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Date of birth: 19th January 1982

Julien Mairal

Education

- 2007–2010** **Ecole Normale Supérieure, Paris**, Ph.D, INRIA Willow Project-Team.
Supervisors: *Jean Ponce / Francis Bach*.
Description: Sparse coding for machine learning, image processing and computer vision.
- 2006–2007** **Ecole Normale Supérieure, Cachan**, Master of Science, Machine Learning, Computer Vision, and Image Processing.
- 2005–2007** **Telecom ParisTech, Paris**, Master of Science, Information Systems, Image Processing, Artificial Intelligence and Software Design.
- 2002–2005** **Ecole Polytechnique, Palaiseau**, Bachelor of Science, The best rated french engineering school with intensive training in mathematics, physics, computer science, economics and social sciences, end of studies ranking : 9th out of more than 400.
- 2000–2002** **Lycée Louis le Grand, Paris**, “Classes préparatoires“, Preparation for the nationwide competitive examination to the french engineering schools.

Work Experiences

- 2011–present** **University of California, Berkeley**, Postdoctoral researcher.
Department of Statistics, working with Pr. Bin Yu
- 2006** **University of Minnesota, Minneapolis**, Research internship, 7 month.
Sparse representations for image restoration. Supervisor: Guillermo Sapiro.
- 2005** **INRIA - Odyssee project, Paris**, Research Internship, 5 month.
Variational stereo algorithms on GPU. Supervisor: Renaud Keriven.

Awards

- best PhD Award winner of the best PhD thesis prize from AFRIF (pattern recognition). 2010
- best PhD award winner of the best PhD thesis prize of the “fondation EADS”, (information and communication technologies). 2011
- best PhD award runner-up for the 2011 Gilles-Kahn prize (computer science). 2011

Other Research Activities

- Reading Groups Several talks given in the Statistical Machine Learning in Paris (SMILE) seminar, in the INRIA-Willow Project-Team reading group, and in the reading group of Pr. Yu at UC Berkeley.
- Workshops Multi-manifold data modeling and applications, IMA, Minneapolis, 2008 ; Sparse statistics, optimization and machine learning, à Banff, 2011 ; High dimensional phenomena, IMA, Minneapolis, 2011.

- Teaching Tutorial on “Sparse Coding and Dictionary Learning for Image Analysis”, given at the international conferences ICCV 2009, Kyoto, and CVPR 2010, San Francisco, and in the summer schools CVML 2010, Grenoble and ERMITES 2010, Hyères. Two lectures given in the computer vision course of Jean Ponce in the master MVA. Tutorial “Optimization Methods for Sparse Problems” given in Pr. Yu seminar at UC Berkeley.
- Software Developer of the software SPAMS (SPArse Modelling Software). <http://www.di.ens.fr/willow/SPAMS/>, efficient library for solving sparse estimation problems. Coded in C++ and interfaced with Matlab. The software is open-source under licence GPLv3. It is commonly used by various research teams from different communities: computer vision, neuroscience, bio-informatics, image processing. Efficient implementation of my denoising and demosaicing algorithms are also available on my web page. I also acquired some GPU programming skills during an internship in the INRIA Odyssee-Team in 2005.
- Reviewer - CVPR 2009, 2010, 2011, 2012, ICCV 2009, 2011, ICML 2009, 2010, 2011, NIPS
Conferences 2009, 2010, 2011, AISTATS 2010, 2011, ECCV 2010, SIGGRAPH Asia 2010, 2011.
- Reviewer - SIAM Journal on Imaging Science, IEEE Transactions on Signal Processing, IEEE
Journals Pattern Analysis and Machine Intelligence, IEEE Transactions on Image Processing, IEEE Signal Processing Letters, Journal of Machine Learning Research, Machine Learning, Signal Processing, Electronic Journal of Statistics, Journal of Mathematical Imaging and Vision, International Journal of Computer Vision.

Invited Talks

- 10/2011 Feature Selection in Directed Acyclic Graphs. Pr. Sapiro’s seminar. University of Minnesota. Minneapolis.
- 08/2011 Topographic dictionary learning with structured sparsity. SPIE conference on wavelets and sparsity XIV. San Diego.
- 07/2011 Network flow algorithms for structured sparsity. ICML workshop on structured sparsity. Bellevue, Canada.
- 07/2011 Sparse coding for machine learning, image processing and computer vision. Journées ORASIS. Praz-sur-Arly.
- 03/2011 Task-driven dictionary learning. Pr. Darrell’s computer vision seminar, Berkeley.
- 11/2010 Task-driven dictionary learning. Journal Club Redwood Institute, Berkeley.
- 09/2010 Recent advances in structured sparse models. Séminaire de l’équipe-projet INRIA-LEAR, Grenoble.
- 07/2010 Non-local sparse models for image restoration. Oxford-INRIA workshop. Oxford.
- 05/2010 Non-local sparse models for image restoration. Symposium "Statistical Models for Images". Luminy.
- 03/2010 Non-local sparse models for image restoration. Colloque STATIM 2010, Evry.
- 01/2010 Non-local sparse models for image restoration. Microsoft-INRIA workshop, Paris.
- 04/2009 Sparse learned representations for image restoration. Symposium “Patch-based Image Representation, Manifolds and Sparsity”, Rennes.
- 12/2008 Sparse learned representations for image restoration. IASC 08, Yokohama.

Publications

The journal articles presented below are published in the main journals in machine learning, computer vision and image processing, with acceptance rates in general below 30%. Other articles are published in the proceedings of the main international conferences in machine learning: NIPS, ICML; and computer vision: ICCV, CVPR et ECCV. These five conferences are very selective with an acceptance rate in general below 25%, and their proceedings play a role which is as important as international journals.

