

# François Fleuret



Born January 10, 1972, in Versailles, France.  
Married, one child (born 2008).

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## Research interests

Machine learning, pattern recognition, statistical modeling, computer vision.

## Positions

Since August 2007

**Senior researcher** at the Idiap Research Institute, Switzerland. EPFL faculty member as *Maître d'Enseignement et de Recherche* since March 2011.

January 2004 - July 2007

**Senior researcher** at the EPFL, CVLab research group, Switzerland.

October 2001 - December 2003

**Researcher** at the INRIA, IMEDIA research group, France (permanent position *Chargé de Recherche*).

July 2001 - September 2001

**Post-doctoral position** at the EPFL, LCN research group, Switzerland.

September 2000 - June 2001

**Post-doctoral position** at the University of Chicago, Department of Computer Science, USA.

## Education

**Habilitation degree in Applied Mathematics** from the University of Paris XIII on “Generative Models and Algorithmic Efficiency for Prediction”, 2006.

**PhD in Probability**, from the University of Paris VI on “Coarse-to-fine Face Detection” under the supervision of Prof. Donald Geman. Special honor *Mention très honorable avec les félicitations du Jury*, 2000.

**Master's degree in Probability** (*Diplôme d'Études Approfondies*) from the University of Paris VI, **Master's degree in Applied Mathematics** (*Magistère de Mathématiques Fondamentales et Appliquées et d'Informatique*) from the École Normale Supérieure de Paris and the University of Paris VI, 1995.

# Teaching

2010, 2011

**Doctoral course in Machine Learning** in collaboration with Prof. A. Billard (22h each year, 20+ students), EPFL.

2008

**Doctoral course in Machine Learning** in collaboration with Prof. A. Billard and Prof. W. Gerstner (12h, 20+ students), EPFL.

2007

**Master's courses on foundations of image science** in collaboration with J. Pilet (28h, 30+ students), **guest lecture, master's course in Machine Learning** (4h, 30+ students), EPFL.

2005, 2006

**Undergraduate C++ programming class and exercise sessions** for Life-Sciences (4h per week for 14 weeks each year, 80+ students), EPFL.

2001

**Graduate lectures in artificial vision** in collaboration with Prof. Y. Amit (15h, 20+ students) and **undergraduate C++ programming class** (3h per week for 10 weeks, 50+ students), University of Chicago.

1998, 1999, 2000

**Undergraduate exercise sessions in statistics** (1h per week for 28 weeks each year, 30+ students) and in **computer programming** (2h per week for 28 weeks each year, 30+ students), University of Paris Dauphine.

1993, 1994

**Undergraduate Pascal programming class**, 2h per week for 25 weeks each year, 20+ students), *Classe Préparatoire*, Lycée Buffon, Paris.

## Grants

- **Principal investigator** of the FP7 European project “MASH: Massive Sets of Heuristics for Machine Learning” (2.3M€), 2010–2012.
- **Principal investigator** of the Swiss National Science Foundation research grant “VELASH: Very Large Sets of Heuristics for Scene Interpretation” (176K€), 2009–2013.
- **Co-investigator** of the Swiss National Science Foundation research grant “Understanding Brain Morphogenesis” (950K€), 2009–2012.
- **Co-investigator** of the Swiss National Science Foundation research grant “MULTI: Multimodal Interaction and Multimedia Data Mining” (75K€), 2008–2011.
- **Co-investigator** of the Swiss National Science Foundation research grant “Training Embedded Vision Systems” (120K€), 2007–2011.
- **Co-investigator** of the Swiss National Science Foundation research grant “View Sets for 3-D Object Detection and Recognition” (115K€), 2005–2009.

## Invitations

- Invited speaker, Machine Learning Summer School, Purdue University (West Lafayette, USA), 2011.
- Invited speaker, Workshop on Validation in Statistics and Machine Learning, WIAS (Berlin, Germany), 2010.
- Invited speaker, Vision seminar of University College London, (London, UK), 2008.
- Invited speaker at the Workshop in Honor of Donald Geman 65th birthday, Johns Hopkins University, (Baltimore, USA) 2008.
- Visiting Associate, Vision Lab, Caltech (Pasadena, USA), summers 2006, 2007.
- Invited at the workshop on Visual Learning and Recognition organized by the American Institute for the Mathematics and Applications (Minneapolis, USA), 2006.

## Services

- Expert for the Research Council of the Academy of Finland, panel for Computer Science, 2009.
- Expert for the Austrian Science Fund, 2009.
- Expert for the French National Research Agency (ANR), 2007
- Idiap site manager for the PASCAL 2 Network of Excellence, 2008 – present.
- Co-organizer of the NIPS Workshop on Efficient Machine Learning, 2007.

