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Mehrdad Yaghoobi

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EDUCATION

Doctor of Philosophy, Ph.D., in Signal Processing — January 2010
University of Edinburgh, EH9 3JL, UK
Thesis title: Adaptive Sparse Coding and Dictionary Selection
Supervisor: Prof. Mike Davies

Master of Science, M.Sc., in Biomedical Engineering — September 2002
Sharif University of Technology, P.O.Box 1365-9363 Tehran , IRAN
Thesis title: Image Texture Extraction using Matching Pursuit with a Gabor-Wavelet Dictionary
Supervisor: Dr. Mohammad B. Shamsollahi

Bachelor of Science, B.Sc. in Electrical Engineering — September 1999
University of Tehran, North Kargar, Engineering Faculty, Tehran, IRAN
Thesis title: Simulation and Control of a Manipulator Robot with 2D of Freedom
Supervisor: Dr. Majid Nili Ahmadabadi

WORK EXPERIENCE

- Research Fellow, EPSRC grant "Signal Processing for the Networked Battlespace",
  University of Edinburgh — June 2013 - now
- Research Fellow, EPSRC grant "Sensor Signal Processing",
  University of Edinburgh — July 2012 - May 2013
- Postdoctoral Researcher, EU project SMALL,
  University of Edinburgh — June 2009 - June 2012

FIELDS OF INTEREST

- Compressive Sampling
- Supper-resolution
- Sensor Signal Processing
- Ultra-wideband ADC's
- Sparse and Cosparse Signal Models
- Low-dimensional Signal Modelling
- Adaptive Sampling
- Dictionary Learning for Sparse Approximation/Representation
- System Calibration
- Machine Learning

COLLABORATORS

- Prof. Mike Davies from the University of Edinburgh
- Dr. Remi Gribonval from INRIA, Rennes
- Prof. Laurent Daudet from University Paris Diderot - Paris 7
- Dr. Sangnam Nam from CNRS, Marseille
- Dr. Thomas Blumensath from Oxford University
- Shaun Kelly from the University of Edinburgh

PUBLICATIONS

- Journals:
  1. "Sparisty-based Autofocus Techniques for Under-sampled Synthetic Aperture Radar", with S. Kelly, M. Davies, IEEE Transactions on Aerospace and Electronic Systems, April, 2014.
  2. "Constrained Overcomplete Analysis Operator Learning for Cosparse Signal Modelling", with S. Nam, R. Gribonval, M. Davies, IEEE Transactions on Signal Processing, Vol. 61, No. 9, pp 2341-2355, 2013.
  3. "Parametric Dictionary Design for Sparse Coding", with L. Daudet, M. Davies, IEEE Transaction on Signal Processing, Vol. 57, No. 12, pp 4800-4810, 2009.
  4. "Dictionary Learning for Sparse Approximations with the Majorization Method", with T. Blumensath and M. Davies, IEEE Transaction on Signal Processing, Vol. 57, No. 6, pp 2178-2191, 2009.
- Submitted Preprints:
  1. "Optimal Dictionary Selection Using an Overcomplete Joint Sparsity Model", with L. Daudet, M. Davies, under-revision 2012.
- Under Preparation:
  1. "Super-resolution Sparse Multitouch Sensing", with S. McLaughlin M. Davies.
- Conferences:
  1. "A Low-complexity Sub-Nyquist Sampling System for Wideband Radar ESM Receivers", M. Yaghoobi, M. Lexa, Fabian Millioz and M. E. Davies, ICASSP, Florence, Italy, May 2014.
  2. "Super-resolution sparse projected capacitive multitouch sensing", M. Yaghoobi, S. McLaughlin, M. Davies, ISP Conference, London December, 2013.
  3. "Relaxed Analysis Operator Learning" , with M. Davies, NIPS, Workshop on Analysis Operator Learning vs. Dictionary Learning: Fraternal Twins in Sparse Modeling, December 2012.
  4. "Auto-focus for Under-sampled Synthetic Aperture Radar",with S. Kelly, M. E. Davies, SSPD 2012.
  5. "Auto-focus for Compressively Sampled SAR" with S. Kelly, M. E. Davies, International Workshop on Compressed Sensing applied to Radar, CoSeRa 2012.
  6. "Noise Aware Analysis Operator Learning for Approximately Cosparse Signals" with S. Nam, R. Gribonval, M. Davies, ICASSP, 2012. (invited paper)
  7. "Analysis Operator Learning for Overcomplete Cosparse Representations", with S. Nam, R. Gribonval, M. Davies, European Signal Processing Conference (EUSIPCO), August, 2011. (invited paper)

