

Siwei Lyu

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Education:

- Ph.D., Computer Science, Dartmouth College, 2005
- M.S., Computer Science and Technology, Peking University, 2000
- B.S., Information Science, Peking University, 1997

Work Experience:

- Assistant Professor (09/2008 – present)
Computer Science Department, University at Albany, State University of New York
- Research Associate (08/2005 – 08/2008)
Howard Hughes Medical Institute, and the Center for Neural Science, New York University
- Assistant Researcher (06/2000 – 07/2001)
Microsoft Research Asia, Beijing, China

Awards and Honors

- SUNY Albany **Distinguished Dissertation Award**, 2012 (for Xunyu Pan's thesis)
- SUNY Albany Faculty Research Award, 2012
- National Science Foundation **Early Faculty Career Award**, 2010
- IEEE Signal Processing Society **Best Paper Award**, 2010
- SUNY Albany Faculty Research Award, 2009
- Dartmouth College Alumni Thesis Dissertation Award, 2006
- Dartmouth College Graduate Poster Award, 2004
- Kodak Fellowship, Peking University, 2000
- Award for Excellence in Graduate Study, Peking University, 2000
- Samsung Scholarship, Peking University, 1999
- Award for Excellence in Graduate Study, Peking University, 1999

Journal Publications:

- **S. Lyu**. Divisive Normalization as an Efficient Coding Transform: Justification and Effectiveness. *Neural Computation*, 23(11):2942-2973, 2011.
- X. Pan and **S. Lyu**. Region Duplication Detection Using Image Feature Matching, *IEEE Transactions on Information Forensics and Security*, 5(4):857-867, 2010.
- **S. Lyu** and E. P. Simoncelli. Nonlinear extraction of 'Independent Components' of natural images using radial Gaussianization. *Neural Computation*, 21(6):1-35, 2009. (figure used as cover image)
- **S. Lyu** and E. P. Simoncelli. Modeling Wavelet Subbands of Photographic Images with Fields of Gaussian Scale Mixtures. *IEEE Transaction on Pattern Analysis and Machine Intelligence*, 21(6):1-35, 2009.
- **S. Lyu** and H. Farid. Steganalysis Using Higher-Order Image Statistics. *IEEE Transactions on Information Forensics and Security*, 1(1):111-119, 2006. (*Best Paper Award*, IEEE Signal Processing Society, 2010)
- D. Rockmore, **S. Lyu**, and H. Farid. A Digital Technique for Authentication in the Arts. *International Foundation for Art Research (IFAR) Journal*, 8(2):21-29, 2006.
- **S. Lyu** and H. Farid. How Realistic is Photorealistic?. *IEEE Transactions on Signal Processing*, 53(2):845-850, 2005.

- **S. Lyu**, D. Rockmore, and H. Farid. A Digital Technique for Art Authentication. *Proceedings of National Academy of Science*, 101(49):17006-17010, 2004.

Publications in Prestigious Conferences:

- X. Pan, X. Zhang and **S. Lyu**. Exposing Image Splicing with Inconsistent Local Noise Variances. *International Conference on Computational Photography (ICCP)*, Seattle, WA, 2012. (Acceptance rate 20%)
- **S. Lyu**. Unifying Non-Maximum Likelihood Learning Objectives with Minimum KL Contraction. *Advances in Neural Information Processing Systems (NIPS)*, Granada, Spain, 2011. (Acceptance rate 22%)
- **S. Lyu**. Divisive Normalization: Justification and Effectiveness as Efficient Coding Transform. *Advances in Neural Information Processing Systems (NIPS)*, Vancouver, Canada, 2010. (Acceptance rate 24%)
- **S. Lyu**. Interpretation and Generalization of Score Matching. *Uncertainty in Artificial Intelligence (UAI)*, Montreal, Canada, 2009. (**Oral Presentation**, Acceptance rate 12%)
- **S. Lyu**. An Implicit Markov Random Field Model for Natural Images in Multi-scale Oriented Representations. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Miami, FL, 2009. (Acceptance rate 26%)
- **S. Lyu** and E. P. Simoncelli. Reducing Statistical Dependencies in Natural Signals Using Radial Gaussianization. *Advances in Neural Information Processing Systems (NIPS)*, Vancouver, Canada, 2008. (**Oral Presentation**, Acceptance rate 2.7%)
- **S. Lyu** and E. P. Simoncelli. Nonlinear Image Representation Using Neighborhood Normalization, *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Anchorage, AK, 2008. (Acceptance rate 24%)
- **S. Lyu** and E. P. Simoncelli. Statistical Modeling of Images with Fields of Gaussian Scale Mixtures. *Advances in Neural Information Processing Systems (NIPS)*, Vancouver, Canada, 2006. (Acceptance rate 26%)
- **S. Lyu**. Kernels for Unordered Sets: the Gaussian Mixture Approach *European Conference on Machine Learning (ECML)*, Porto, Portugal, 2005. (Acceptance rate 10%)
- **S. Lyu**. Mercer Kernels for Object Recognition with Local Features *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, San Diego, CA, 2005. (Acceptance rate 26%)
- **S. Lyu**. Infomax Boosting. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, San Diego, CA, 2005. (Acceptance rate 26%)
- **S. Lyu**. Automatic Image Orientation Determination with Natural Image Statistics. *ACM Multimedia*, Singapore, 2005. (Acceptance rate 32%)
- **S. Lyu** and H. Farid. Detecting Hidden Messages Using Higher-Order Statistics and Support Vector Machines. *5th International Conference on Information Hiding*, Noordwijkerhout, The Netherlands, 2002. (Acceptance rate 24%)