- Member of the INRIA post-doctoral grant commission, 2002, 2003.
- Reviewer for / member of the program committees of: IEEE Transactions on Pattern Analysis and Machine Intelligence, IEEE Transactions on Signal Processing, IEEE Transactions on Neural Networks, IEEE Transactions on Image Processing, Journal of Machine Learning Research, International Journal of Computer Vision, Machine Learning Journal, Neural Information Processing Systems Conference (NIPS), International Conference on Machine Learning (ICML), IEEE international conference on Computer Vision and Pattern Recognition (CVPR), IEEE International Conference on Computer Vision (ICCV), European Conference on Computer Vision (ECCV), International Conference on Advances in Pattern Recognition (ICAPR).

## Software and patents

- Co-inventor of the US patent application US13/348331: **A method and apparatus for multiple object tracking with k-shortest paths.**
- Author of the **Folded Hierarchy of Classifiers**, distributed under the GNU General Public Licence.
- Author of the **Probabilistic Occupancy Map** distributed under the GNU General Public Licence.
- Author of the **Conditional Mutual Information Maximization** feature selection algorithm, distributed under the GNU General Public Licence.
- Author of a **fast face detector**, registered at the French Agency for Software Protection (APP) under the reference IDDN.FR.001.200015.000.S.P.2002.000.21000.
- Co-author of the **image indexing platform “Maestro”**, registered under the references IDDN.FR.001.510012.000.S.P.2002.000.21000 (server) and IDDN.FR.001-510009.000.S.P.2002.000.21000 (client).

# Student supervisions

## Phd, ongoing

- Leonidas Lefakis, **PhD supervision** on prediction and action selection with very large feature sets (IDIAP).
- Charles Dubout, **PhD supervision** on object detection with very large feature sets (IDIAP).
- Nicolae Suditu, **PhD supervision** on large-scale interactive image retrieval (IDIAP).
- Karim Ali, **PhD co-supervision** with Prof. Pascal Fua on hand detection in industrial environment (EPFL/CSEM).
- Horesh Ben Shitrit, **PhD co-supervision** with Prof. Pascal Fua on multi-camera basket-ball player tracking, (EPFL).

## Phd, finished

- Germán González Serrano, **PhD co-supervision** with Prof. Pascal Fua on filament reconstruction (EPFL), 2011.
- Jérôme Berclaz, **PhD co-supervision** with Prof. Pascal Fua on multi-camera people tracking (EPFL), 2010.
- Ali Shahrokni, **PhD co-supervision** with Prof. Pascal Fua on texture segmentation (EPFL), 2005.

## Master's thesis, finished

- Elia Palme, **Master's thesis supervision** on adding stereo vision to a salamander robot (EPFL), 2007.
- Yariv Levy, **Master's thesis co-supervision** on the analysis of high dimensional dynamical activity in the cortex (EPFL), 2004.
- Sandro Saitta, **Master's thesis supervision** on forecasting airborne pollen concentrations (EPFL), 2004.
- Moez Tarzi, **Master's thesis supervision** on face detection and video stream compression (INRIA), 2002.
- François Tonin, **Master's thesis supervision** on color distribution distances (INRIA), 2000.

## Miscellaneous

- Fanny Gilliéron, **undergraduate project supervision** on auto camera calibration (EPFL), 2007.
- Benoît Rat, **undergraduate project supervision** on adding vision algorithms to a salamander robot (EPFL), 2006.
- Jérémy Jakubowicz, **undergraduate project supervision** on neural network performances and input signal complexity (INRIA), 2002.

# Publications

## Peer-reviewed Journal Articles

F. Fleuret, T. Li, C. Dubout, E. K. Wampler, S. Yantis, and D. Geman. Comparing machines and humans on a visual categorization test. *Proceedings of the National Academy of Sciences (PNAS)*, 108(43):17621–17625, 2011

K. Ali, F. Fleuret, D. Hasler, and P. Fua. A real-time deformable detector. *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, 2011. To appear

J. Berclaz, E. Turetken, F. Fleuret, and P. Fua. Multiple object tracking using k-shortest paths optimization. *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, 33(9):1806–1819, 2011

F. Fleuret. Multi-layer Boosting for pattern recognition. *Pattern Recognition Letters (PRL)*, 30:237–241, 2009

A. Shahrokni, F. Fleuret, T. Drummond, and P. Fua. Classification-based probabilistic modeling of texture transition for fast line search tracking and delineation. *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, 31(3):570–576, 2009

F. Fleuret and D. Geman. Stationary features and cat detection. *Journal of Machine Learning Research (JMLR)*, 9:2549–2578, 2008

F. Fleuret, J. Berclaz, R. Lengagne, and P. Fua. Multi-camera people tracking with a probabilistic occupancy map. *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, 30(2):267–282, 2008