8. "Dictionary Learning for Sparse Representations: A Pareto Curve Root Finding Approach", with M. Davies, Ninth International Conference on Latent Variable Analysis and Signal Separation LVA/ICA September, pp 410-417, 2010.
9. "Structured and Incoherent Parametric Dictionary Design", with L. Daudet, M. Davies, ICASSP, 5486-5489, March 2010. (invited paper)
10. "Parametric Dictionary Design for Sparse Coding", with L. Daudet, M. Davies, SPARS09, Saint-Malo, France, April 2009
11. "Parsimonious Dictionary Learning", with T. Blumensath and M. Davies, ICASSP, 2869-2872, April 2009.
12. "Compressible Dictionary Learning for Fast Sparse Approximation", with M. Davies, IEEE Statistical Signal Processing (SSP), Cardiff, UK, 662-665, August, 2009.
13. "Regularized Dictionary Learning for Sparse Approximation", with T. Blumensath and M. Davies, EUSIPCO, August 2008.
14. "Quantized Sparse Approximation with Iterative Thresholding for Audio Coding", with T. Blumensath and M. Davies, ICASSP, 257-260, April 2007.
15. "Iterative Hard Thresholding and L0 Regularization", with T. Blumensath and M. Davies, ICASSP, 877-880, April 2007.
16. "A New Image Texture Extraction Algorithm Based on Matching Pursuit Gabor Wavelets", with H.R. Rabiee and others, ICASSP, 2005.
17. "Using Matching Pursuit Expansion for Image Texture Extraction", with M.B.Shamsollahi, 2nd Biannual Iranian Conference on Machine Vision and Image Processing, 253-260, Vol. 1, Feb. 13-15, 2003 (in Persian).
18. "Three Linearized Controllers for a Robotic Manipulator: A Comparative Output Error Study", with M. Nili Ahmadabadi, 9th Iranian Conference on Electrical Engineering (ICEE), 2001 (in Persian).

- Technical Reports:
  1. "Adaptive sparse coding and dictionary selection", PhD. thesis, the University of Edinburgh, January 2010.
  2. "Fast and Scalable: A Survey on Sparse Approximation Methods", EU funded SMALL project, December 2009.
  3. "Audio Time Stretching using Matching Pursuit", Digital Media Lab., AICTC, Sharif Univ., 2002.
- Communications (Without Proceedings):
  1. "A Computationally Efficient Multi-coset Wideband Radar ESM Receiver", M. Yaghoobi and M. E. Davies, NATO Specialist Meeting on Compressed Sensing, May 2014.
  2. "Large but Rank-Deficient Analysis Operator Learning", Signal Processing with Adaptive Sparse Structured Representations workshop, SPARS13, Lausanne, June, 2013 (poster).
  3. "Overcomplete Joint Sparsity Model for Dictionary Selection" international Biomedical and Astronomical Signal Processing (BASP) Frontiers workshop, Villars, Switzerland, January 2013 (poster).
  4. "Cosparse Low-Dimensional Signal Modelling", Workshop on Sparse Reprentations, Compressed Sensing and Applications, London, November 2012 (invited talk).

5. "Constrained Overcomplete Analysis Operator Learning for Cosparse Signal Modelling", IMA Conference on Numerical Linear Algebra and Optimisation, September 2012 (invited talk).
6. "Cosparsifying Overcomplete Analysis Operator Learning", Workshop on Sparsity, Localization and Dictionary Learning, Queen Mary University of London, June 2012 (poster).
7. "Analysis Operator Learning for Overcomplete Cosparse Representations", Signal Processing with Adaptive Sparse Structured Representations workshop, SPARS11, Edinburgh, June, 2011 (talk).
8. "Structured and Incoherent Parametric Dictionary Design", INSPIRE Conference on information representation and estimation, Imperial College London, September 21-24, 2009 (talk).
9. "Compressible Dictionary Learning for Fast Sparse Approximation", INSPIRE Sparsity Workshop, Robinson College, University of Cambridge, December 14-15, 2008 (poster).

HONORS

- Five invited talks in national and international meetings. 2010-2012
- University of Edinburgh international tuition fee waiver for $2\frac{1}{2}$ years. 2006
- Queen Mary University of London, international tuition fee waiver for 3 years. 2005
- EPSRC Studentship for three years (includes expenses and EU tuition fees). 2005
- Ranked 264^{th}, among more than 300,000 participants, in the nationwide university entrance exam. 1994

GRANTS

- Edinburgh/Heriot-Watt platform grant (awarded) for 1,437,225.00£ 2012
  titled: "Sensor Signal Processing", panel meeting: Jan. 20,2012
  starts: Apr. 1, 2012, period: 4 years, role: key postdoc researcher.
- ICASSP student travel grant worth 500$. 2009

INDUSTRIAL ENGAGEMENTS

- Plextek Consultating: Knowledge transfer to design and fabricate an efficient sub-Nyquist wideband receiver for the radar electronic surveillance. 2014
- Drumgange ltd.: Knowledge transfer and consultancy for the compressive intercept sonar application. 2014

SERVICE

I have served as a reviewer for the following Journals:
IEEE Transactions on "Signal Processing", "Aerospace and Electronic Systems", "Image Processing", "Information Theory", "Neural Networks and Learning Systems, "Audio, Speech and Language Processing", IEEE Signal Processing Letters, IET Signal Processing, *Elsevier* "Signal Processing", "Machine Learning", "Applied and Computational Harmonic Analysis", *Springer* Journal of Signal, Image and Video Processing and *SIAM* "Journal on Optimization" .
I have also served as a reviewer for the following conferences:
DSP2009, EUSIPCO2011-14, ICASSP2012, SPAWC2013.