Other Peer-Reviewed Conference Publications:

- X. Pan, X. Zhang and **S. Lyu**, Detecting Splicing in Digital Audios Using Local Noise Level Estimation, *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Kyoto, Japan, 2012.
- X. Pan, X. Zhang and **S. Lyu**, Blind Local Noise Estimation for Medical Images Reconstructed from Rapid Acquisition, *SPIE Medical Imaging*, San Diego, CA, 2012.
- X. Pan, X. Zhang and **S. Lyu**, “Exposing Image Forgery with Blind Noise Estimation”, *ACM Workshop on Multimedia and Security*, Buffalo, NY, 2011.
- **S. Lyu**. Estimating Vignetting Function from a Single Image for Image Authentication. *ACM Workshop on Multimedia and Security*, Rome, Italy, 2010.
- **S. Lyu**. Single Image Vignetting Correction with Natural Image Statistics in Derivative Domains. *IEEE International Conference on Image Processing (ICIP)*, Hong Kong, 2010.

- X. Pan and **S. Lyu**. Detecting Image Region Duplication Using SIFT Features. *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Dallas, TX, 2010.
- **S. Lyu**. Nonnegative Matrix Factorization with Matrix Exponentiation. *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Dallas, TX, 2010.
- **S. Lyu** and E. P. Simoncelli. Statistically and Perceptually Motivated Nonlinear Image Representation. *SPIE Symposium on Electronic Imaging*, San Jose, CA, 2007
- **S. Lyu**, D. Rockmore, and H. Farid. Wavelet Analysis for Art Authentication. *Art+Math = X Conference*, Boulder, CO, 2005
- M. K. Johnson, **S. Lyu** and H. Farid. Steganalysis in Recorded Speech. *SPIE Symposium on Electronic Imaging*, San Jose, CA, 2005
- **S. Lyu** and H. Farid. Steganalysis Using Color Wavelet Statistics and One-Class Support Vector Machines. *SPIE Symposium on Electronic Imaging*, San Jose, CA, 2004
- H. Farid and **S. Lyu**. Higher-Order Wavelet Statistics and their Application to Digital Forensics. *IEEE Workshop on Statistical Analysis in Computer Vision (in conjunction with CVPR)*, Madison, WI, 2003

Theses:

- **S. Lyu**, Natural Image Statistics and Their Application in Digital Forensics, Ph.D. Thesis, Department of Computer Science, Dartmouth College, 2005
- **S. Lyu**, Component-based Software Architecture for Multimedia Authoring Systems. M.S. Thesis (in Chinese), Department of Computer Science and Technology, Peking University, 2000
- **S. Lyu**. A Survey of Multimedia Authoring Systems. B.S. Thesis (in Chinese), Department of Information Science, Peking University, 1997

Other Publications:

- H. Li, X. Chen and **S. Lyu**. Global Optimization CAD in MM Wave Waveguide Cavity. *International Journal of Infrared and Mili-meter Waves*, 20(5):895-904, 2001
- H. Li, X. Chen and **S. Lyu**. Multiple Diodes Quasi-Optical Oscillator. *International Journal of Infrared and Mili-meter Waves*, 22(6):905-915, 2001
- **S. Lyu** and A. Pan. Introduction to Active Scripting Techniques. *Computer World Magazine* (in Chinese), 2000
- H. Li, X. Chen and **S. Lyu**. MMW Source CAD in Quasi-Optical Resonator. *International Journal of Infrared and Mili-meter Waves*, 20(5):867-881, 1999
- **S. Lyu** and A. Pan. Building ActiveX Components with Active Template Library. *Computer World Magazine* (in Chinese), 1999

Posters and Abstracts:

- Unification of non-ML Learning Objectives, *6th Annual Machine Learning Symposium of New York Academy of Sciences*, New York, NY, 2011
- Reducing Statistical Dependencies in Natural Signals Using Radial Gaussianization, *3rd Annual Machine Learning Symposium of New York Academy of Sciences*, New York, NY, 2008
- Optimal Image Denoising with Fields of Gaussian Scale Mixtures, *2nd Annual Machine Learning Symposium of New York Academy of Sciences*, New York, NY, 2007
- Natural Image Statistics for Rebroadcast Detection, *Digital Identity Systems Workshop*, Brooklyn, NY, 2007
- Statistical Modeling of Natural Images with Fields of Gaussian Scale Mixtures, *Gordon Research Conference on Sensory Coding and the Natural Environment*, Big Sky, MO, 2006