F. Fleuret. Fast binary feature selection with conditional mutual information. *Journal of Machine Learning Research (JMLR)*, 5:1531–1555, 2004

F. Fleuret and D. Geman. Coarse-to-fine face detection. *International Journal of Computer Vision (IJCV)*, 41(1/2):85–107, 2001

F. Fleuret and E. Brunet. DEA : An architecture for goal planning and classification. *Neural Computation*, 12:1987–2008, 2000

## Peer-reviewed Conference Proceedings

R. Lefort and F. Fleuret. A tree-based distance between distributions: application to classification of neurons. In *Proceedings of the IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2012. To appear

C. Dubout and F. Fleuret. Boosting with maximum adaptive sampling. In *Proceedings of the Neural Information Processing Systems Conference (NIPS)*, pages 1332–1340, 2011

C. Dubout and F. Fleuret. Tasting families of features for image classification. In *Proceedings of the IEEE International Conference on Computer Vision (ICCV)*, pages 929–936,

2011

N. Suditu and F. Fleuret. HEAT: Iterative relevance feedback with one million images. In *Proceedings of the IEEE International Conference on Computer Vision (ICCV)*, pages 2118–2125, 2011

H. Ben Shitrit, J. Berclaz, F. Fleuret, and P. Fua. Tracking multiple objects under global appearance constraints. In *Proceedings of the IEEE International Conference on Computer Vision (ICCV)*, pages 137–144, 2011

F. Fleuret, P. Abbet, C. Dubout, and L. Lefakis. The MASH project. In *Proceedings of the European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML/PKDD)*, pages 626–629, 2011

K. Ali, D. Hasler, and F. Fleuret. Flowboost – Appearance learning from sparsely annotated video. In *Proceedings of the Conference on Computer Vision and Pattern Recognition (CVPR)*, pages 1433–1440, 2011

G. Gonzalez, E. Turetken, F. Fleuret, and P. Fua. Delineating trees in noisy 2d images and 3d image stacks. In *Proceedings of the IEEE international conference on Computer Vision and Pattern Recognition (CVPR)*, pages 2799–2806, 2010

L. Lefakis and F. Fleuret. Joint cascade optimization using a product of boosted classifiers. In *Proceedings of the Neural Information Processing Systems Conference (NIPS)*, pages 1315–1323, 2010

J. Berclaz, F. Fleuret, and P. Fua. Multiple object tracking using flow linear programming. In *Proceedings of the 12th IEEE International Workshop on Performance Evaluation of Tracking and Surveillance (Winter-PETS)*, pages 1–8, 2009

J. Berclaz, A. Shahrokni, F. Fleuret, J. Ferryman, and P. Fua. Evaluation of probabilistic occupancy map people detection for surveillance systems. In *Proceedings of the IEEE International Workshop on Performance Evaluation of Tracking and Surveillance (PETS)*, pages 55–62, 2009

K. Ali, F. Fleuret, D. Hasler, and P. Fua. Joint pose estimator and feature learning for object detection. In *Proceedings of the IEEE International Conference on Computer Vision (ICCV)*, pages 1373–1380, 2009

G. Gonzalez, F. Fleuret, and P. Fua. Learning rotational features for filament detection. In *Proceedings of the IEEE international conference on Computer Vision and Pattern Recognition (CVPR)*, pages 1582–1589, 2009

G. Gonzalez, F. Aguet, F. Fleuret, M. Unser, and P. Fua. Steerable features for statistical 3d dendrite detection. In *Proceedings of the International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)*, pages 625–632, 2009

J. Berclaz, F. Fleuret, and P. Fua. Multi-camera tracking and atypical motion detection with behavioral maps. In *Proceedings of the European Conference on Computer Vision*

(*ECCV*), pages 112–125, 2008

G. Gonzalez, F. Fleuret, and P. Fua. Automated delineation of dendritic networks in noisy image stacks. In *Proceedings of the European Conference on Computer Vision (ECCV)*, pages 214–227, 2008

J. Berclaz, F. Fleuret, and P. Fua. Principled detection-by-classification from multiple views. In *Proceedings of the International Conference on Computer Vision Theory and Applications (VISAPP)*, volume 2, pages 375–382, 2008

A. Lanza, L. Di Stefano, J. Berclaz, F. Fleuret, and P. Fua. Robust multi-view change detection. In *Proceedings of the British Machine Vision Conference (BMVC)*, 2007

G. Blanchard and F. Fleuret. Occam’s hammer. In *Proceedings of the Annual Conference on Learning Theory (COLT)*, pages 112–126, 2007

J. Berclaz, F. Fleuret, and P. Fua. Robust people tracking with global trajectory optimization. In *Proceedings of the IEEE international conference on Computer Vision and Pattern Recognition (CVPR)*, volume 1, pages 744–750, 2006

