

# Francis Bach

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## Education

- 2009 Habilitation à diriger les recherches, Ecole Normale Supérieure, Cachan, France
- 2005 Ph.D. in Computer Science, University of California, Berkeley, CA, USA  
Dissertation: “Machine learning for blind source separation”  
Advisor: Prof. Michael I. Jordan.
- 2000 M.S. in Applied Mathematics, Ecole Normale Supérieure, Cachan, France
- 2000 Master of Public Administration (M.P.A.), Corps National des Mines, Paris, France
- 1997 B.S. in Mathematics, Ecole Polytechnique, Palaiseau, France

## Professional experience

- 2007 - present Research faculty, INRIA - Ecole Normale Supérieure, Paris, France  
Member of WILLOW project-team (2007-2010)  
Head of SIERRA project-team (since 2011)
- 2005 - present Lecturer for M. S. class on graphical models, Ecole Normale Supérieure, Cachan
- 2005 - 2007 Assistant Professor, Ecole des Mines de Paris, Fontainebleau, France

## Awards and distinctions

- 2009 European Research Council (ERC) starting investigator grant
- 2005 Eli Jury Award, U.C. Berkeley (Best thesis in signal processing)
- 2005 Best student paper award, AISTATS conference
- 2004 Best paper, honorable mention, ICML conference
- 2002 Microsoft Research Fellowship, awarded to 12 Computer Science students in the U.S.
- 1997 Prix d’Option, department of mathematics, Ecole Polytechnique

## Professional activities

- Action editor, Journal of Machine Learning Research (JMLR), since 2008
- Associate editor, IEEE Trans. on Pattern Analysis and Machine Intelligence, since 2009
- Associate editor, SIAM Journal on Imaging Sciences, since 2010
- Program committee member: conf. NIPS 2007, 2008, ECCV 2010, ICCV 2011 (area chair)
- Senior program committee member: conference ICML 2009, 2010, 2011 (area chair)
- Program committee member: conference COLT 2009, 2012
- Co-editor of a special issue on Machine Learning, Math. Programming, Series B, 2008-2009
- Member of the European Network of Excellence MUSCLE (2005-2007)
- Member of the European Network of Excellence PASCAL2 (since 2008)
- Reviewer: JMLR, Mach. Learn. Journal, IEEE Sig. Proc., IEEE Inf. Theo., IEEE Neur. Net., IEEE PAMI, Statistics and Comp., Neural Comp., Conferences ICA, ICML, NIPS, COLT, AISTATS, CVPR, ICCV.

