# Guoshen YU

Date of birth : 09/29/1980
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## PROFESSIONAL EXPERIENCE

- **Quantitative researcher - systematic trading**
  BlueCrest Capital Management LLP, Geneva, Switzerland 12/2010 – present

- **Postdoctoral research associate**
  **University of Minnesota,** Electrical and Computer Engineering Dept., USA 09/2009 – 11/2010
  Supervisor: Prof. Guillermo Sapiro

## EDUCATION

- **Ph.D**., image and signal processing 09/2006 – 06/2009
  **Ecole Polytechnique**, Center for Applied Mathematics, Palaiseau, France
  *"Sparse Grouping and Invariant Representations for Estimation and Recognition"*
  Advisor: Prof. Stéphane Mallat
  Part of work under the supervision of Prof. Jean-Michel Morel (ENS Cachan) and Prof. Jean-Jacques Slotine (MIT).
  Defended on June 30, 2009, with highest honors *(mention très honorable)*.
  Jury : Emmanuel Bacry, Michael Elad, Henri Maître, Stéphane Mallat, Jean-Michel Morel, Jean Ponce, Guillermo Sapiro, Jean-Jacques Slotine.

- **Visiting graduate student** 02/2008 – 05/2008
  **MIT**, Mechanical Engineering Dept, Cambridge, MA, U.S.A.

- **M.Sc**., applied mathematics and image processing 09/2005 – 07/2006
  **Ecole Normale Supérieure de Cachan**, Cachan, France
  *With highest honors (mention très bien)*

- **Engineering Degree**, signal and image processing 09/2003 – 07/2006
  **Ecole Nationale Supérieure des Télécommunications (Telecom Paris)**, Paris, France

- **B.Sc**., electronic engineering 09/1999 – 07/2003
  **Fudan University**, Shanghai, China

## INDUSTRY INTERN EXPERIENCE

- **Let It Wave**, Paris, France 01/2005 – 08/2005
  Full-time research intern, with Prof. Stéphane Mallat
  - Video deinterlacement and super-resolution (algorithmic research)
  - Microscopic image restoration (kernel calibration and deconvolution)

- **STMicroelectronics**, Advanced System Technology Lab, Agrate, Italy 07/2004 – 12/2004
  Full-time engineering intern, with Dr. Daniele Bagni
  - AVS Video Coding Standard (Chinese version of H.264) research and its VLIW implementation

# PUBLICATIONS

### Journal Papers

- G. Yu and G. Sapiro, Statistical Compressive Sensing of Gaussian Mixture Models, submitted, arxiv.org/abs/1101.5785, Jan. 2011.
- G.Yu, G. Sapiro, and S. Mallat, Solving Inverse Problems with Piecewise Linear Estimators: From Gaussian Mixture Models to Structured Sparsity, submitted, arxiv.org/abs/1006.3056, June, 2010.
- J.M. Morel and G.Yu, Is SIFT Scale Invariant?, *Inverse Problems and Imaging*, vol. 5, no. 1, Feb., 2011
- S. Mallat and G. Yu, Super-Resolution with Sparse Mixing Estimators, *IEEE Trans. on Image Processing*, vol.19, issue 11, pp. 2889 - 2900, 2010.
- J.M. Morel and G. Yu, ASIFT: A New Framework for Fully Affine Invariant Image Comparison, *SIAM Journal on Imaging Sciences*, vol.2, issue 2, pp. 438-469, 2009.
- G. Yu and J.J. Slotine, Visual Grouping by Neural Oscillator Networks, *IEEE Trans. on Neural Networks*, vol.20, issue 12, pp. 1871-1884, 2009.
- G. Yu, S. Mallat, and E. Bacry, Audio Denoising by Time-Frequency Block Thresholding, *IEEE Trans. on Signal Processing*, vol 56, no. 5, pp. 1830-1839, May 2008.

### Conference Proceedings

- G. Yu and G. Sapiro, Statistical Compressive Sensing of Gaussian Mixture Models, accepted to *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2011.
- F. Léger, G. Yu and G. Sapiro, Efficient Matrix Completion with Gaussian Models, accepted to *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2011.
- G. Yu, G. Sapiro, and S. Mallat, Image Modeling and Enhancement via Structured Sparse Model Selection, *Proc. IEEE International Conference on Image Processing (ICIP)*, Hong Kong, 2010.
- S. Mallat and G. Yu, Structured Space Pursuits for Geometric Super-Resolution, invited paper, *IEEE International Conference on Image Processing (ICIP)*, Cairo, 2009.
- G. Yu and S. Mallat, Sparse Super-Resolution with Space Matching Pursuits, *Proc.SPARS'09*, Saint-Malo, 2009.
- G. Yu and J.M. Morel, A Fully Affine Invariant Image Comparison Method, *Proc. IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP),* Taipei, 2009.
- G. Yu and J.J. Slotine, Audio Classification from Time-Frequency Texture, *Proc. IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP),* Taipei, 2009.
- G. Yu and J.J. Slotine, Visual Grouping by Neural Oscillators, *Proc. IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP),* Taipei, 2009.
- G. Yu and J.J. Slotine, Fast Wavelet-based Visual Classification, Proc. IEEE International Conference on Pattern Recognition (ICPR), Tampa, 2008.
- G. Yu, E. Bacry, and S. Mallat, Audio Signal Denoising with Complex Wavelets and Adaptive Block Attenuation, *Proc. IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Hawaii, pp. 869-872, 2007.