- Art Forensics with Digital Techniques, *Graduate Appreciation Week Poster Presentation*, Dartmouth College, Hanover, NH, 2004 (**Best Poster Award Winner**)

Patents:

- Method and System for Representing and Displaying Digital Ink. U.S. Patent 7450125 (B2), 2008, U.S. Patent 7057615 (B2), 2006, and E.U. Patent EP1271407, 2003
- Method and System for Separating Text and Drawings in Digital Ink. U.S. Patent 7298903 (B2), 2007
- Computer Readable Medium for Expressing and Displaying Digital Ink and Computer System. Japan Patent JP2003141100, 2005

Grants:

- Faculty Research Award Program (FRAP-A), 05/2012 – 04/2015
Project Title:
University at Albany, SUNY
- Research Grant, 10/01/2011 – 09/30/2012
Project Title: *Recognizing Group Behavior in Surveillance Videos*
National Institute of Justice (through a subcontract with General Electronic Global Research)
- NSF CAREER Award (IIS-0953373), 06/2010 – 05/2015
Project Title: *A New Statistical Framework for Natural Images with Applications in Vision*
National Science Foundation
- Research Grant, 01/2010 – 12/2011
Project Title: *Compressing and Mining GPS Stream Data*
University Transportation Research Center (Region II)
- Research Grant, 06/2009 – 05/2011
Project Title: *Statistical Patterns to Detect Financial Fraud*
IBM Research Center, Hawthorne, NY
- Faculty Research Award Program (FRAP-A), 05/2009 – 04/2012
Project Title: *Seeing the Unseen: Natural Image Statistics for Digital Forensics*
University at Albany, SUNY

Presentations:

- Musell Center for Imaging Science, Rochester Institute of Technology, Rochester, NY, January, 2012
- Computer Science Department, Union College, Schenectady, NY, January, 2012
- Computer Science Department, Rensselaer Polytechnic Institute, April, 2011
- Schenectady Photography Society, Schenectady, NY, March, 2011
- Redwood Center for Neural Sciences, UC Berkeley, January, 2011
- IBM T.J. Watson Research Center, Hawthorne, NY, August, 2009
- GE Global Research Center, Niskayuna, NY, August, 2009
- Computer Science Department, New York University, April, 2009
- Computer Science Department, Temple University, April, 2009
- GRASP Lab, University of Pennsylvania, April, 2009
- ECE Department, Rensselaer Polytechnic Institute, October, 2008
- Google Research Lab, New York, NY, April, 2008
- Computer Science Department, Brooklyn Polytechnic University, October, 2007
- Computer Science Department, Columbia University, November, 2007
- CSAIL, Massachusetts Institute of Technology, October, 2007

- Computer Science Department, University at Albany, SUNY, April, 2007
- Computer Science Department, Brown University, February, 2007
- Siemens Corporate Research, Princeton, New Jersey, February, 2007.
- Center for Neural Sciences, New York University, February, 2005
- GRASP Lab, University of Pennsylvania, February, 2005
- CSAIL, Massachusetts Institute of Technology, November, 2004

Keynote Lectures and Tutorials

- ETIC, Toronto, Canada, August, 2012
- Plenary Presentation at the Fourth Conference on New Trends in Informatics Research (NTIR), SUNY Albany, April, 2009
- Modeling Natural Image Statistics. Tutorial at *NCAP Summer School on Learning in Biology and Engineering*, Toronto, Canada, August, 2010
- Natural Image Statistics and Applications in Computer Vision. Tutorial at ICCV, Kyoto, Japan, 2009
- Modeling Natural Image Statistics. Tutorial at *NCAP Summer School on Learning in Biology and Engineering*, Toronto, Canada, August, 2009
- Vision of Unseen, CVPR Workshop, Anchorage, AK, June, 2008

Teaching

- *Machine Learning*, SUNY Albany, Spring 2010, Fall 2010, Spring 2012
- *Digital Image Forensics*, SUNY Albany, Spring 2009, Spring 2010, Spring 2011, Spring 2012
- *Data Mining*, SUNY Albany, Fall 2008, Fall 2009, Fall 2010, Fall 2011

Review Services:

- IEEE TPAMI, IEEE TIP, IEEE TSP, IEEE TIFS, IJCV, JMLR
- ECCV, SIGGRAPH, CVPR, ICCV, NIPS,
- NSF Panelist, 2009, 2010, 2012

Student Advisement:

- Xunyu Pan (Ph.D.) CS SUNY Albany, Chair, Graduated Fall 2011
- Jan Kovsky (Ph.D.) EE SUNY Binghamton, external member, Graduated Spring 2012
- Zuoguan Wang (Ph.D.) ECE, RPI, external member, Graduated Summer 2012
- Jeremy B (Honor Student), SUNY Albany, 2010
- Adam P (Honor Student), SUNY Albany, 2012