## Publications - Journals

- R. Jenatton, J. Mairal, G. Obozinski, F. Bach. Proximal Methods for Hierarchical Sparse Coding. *Journal of Machine Learning Research*, 12, 2297-2334, 2011.
- J. Mairal, R. Jenatton, G. Obozinski, F. Bach. Convex and Network Flow Optimization for Structured Sparsity. *Journal of Machine Learning Research*, to appear, 2011.
- R. Jenatton, J.-Y. Audibert and F. Bach. Structured Variable Selection with Sparsity-inducing Norms. *Journal of Machine Learning Research*, to appear, 2011.
- M. Journée, F. Bach, P.-A. Absil and R. Sepulchre. Low-Rank Optimization on the Cone of Positive Semidefinite Matrices. *SIAM Journal on Optimization*, 20(5):2327-2351, 2010.
- F. Bach. Self-Concordant Analysis for Logistic Regression. *Electronic Journal of Statistics*, 4, 384-414, 2010.
- J. Mairal, F. Bach, J. Ponce, G. Sapiro. Online Learning for Matrix Factorization and Sparse Coding. *Journal of Machine Learning Research*, 11, 10-60, 2010.
- A. Cord, F. Bach, D. Jeulin. Texture classification by statistical learning from morphological image processing: application to metallic surfaces. *Journal of Microscopy*, 239(2), 159-166, 2010.
- M. Zaslavskiy, F. Bach and J.-P. Vert, Global alignment of protein-protein interaction networks by graph matching methods. *Bioinformatics*, 25(12):1259-1267, 2009.
- J. Abernethy, F. Bach, T. Evgeniou, and J.-P. Vert, A New Approach to Collaborative Filtering: Operator Estimation with Spectral Regularization. *Journal of Machine Learning Research*, 10:803-826, 2009.
- M. Zaslavskiy, F. Bach and J.-P. Vert, A path following algorithm for the graph matching problem. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 31(12), 2227-2242, 2009.
- K. Fukumizu, F. Bach, and M. I. Jordan. Kernel dimension reduction in regression. *Annals of Statistics*, 37(4), 1871-1905, 2009.
- A. Rakotomamonjy, F. Bach, S. Canu, and Y. Grandvalet. SimpleMKL. *Journal of Machine Learning Research*, 9, 2491-252.
- A. d'Aspremont, F. Bach and L. El Ghaoui. Optimal solutions for sparse principal component analysis. *Journal of Machine Learning Research*, 9, 1269-1294.
- F. Bach. Consistency of the group Lasso and multiple kernel learning, *Journal of Machine Learning Research*, 9, 1179-1225, 2008.
- F. Bach. Consistency of trace norm minimization, *Journal of Machine Learning Research*, 9, 1019-1048, 2008
- J. Louradour, K. Daoudi and F. Bach. Feature Space Mahalanobis Sequence Kernels: Application to SVM Speaker Verification. *IEEE Transactions on Audio, Speech and Language Processing*, 15 (8), 2465-2475, 2007.
- Y. Yamanishi, F. Bach., and J.-P. Vert. Glycan Classification with Tree Kernels, *Bioinformatics*, 2007.
- K. Fukumizu, F. Bach, A. Gretton. Consistency of Kernel Canonical Correlation Analysis. *Journal of Machine Learning Research*, 8, 361-383, 2006.
- F. Bach, M. I. Jordan, Learning spectral clustering, with application to speech separation, *Journal of Machine Learning Research*, 7, 1963-2001, 2006.

- F. Bach, D. Heckerman, E. Horvitz, Considering cost asymmetry in learning classifiers, *Journal of Machine Learning Research*, 7, 1713-1741, 2006.
- F. Bach, M. I. Jordan. Learning graphical models for stationary time series, *IEEE Transactions on Signal Processing*, vol. 52, no. 8, 2189-2199, 2004.
- K. Fukumizu, F. Bach, M. I. Jordan. Dimensionality reduction for supervised learning with reproducing kernel Hilbert spaces, *Journal of Machine Learning Research*, 5, 73-99, 2004.
- F. Bach, M. I. Jordan. Beyond independent components: trees and clusters, *Journal of Machine Learning Research*, 4, 1205-1233, 2003.
- F. Bach, M. I. Jordan. Kernel independent component analysis, *Journal of Machine Learning Research*, 3, 1-48, 2002.