M. Oezuysal, V. Lepetit, F. Fleuret, and P. Fua. Feature harvesting for tracking-by-detection. In *Proceedings of the European Conference on Computer Vision (ECCV)*, volume 3953, pages 592–605, 2006

F. Fleuret and W. Gerstner. A Bayesian kernel for the prediction of neuron properties from binary gene profiles. In *Proceedings of the IEEE International Conference on Machine Learning and Applications (ICMLA)*, pages 129–134, 2005

F. Fleuret and G. Blanchard. Pattern recognition from one example by Chopping. In *Proceedings of the Neural Information Processing Systems Conference (NIPS)*, pages 371–378, 2005

F. Fleuret, R. Lengagne, and P. Fua. Fixed point probability field for complex occlusion handling. In *Proceedings of the IEEE International Conference on Computer Vision (ICCV)*, volume 1, pages 694–700, 2005

A. Shahrokni, F. Fleuret, and P. Fua. Classifier-based contour tracking for rigid and deformable objects. In *Proceedings of the British Machine Vision Conference (BMVC)*, volume 2, pages 699–708, 2005

S. Boughorbel, J-P. Tarel, F. Fleuret, and N. Boujemaa. The GCS kernel for SVM based image recognition. In *Proceedings of the International Conference on Artificial Neural Networks (ICANN)*, volume 2, pages 595–600, 2005

S. Boughorbel, J-P. Tarel, and F. Fleuret. Non-Mercer kernel for SVM object recognition. In *Proceedings of the British Machine Vision Conference (BMVC)*, pages 137–146, 2004

N. Boujemaa, F. Fleuret, V. Gouet, and H. Sahbi. Automatic textual annotation of video news based on semantic visual object extraction. In *Proceedings of the conference of the*

- International Society for Optical Engineering (SPIE)*, volume 5307, pages 329–339, 2004
- F. Fleuret and H. Sahbi. Scale invariance of support vector machines based on the triangular kernel. In *Proceedings of the workshop on Statistical and Computational Theories of Vision of the IEEE International Conference on Computer Vision (ICCV/SCTV)*, 2003
- F. Rossi, B. Conan-Guez, and F. Fleuret. Functional data analysis with multi layer perceptrons. In *Proceedings of the IEEE International Joint Conference on Neural Networks (IJCNN)*, pages 2843–2848, 2002
- F. Rossi, B. Conan-Guez, and F. Fleuret. Theoretical properties of functional multi layer perceptrons. In *Proceedings of the European Symposium on Artificial Neural Networks (ESANN)*, pages 7–12, 2002
- F. Fleuret and D. Geman. Fast face detection with precise pose estimation. In *Proceedings of the IEEE International Conference on Pattern Recognition (ICPR)*, volume 1, pages 235–238, 2002
- N. Boujemaa, F. Fauqueur, M. Ferecatu, F. Fleuret, V. Gouet, B. Le Saux, and H. Sahbi. Interactive specific and generic image retrieval. In *Proceedings of the international workshop on Multi-Media Content Based Indexing and Retrieval (MMCBIR)*, 2001
- F. Fleuret and J-M. Vézien. Détection de visages dans des séquences vidéo à l’aide d’arbres de décision. In *Actes de la conférence Reconnaissance des Formes et Intelligence Artificielle (RFIA)*, volume 1, pages 17–25, 2000
- F. Fleuret and D. Geman. Apprentissage hiérarchique pour la détection de visages. In *Actes de la conférence Reconnaissance des Formes et Intelligence Artificielle (RFIA)*, volume 2, pages 349–357, 2000
- F. Fleuret and D. Geman. Graded learning for object detection. In *Proceedings of the workshop on Statistical and Computational Theories of Vision of the IEEE international conference on Computer Vision and Pattern Recognition (CVPR/SCTV)*, 1999
- L. Oisel, F. Fleuret, P. Horain, L. Morin, J. M. Vézien, F. Prêteux, A. Gagalowicz, C. Labit, and P. Leray. Analyse de séquences non calibrées pour la reconstruction 3d de scènes. In *Actes de la conférence Reconnaissance des Formes et Intelligence Artificielle (RFIA)*, volume 1, pages 189–198, 1998
- B. Jedynak and F. Fleuret. Reconnaissance d’objets 3d à l’aide d’arbres de classification. In *Actes de la conférence Images et Communication (IMAGECOM)*, 1996

## Miscellaneous

F. Fleuret. Modèles génératifs et efficacité algorithmique pour la prédiction. Habilitation dissertation, University of Paris XIII, 2006

F. Fleuret. *Détection hiérarchique de visages par apprentissage statistique*. PhD thesis, Université Paris-VI, Paris, 2000

F. Fleuret and H. Sahbi. Coarse-to-fine object detection. *ERCIM News*, 55, 2003