According to Google Scholar, my papers received more than 1200 citations, which are given below for all papers with at least 20 citations.

Journal articles and book chapters

- F. Bach, R. Jenatton, J. Mairal, and G. Obozinski. Optimization with sparsity-inducing penalties. *Foundations and Trends in Machine Learning*, 2011. to appear.
- F. Bach, R. Jenatton, J. Mairal and G. Obozinski. Structured sparsity through convex optimization. *Statistical Science*, 2011. accepted with minor revisions.
- J. Mairal, R. Jenatton, G. Obozinski, and F. Bach. Convex and network flow optimization for structured sparsity. *Journal of Machine Learning Research (JMLR)*, 12(9), 2649–2689, 2011.
- J. Mairal, F. Bach, and J. Ponce. Task-driven dictionary learning. *IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*, 2011. to appear.
- R. Jenatton, J. Mairal, G. Obozinski, and F. Bach. Proximal methods for hierarchical sparse coding. *Journal of Machine Learning Research (JMLR)*, 12(7), 2297–2334, 2011.
- F. Bach, R. Jenatton, J. Mairal, and G. Obozinski. Convex optimization with sparsity-inducing norms. In S. Sra, S. Nowozin, and S. J. Wright, editors, *Optimization for Machine Learning*. MIT Press, 2011.
- J. Mairal, F. Bach, J. Ponce, and G. Sapiro. Online learning for matrix factorization and sparse coding. *Journal of Machine Learning Research (JMLR)*, 11(1), 19–60, 2010. **127 citations**.
- J. Wright, Y. Ma, J. Mairal, G. Sapiro, T. Huang and S. Yan. Sparse representation for computer vision and pattern recognition. *Proceedings of the IEEE*. 98(6):1031–1044. 2010. **77 citations**.
- J. Mairal, G. Sapiro, and M. Elad. Learning multiscale sparse representations for image and video restoration. *SIAM Multiscale Modelling and Simulation*, 7(1):214–241, 2008. **97 citations**.
- J. Mairal, M. Elad, and G. Sapiro. Sparse representation for color image restoration. *IEEE Transactions on Image Processing*, 17(1):53–69, 2008. **209 citations**.

Articles in peer-reviewed international conferences

- L. Benoit, J. Mairal, F. Bach, and J. Ponce. Sparse image representation with epitomes. In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2011.
- J. Mairal, R. Jenatton, G. Obozinski, and F. Bach. Network flow algorithms for structured sparsity. In *Advances in Neural Information Processing Systems (NIPS)*, 2010. **30 citations**.
- R. Jenatton, J. Mairal, G. Obozinski, and F. Bach. Proximal methods for sparse hierarchical dictionary learning. In *Proceedings of the International Conference on Machine Learning (ICML)*, 2010. **69 citations**.
- J. Mairal, F. Bach, J. Ponce, G. Sapiro, and A. Zisserman. Non-local sparse models for image restoration. In *Proceedings of the IEEE International Conference on Computer Vision (ICCV)*, 2009. **90 citations**.
- J. Mairal, F. Bach, J. Ponce, and G. Sapiro. Online dictionary learning for sparse coding. In *Proceedings of the International Conference on Machine Learning (ICML)*, 2009. **107 citations**.
- J. Mairal, F. Bach, J. Ponce, G. Sapiro, and A. Zisserman. Supervised dictionary learning. In *Advances in Neural Information Processing Systems (NIPS)*. 2008. **127 citations**.

J. Mairal, M. Leordeanu, F. Bach, M. Hebert, and J. Ponce. Discriminative sparse image models for class-specific edge detection and image interpretation. In *Proceedings of the European Conference on Computer Vision (ECCV)*, 2008. **Oral presentation. 42 citations.**

J. Mairal, F. Bach, J. Ponce, G. Sapiro, and A. Zisserman. Discriminative learned dictionaries for local image analysis. In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2008. **120 citations.**

J. Mairal, G. Sapiro, and M. Elad. Multiscale sparse image representation with learned dictionaries. In *Proceedings of the IEEE International Conference on Image Processing (ICIP)*, 2007. **Oral presentation.**

J. Mairal, R. Keriven, and A. Chariot. Fast and efficient dense variational stereo on GPU. In *In Proceedings of 3D Data Processing, Visualization and Transmission (3DPVT)*, 2006.

Articles in peer-reviewed international workshops

J. Mairal, B. Yu. Path coding penalties for directed acyclic graphs. In *Proceedings of the 4th NIPS Workshop on Optimization for Machine Learning (OPT'11)*, 2011. **Oral presentation.**

Invited papers in international conferences

J. Mairal, R. Jenatton, G. Obozinski and F. Bach. Learning hierarchical and topographic dictionaries with structured sparsity. In *Proceedings of the SPIE conference on wavelets and sparsity XIV*, 2011.

J. Mairal, M. Elad, and G. Sapiro. Sparse learned representations for image restoration. In *Proceedings of the 4th World conference of the International Association of Statistical Computing (IASC)*, 2008.

Technical reports / submitted papers

F. Couzinie-Dévy, J. Mairal, F. Bach, and J. Ponce. Dictionary learning for deblurring and digital zooming. Technical report arXiv:1110.0957. 2011.

F. Bach, J. Mairal, J. Ponce. Convex sparse matrix factorizations. Technical report HAL-00345747, 2008.

Languages

french **mother tongue.**

english **fluent.**

Computer Skills

Languages: Matlab, C++, C, Ocaml, Java.