### **Publications - Conferences**

- F. Bach. Shaping Level Sets with Submodular Functions. *Advances in Neural Information Processing Systems (NIPS)*, 2011.
- F. Bach, E. Moulines. Non-Asymptotic Analysis of Stochastic Approximation Algorithms for Machine Learning. *Advances in Neural Information Processing Systems (NIPS)*, 2011.
- M. Schmidt, N. Le Roux, F. Bach. Convergence Rates of Inexact Proximal-Gradient Methods for Convex Optimization. *Advances in Neural Information Processing Systems (NIPS)*, 2011.
- E. Grave, G. Obozinski, F. Bach. Trace Lasso: a trace norm regularization for correlated designs, 2011. *Advances in Neural Information Processing Systems (NIPS)*, 2011.
- Y-L. Boureau, N. Le Roux, F. Bach, J. Ponce, and Y. LeCun. Ask the locals: multi-way local pooling for image recognition. *Proceedings of the International Conference on Computer Vision (ICCV)*, 2011.
- T. Hocking, A. Joulin, F. Bach and J.-P. Vert. Clusterpath: an Algorithm for Clustering using Convex Fusion Penalties. *Proceedings of the International Conference on Machine Learning (ICML)*, 2011.
- L. Benot, J. Mairal, F. Bach, J. Ponce, Sparse Image Representation with Epitomes. *Proceedings of the Conference on Computer Vision and Pattern Recognition (CVPR)*, 2011.
- A. Lefèvre, F. Bach, C. Fvotte, Itakura-Saito nonnegative matrix factorization with group sparsity, *Proceedings of the International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2011.
- F. Bach, R. Jenatton, J. Mairal and G. Obozinski. Convex optimization with sparsity-inducing norms. In S. Sra, S. Nowozin, S. J. Wright., editors, *Optimization for Machine Learning*, MIT Press, 2011.
- F. Bach. Structured Sparsity-Inducing Norms through Submodular Functions. *Advances in Neural Information Processing Systems (NIPS)*, 2010.
- J. Mairal, R. Jenatton, G. Obozinski, F. Bach. Network Flow Algorithms for Structured Sparsity. *Advances in Neural Information Processing Systems (NIPS)*, 2010.
- A. Joulin, F. Bach, J. Ponce. Efficient Optimization for Discriminative Latent Class Models. *Advances in Neural Information Processing Systems (NIPS)*, 2010.
- M. Hoffman, D. Blei, F. Bach. Online Learning for Latent Dirichlet Allocation. *Advances in Neural Information Processing Systems (NIPS)*, 2010.

- R. Jenatton, J. Mairal, G. Obozinski, F. Bach. Proximal Methods for Sparse Hierarchical Dictionary Learning. Proceedings of the International Conference on Machine Learning (ICML), 2010.
- A. Joulin, F. Bach, J. Ponce. Discriminative Clustering for Image Co-segmentation. Proceedings of the Conference on Computer Vision and Pattern Recognition (CVPR), 2010.
- Y-L. Boureau, F. Bach, Y. LeCun, J. Ponce. Learning Mid-Level Features For Recognition. Proceedings of the Conference on Computer Vision and Pattern Recognition (CVPR), 2010.
- R. Jenatton, G. Obozinski, F. Bach. Structured Sparse Principal Component Analysis. Proceedings of the International Conference on Artificial Intelligence and Statistics (AISTATS), 2010.
- M. Zaslavskiy, F. Bach and J.-P. Vert. Many-to-Many Graph Matching: a Continuous Relaxation Approach. Proceedings of the European Conference on Machine Learning (ECML), 2009.
- P. Liang, F. Bach, G. Bouchard, M. I. Jordan. Asymptotically Optimal Regularization in Smooth Parametric Models. Advances in Neural Information Processing Systems (NIPS), 2009.
- S. Arlot, F. Bach. Data-driven Calibration of Linear Estimators with Minimal Penalties. Advances in Neural Information Processing Systems (NIPS), 2009.
- J. Mairal, F. Bach, J. Ponce, G. Sapiro and A. Zisserman. Non-Local Sparse Models for Image Restoration. International Conference on Computer Vision (ICCV), 2009.
- O. Duchenne, I. Laptev, J. Sivic, F. Bach and J. Ponce. Automatic Annotation of Human Actions in Video. International Conference on Computer Vision (ICCV), 2009.
- J. Mairal, F. Bach, J. Ponce and G. Sapiro. Online dictionary learning for sparse coding. International Conference on Machine Learning (ICML), 2009.
- O. Duchenne, F. Bach, I. Kweon, and J. Ponce. A tensor-based algorithm for high-order graph matching. IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2009.
- F. Bach. Exploring Large Feature Spaces with Hierarchical Multiple Kernel Learning. Advances in Neural Information Processing Systems (NIPS), 2008.
- J. Mairal, F. Bach, J. Ponce, G. Sapiro and A. Zisserman. Supervised Dictionary Learning. Advances in Neural Information Processing Systems (NIPS), 2008.
- L. Jacob, F. Bach, J.-P. Vert. Clustered Multi-Task Learning: A Convex Formulation. Advances in Neural Information Processing Systems (NIPS), 2008.
- Z. Harchaoui, F. Bach, and E. Moulines. Kernel change-point analysis, Advances in Neural Information Processing Systems (NIPS), 2008.
- C. Archambeau, F. Bach. Sparse probabilistic projections, Advances in Neural Information Processing Systems (NIPS), 2008.
- J. Mairal, M. Leordeanu, F. Bach, M. Hebert and J. Ponce. Discriminative Sparse Image Models for Class-Specific Edge Detection and Image Interpretation. Proceedings of the European Conference on Computer Vision (ECCV), 2008.
- F. Bach. Bolasso: model consistent Lasso estimation through the bootstrap. Proceedings of the Twenty-fifth International Conference on Machine Learning (ICML), 2008.
- J. Mairal, F. Bach, J. Ponce, G. Sapiro and A. Zisserman. Discriminative Learned Dictionaries for Local Image Analysis, Proceedings of the Conference on Computer Vision and Pattern Recognition (CVPR), 2008.

