minimax Characterization of Active Learning", in *MITACS Seminar series, McGill University, Montreal, Canada*, November 2007.

12. R. Castro and R. Nowak, "Upper and Lower Bounds for Active Learning", in *Proceedings of the 44th Annual Allerton Conference on Communication, Control and Computing, Allerton House, University of Illinois*, September 2006.

13. "Active Learning, and the Importance of Feedback in Sampling", Instituto Superior Técnico (IST), Lisboa, Portugal, May 2006.

14. "Hierarchical Clustering and Network Topology Identification", in *ISMA 2004 Workshop on Internet Signal Processing (WISP)*, University of California, San Diego Supercomputing Center, La Jolla, November 2004.

15. "Hierarchical Clustering and Network Topology Identification", in *Interface 2004: Computational Biology and Bioinformatics*, 36th Symposium on the Interface, Baltimore, Maryland, May 2004.

16. "Tutorial - Network Tomography and Topology Identification", in *Workshop on Internet Tomography, Statistical and Applied Mathematical Sciences Institute (SAMSI)*, Research Triangle Park, North Carolina, October 2003.

17. "Network Tomography Using the EM Algorithm", in *Bulleting of the International Statistical Institute (ISI), 54th Session*, Berlin, Germany, August 2003.

CONFERENCE PROCEEDINGS AND PRESENTATIONS

1. R. Castro, J. Haupt and R. Nowak, "Distilled Sensing: Active Sensing for Sparse Recovery", in *Sparsity in Machine Learning and Statistics, Cumberland Lodge, London, U.K.*, April 2009.

2. J. Haupt, R. Castro, and R. Nowak, "Distilled sensing: selective sampling for sparse signal recovery", in *Proc. 12th Conference on Artificial Intelligence and Statistics, Clearwater Beach, Florida*, April 2009.

3. R. Castro, J. Haupt and R. Nowak, "Distilled Sensing: Active Sensing for Sparse Signal Detection and Estimation", in *New York Workshop on Computer, Earth, and Space Sciences, New York*, February 2009.

4. J. Haupt, R. Castro, and R. Nowak, "Adaptive Sensing for Sparse Signal Recovery", in *Proc. IEEE Digital Signal Processing Workshop and Workshop on Signal Processing Education, Marco Island, Florida*, January 2009.

5. R. Castro, C. Kalish, R. Nowak, R. Qian, T. Rogers and X. Zhu, "Human Active Learning", in *Advances in Neural Information Processing Systems (NIPS), Vancouver, Canada*, December 2008.

6. J. Haupt, R. Castro and R. Nowak, "Adaptive Discovery of Sparse Signals in Noise", in *42th Asilomar Conference on Signal, Systems and Computers, Pacific Grove, California*, October 2008.

7. R. Castro, J. Haupt, R. Nowak and G. Raz, "Finding Needles in Noisy Haystacks", in *Proceedings of IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Las Vegas, USA*, March-April 2008.

8. R. Castro and R. Nowak, "Minimax Bounds for Active Learning", in *Proceedings of the 20th Annual Conference on Learning Theory - COLT 2007, San Diego, California*, June 2007.

9. J. Haupt, R. Castro and R. Nowak, "Compressive Sampling for Signal Classification", in *40th Asilomar Conference on Signal, Systems and Computers, Pacific Grove, California*, October 2006.

10. R. Castro, J. Haupt and R. Nowak, "Compressed Sensing vs. Active Learning", in *Proceedings of IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Toulouse, France*, May 2006.

11. R. Castro, J. Haupt and R. Nowak, "Compressed Sensing and Adaptive Sampling", *NIPS Workshop on Value of Information in Inference, Learning and Decision-Making*, Vancouver, Canada, December 2005.

12. R. Castro, R. Willett and R. Nowak, "Faster Rates in Regression Via Active Learning", in *Neural Information Processing Systems (NIPS), Vancouver, Canada*, December 2005.

13. R. Castro, R. Willett and R. Nowak, "Coarse-to-Fine Manifold Learning", in *Procedings of IEEE International Conference on Acoustics, Speech and Signal Processing, Montreal, Canada*, May 2004.

14. R. Castro and R. Nowak, "Likelihood Based Hierarchical Clustering and Network Topology Identification", in *Fourth International Workshop on Energy Minimization Methods in Computer Vision and Pattern Recognition (EMMCVPR 2003)*, Lisboa, Portugal, July 2003. (available in Lecture Notes in Computer Science 2683, Springer 2003)

15. R. Castro, M. Wakin and M. Orchard, "On The Problem of Simultaneous Encoding of Magnitude and Location Information", in *36th Asilomar Conference on Signal, Systems and Computers*, Pacific Grove, California, November 2002.

16. M. Coates, R. Castro, R. Nowak and Y. Tsang, "Maximum Likelihood Network Topology Identification from Edge-Based Unicast Measurements", in *Proc. ACM Sigmetrics*, Marina del Rey, California, June 2002.

17. R. Castro, M. Coates and R. Nowak, "Maximum Likelihood Identification of Network Topology from End-to-end Measurements", in *DIMACS Workshop on Internet Measurement, Mapping and Modeling, DIMACS Center, Rutgers University*, Piscataway, New Jersey, February 2002.

18. R. M. Castro, and J. M. Leitão, "Phase Estimation in Mobile Communications and Navigation", in *Second Conference in Telecommunications - ConfTele'99,* Sesimbra, Portugal, April 1999.

TEACHING

ELEN3801, Signals and Systems (Fall 2008)
ELEN3084, Signals and Systems Laboratory (Fall 2008)
ELEN6887, Statistical Pattern Recognition (Spring 2009)

TECHNICAL ACTIVITIES and MEMBERSHIPS

Reviewer for NIPS2008 and COLT2009 conferences
Reviewer for IEEE Transactions on Information Theory
Reviewer for the Journal of the Bernoulli Society
Reviewer for IEEE Transactions on Geoscience and Remote Sensing
Reviewer for IEEE Transactions on Neural Networks
Reviewer for IEEE Transactions on Signal Processing
Coordinator of volunteers for the *IEEE Statistical Signal Processing Workshop, Madison WI*, August 2007
Weekly lecture series coordinator, CommDSP group, University of Wisconsin, Fall 2005
Eta Kappa Nu Electrical Engineering Honor Society, Member
Portuguese American Post-Graduate Society (PAPS), Member

SERVICE

M.S. program admissions committee
Ph.D. program admissions committee
Task Force for Undergraduate Program Revitalization committee

CITIZENSHIP

Portugal

LANGUAGE SKILLS

Fluent in English
Fluent in Portuguese (native language)
Knowledge of French