### Book Chapters

- G. Yu and G. Sapiro, Image Enhancement and Restoration, *«Encyclopedia of Computer Vision», in press,* Springer, 2011.
- A. Castrodad, I. Ramirez, G. Sapiro, P. Sprechmann, and G. Yu, Second Generation Sparse Modeling: Structured and Collaborative Signal Analysis, *«Compressed Sensing: Theory and Applications», in press,* Cambridge Univ. Press, 2011.

# PATENTS

- S. Mallat and G. Yu, Video Enhancement Using Recursive Bandlets, PCT/IB2008/051770, pending, 2008.
- J.M. Morel and G. Yu, Viewpoint Invariant Object and Shape Recognition in Digital Images, FR 08/53244 pending, 2008.
- J.J. Slotine and G. Yu, Fast Pattern Classification Based on a Sparse Transform, US/PCT 13191, pending, 2009.

# ONLINE DEMOS

- ASIFT demo: an online demo that allows you to try the ASIFT algorithm with your own images. (Until Sept 2010, the demo has received more than **8600** experiments from anonymous researchers and engineers all over the world. See [Morel and Yu 09], [Yu and Morel 09].) *http://www.cmap.polytechnique.fr/~yu/research/ASIFT/demo.html*
- Online lecture: Sparse geometric super-resolution. (Speaker Stéphane Mallat. See [Yu and Mallat, 09], [Mallat and Yu, 09].) *http://videolectures.net/etvc08_mallat_sgsr/*

## TALKS

- Solving Inverse Problems with Piecewise Linear Estimators, *IEEE International Conference on Image Processing (ICIP)*, Hong Kong, Sept., 2010.
- Solving Inverse Problems with Gaussian Mixture Models, *The Hong Kong Polytechnic University (invited by Professor Lei Zhang)*, Sept., 2010.
- Solving Inverse Problems with Piecewise Linear Estimators, *IAS/Park City Mathematics Program (PCMI)*, June, 2010.
- Image Modeling and Enhancement with Structured Sparse Mixing Estimators, *SIAM conference on imaging science* (invited by Professors Michael Elad, Peyman Milanfar and Gabriel Peyré), Chicago, IL, U.S.A, March, 2010.
- Image Modeling and Enhancement with Structured Sparse Model Selection, *Johns Hopkins University* (invited by Professor Laurent Younes), Baltimore, MD, U.S.A., March, 2010.
- Structured Sparse Image Super-Resolution, *University of Minnesota* (invited by Professor Guillermo Sapiro), Minneapolis, MN, U.S.A., September, 2009.
- ASIFT: A New Framework for Fully Affine Invariant Image Comparison, *EPFL* (invited by Professor Martin Vetterli), Lausanne, Switzerland, June, 2009.
- ASIFT: A New Framework for Fully Affine Invariant Image Comparison, *Jiaotong University* (invited by Professor Yuncai Liu), Shanghai, China, April, 2009.
- Fully Affine Invariant Image Comparison, *Fudan University* (invited by Professor Yuanyuan Wang), Shanghai, China, August, 2008.
- Fully Affine Invariant Image Comparison, *East China Normal University* (invited by Professor Chunli Shen), Shanghai, China, July, 2008.
- Viewpoint Invariant Image Comparison, *MIT* (invited by Professor Jean-Jacques Slotine), Cambridge, MA, U.S.A., May, 2008.
- Audio Denoising by Time-Frequency Block Thresholding, *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Hawaii, U.S.A., April, 2007.

## JOURNAL REVIEWER

IEEE Transactions on Image Processing, SIAM Journal on Imaging Sciences, IEEE Signal Processing Letters, IEEE Journal of Selected Topics in Signal Processing, IEEE Transactions on Circuits and Systems for Video Technology, Journal of Mathematical Imaging and Vision, Signal Processing, Applied and Computational Harmonic Analysis, Neurocomputing, Journal of Computer Science and Technology

## HONORS

- **ParisTech Best Thesis Prize 2010** (3 doctoral theses out of 550 defended in 2009 in ParisTech, comprised of the twelve most prestigious French *Grandes Ecoles* including Ecole Polytechnique, Mine ParisTech, Ecole des Ponts ParisTech, etc., were selected to award the prize.)
- **CNRS (French National Center for Scientific Research) national recruitment competitions 2010**
  1st ex-aequo (199 candidates), information and communication sciences and technologies
  2nd (66 candidates), applied mathematics
- I**nnovation Prize 2010**, Ecole Polytechnique, finalist, 2nd ex-aequo
- **GASPARD MONGE International Doctoral Fellowship**, Ecole Polytechnique 2006 – 2008
- **Best Poster Prize 2008**, Xdoc, Ecole Polytechnique

## LANGUAGE SKILLS

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|---|---|
| *Chinese* | native language. |
| *English* | fluent (TOEFL 277/300, Writing 6/6, living in the U.S.A. since 2009). |
| *French* | fluent (living in France from 2003 to 2009). |
| *Italian* | notation. |

## COMPUTER SKILLS

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|---|---|
| *Languages* | C/C++, Matlab, VHDL, Java, Yorick, Assembly languages Intel 8086, Intel 8051 |
| *Operating systems* | Windows, Unix/Linux, Mac |

## INTERESTS AND SOCIAL ACTIVITIES

- Trainer of the Ping-pong Club of France Telecom R&D, Issy-les-Moulineaux 2007 – 2008
- Trombonist in the orchestra of Fudan University 2000 – 2003
- Vice chair, Students' International Affairs Study Association, Fudan University 2000 – 2001