- F. Bach. Graph kernels between point clouds. Proceedings of the Twenty-fifth International Conference on Machine Learning (ICML), 2008.
- Z. Harchaoui, F. Bach, and E. Moulines. Testing for Homogeneity with Kernel Fisher Discriminant Analysis, Advances in Neural Information Processing Systems (NIPS) 20, 2007.
- F. Bach and Z. Harchaoui. DIFFRAC : a discriminative and flexible framework for clustering, Advances in Neural Information Processing Systems (NIPS) 20, 2007.
- A. d'Aspremont, F. Bach and L. El Ghaoui. Full regularization path for sparse principal component analysis. Proceedings of the Twenty-fourth International Conference on Machine Learning (ICML), 2007.
- A. Rakotomamonjy, F. Bach, S. Canu, and Y. Grandvalet. More Efficiency in Multiple Kernel Learning, Proceedings of the Twenty-fourth International Conference on Machine Learning (ICML), 2007.
- Z. Harchaoui and F. Bach. Image classification with segmentation graph kernels, Proceedings of the Conference on Computer Vision and Pattern Recognition (CVPR), 2007.
- F. Bach, Active learning for misspecified generalized linear models, Advances in Neural Information Processing Systems (NIPS) 19, 2006.
- F. Bach, M. I. Jordan. Predictive low-rank decomposition for kernel methods. Proceedings of the Twenty-second International Conference on Machine Learning (ICML), 2005.
- F. Bach, M. I. Jordan. Discriminative training of hidden Markov models for multiple pitch tracking, Proceedings of the International Conference on Acoustics, Speech, and Signal Processing (ICASSP), 2005
- F. Bach, M. I. Jordan. Blind one-microphone speech separation: A spectral learning approach. Advances in Neural Information Processing Systems (NIPS) 17, 2004.
- F. Bach, R. Thibaux, M. I. Jordan. Computing regularization paths for learning multiple kernels. Advances in Neural Information Processing Systems (NIPS) 17, 2004.
- F. Bach, Gert R. G. Lanckriet, M. I. Jordan. Multiple Kernel Learning, Conic Duality, and the SMO Algorithm. Proceedings of the Twenty-first International Conference on Machine Learning, 2004
- F. Bach, M. I. Jordan. Learning spectral clustering, Advances in Neural Information Processing Systems (NIPS) 16, 2004.
- Kenji Fukumizu, F. Bach, and M. I. Jordan. Kernel dimensionality reduction for supervised learning, Advances in Neural Information Processing Systems (NIPS) 16, 2004.
- F. Bach, M. I. Jordan. Learning graphical models with Mercer kernels, Advances in Neural Information Processing Systems (NIPS) 15, 2003.
- F. Bach, M. I. Jordan. Tree-dependent component analysis, Uncertainty in Artificial Intelligence (UAI): Proceedings of the Eighteenth Conference, 2002.
- F. Bach, M. I. Jordan. Thin junction trees, Advances in Neural Information Processing Systems (NIPS) 14, 2002.