EXPERIENCE

Academic:

- Guest Lec. Advanced Concepts in Signal Processing — Spring 2014
- Lec., Image Processing with Matlab, Univ. of Edinburgh — Winter 2012
- TA, Signal Processing with Matlab, Univ. of Edinburgh — Fall 2010-11 and 2013
- RA, Institute for Digital Communications (IDCOM), Univ. of Edinburgh — May 2006 - Jan. 2009
- RA, Centre for Digital Music, Queen Mary Univ. of London — Dec. 2005 - Apr. 2006
- TA, Microprocessors Lab., Queen Mary Univ. of London — Winter 2006
- TA, Biomedical Signal Processing Course, Sharif Univ. — Spring 2001
- RA, Robotic Lab. (B.Sc. Thesis), Univ. of Tehran — Spring - Summer 1999
- TA, Control Systems (Course), Univ. of Tehran — Spring 1999
- RA, Industrial Control Lab., Univ. of Tehran — Spring 1999
- RA, Control Systems Lab., Univ. of Tehran — Fall 1998 - Spring 1999

Other experiences:

- Scientific visits, "INRIA", Rennes, Frances, — September 2010 and April 2011
- Cosupervising 5 MSc. students, Univ. of Edinburgh, — Summer 2010 and 2011
- Internship, "Laboratoire d'Acoustique Musicale", Universit Pierre et Marie Curie-Paris VI, France — Feb, - Mar. 2007
- Junior Researcher, AICTC (Advanced Information and Communication Technology Centre), Sharif Univ., IRAN — Spring - Summer 2004 & 2005
- Internship, Advanced Industrial Systems Research Institute, Sharif Univ., IRAN — Winter 2000
- Hardware level design and build of a single board controller (for mixed signals), based on a 8051 micro-controller, University of Tehran — Summer 1998

PASSED COURSES

- Signal Processing:
  1. Digital Signal Processing, Sharif University
  2. Biomedical Signal Processing (BSP), Sharif University
  3. Time-Frequency Signal Analysis, Sharif University
  4. Neuro-Muscular Systems, Sharif University
- Control:
  1. Linear Control, University of Tehran
  2. Modern Control, University of Tehran
  3. Industrial Control, University of Tehran
  4. Adaptive Control, University of Tehran
  5. Optimal Control, University of Tehran
  6. Fuzzy Systems, University of Tehran
- General:
  1. Xilinx DSP Primer Workshop and Teaching Materials (two day workshop), RAL 2012
  2. Hands-on DSP Teaching with the TI OMAP-L138 eXperimenter, ICASSP2012

3. Introduction to Research Funding, the University of Edinburgh
4. How to prepare a poster, Queen Mary University of London
5. Academic Writing Skills, Queen Mary University of London
6. How to supervise M.Sc. Projects, Queen Mary University of London

COMPUTER SKILLS

Languages & Software: C, C++ (basics), MC8051 Assembly, DSP TMS320C25/50 Assembly (basics), Matlab, Simulink, PSpice, Protel, LaTeX,
Operating Systems: Linux, Mac OS, Windows.

MISCELLANEOUS

- Languages:
  - Persian, Fluent
  - English, Fluent
  - Arabic, Basics
- Nationality: IRANIAN
- Visa status: UK, work permit visa holder

REFERENCES

1. **Prof. Mike E. Davies**, Head of Institute
   Room 2.10, Institute for Digital Communications,
   AGB Building, University of Edinburgh,
   EH9 3JL, Edinburgh, UK.
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   Tel.: +44 (0)131 650 5795
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2. **Prof. Bernard Mulgrew,**
   Room 1.16, Institute for Digital Communications,
   AGB Building, University of Edinburgh,
   EH9 3JL, Edinburgh, UK.
   E-mail: B.Mulgrew@ed.ac.uk
   Tel.: +44 (0)131 650 5580
   Fax: +44 (0)131 650 6554

3. **Prof. Laurent Daudet,**
   Paris Diderot University and Institut Universitaire de France
   Building P, 2nd floor, Institut Langevin Ondes et Images (LOA), ESPCI,
   10 rue Vauquelin, 75005 Paris, France.
   E-mail: laurent.daudet@espci.fr
   Tel.: +33 (0)140 795 216

4. **Dr. Remi Gribonval**, Senior Research Scientist, INRIA and head of PANAMA research team
   Centre de Recherche INRIA Rennes - Bretagne Atlantique,
   Campus de Beaulieu, F-35042 Rennes cedex, France.
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