Guillaume CHARPIAT's Curriculum Vitæ

Identity

Guillaume Charpiat
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Nationality : French
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Studies and Employment

since Jan. 2015 :	Researcher at INRIA Saclay, in the TAO / TAU team.
Dec. 2007 - Dec. 2014 :	Researcher in INRIA Sophia-Antipolis, in the Pulsar team (permanent position : Junior (CR2) then Senior (CR1) since Jan. 2011).
Feb. 2007 - Dec. 2007 :	Post-doctoral position in *statistical learning for computer vision* in the Max Planck Institute for Biological Cybernetics, in Bernhard Schölkopf's team, in Tübingen (Germany).
Sep. 2004 - Aug. 2007 :	Grant for PhD thesis & teaching (doctoral school : École Polytechnique).
Sep. 2003 - Dec. 2006 :	PhD thesis on *Shape statistics for image segmentation with priors*, in the Odyssée team (INRIA) : Supervisors : Olivier Faugeras and Renaud Keriven, Jury chair : Grégoire Allaire, Reviewers : David Mumford, Guillermo Sapiro, Alain Trouvé.
2002 - 2003 :	Theoretical Physics (Master's final year lessons as free attender). Obtainment of the École Normale Supérieure's Magistere diplom.
2001 - 2002 :	Vision and Learning (Master's final year degree) at the ENS Cachan (with highest honors), Master internship on *Planar curve deformation*, supervised by Olivier Faugeras and Renaud Keriven.
2000 - 2001 :	Mathematics (Master's first year degree, with high honors), Mathematics (Bachelor's degree, with great honors), Physics (Bachelor's degree, with highest honors), Master's internship on numerical scheme errors of fluid mechanics, supervised by Cécile Appert (LPS).
Sep. 2000 - Aug. 2004 :	École Normale Supérieure de Paris (ENS) student.
2000 :	Successful candidate in the exams of the Ecole Normale Supérieure and École Polytechnique.

Teaching

since 2020 :	*Graphical Models : Discrete Inference and Learning* course in the MVA Master (Mathematics / Vision / leArning) + École CentraleSupélec (Master 2).
since 2018 :	*Deep Learning in Practice* course in the MVA Master + CentraleSupélec (Master 2).
2018 :	Introductive session to deep learning (6h) in the Multimedia Networking cursus of the E3A Master 2 (Electronics, electrical energy, automation) at Telecom ParisTech.
2015 - 2018 :	*Advanced Machine Learning* course (Information Theory + Reinforcement Learning) in the *Data Science program* at École Centrale (Master 2).
2006 - 2007 :	*Initiation to* C++ *programming* course-exercise at the École Polytechnique.
2004 - 2006 :	*Numerical Analysis and Optimization* exercices and support course at the École Polytechnique.
2003 - 2004 :	*Initiation to* C++ *programming* course and exercises at the École Nationale des Ponts et Chaussées.

Supervision

PhD Theses :

since **Oct. 2018 :**	Loris Felardos *(Neural networks for molecular dynamics simulations)*, co-supervised with Jérôme Hénin (Laboratoire de Biochimie Théorique, Institut de Biologie Physico-Chimique) and Bruno Raffin (DataMove team, INRIA Grenoble).
since **Oct. 2018 :**	Julien Girard *(Formal proofs of neural networks)*, co-supervised with Zakaria Chihani (CEA-list) and Marc Schoenauer (TAU team, INRIA Saclay).
since **Nov. 2017 :**	Nicolas Girard *(Satellite image vectorization using neural networks)*, co-supervised with Yuliya Tarabalka and Pierre Alliez (Titane team, INRIA Sophia-Antipolis).
since **Sep. 2017 :**	Théophile Sanchez *(Neural network flexibility and application to people's genetics)*, co-supervised with Flora Jay (CNRS, BioInfo team, LRI, Paris-Sud University) and Marc Schoenauer (TAU team, INRIA Saclay).
since **Sep. 2016 :**	Pierre Wolinski *(Learning the architecture of neural networks)*, co-supervised with Yann Ollivier (CNRS, TAO team, LRI, Paris-Sud University / Facebook FAIR Paris).
since **Jan. 2015 :**	Emmanuel Maggiori *(Learning approaches for large-scale remote sensing image classification)*, main supervision by Yuliya Tarabalka and Pierre Alliez (Titane team, INRIA Sophia-Antipolis).
Jan. 2011 - Dec. 2014 :	Ratnesh Kumar *(Fiber-based segmentation of videos for activity recognition)*, PhD thesis co-supervised with Monique Thonnat (Stars team, INRIA Sophia-Antipolis).

Master 2 students :

May 2020 - Oct. 2020 : Louis Dumont *(Capturing molecular conformations with graph neural networks)*, co-supervised with Loris Felardos and Jérôme Hénin (IBPC).

May 2020 - Sep. 2020 : Pierre Jobic *(Permutation-invariant deep learning for peoples' genetics)*, co-supervised with Théophile Sanchez and Flora Jay (CNRS, BioInfo team, LRI, Univ. Paris-Sud).

July 2018 - Dec. 2018 : Andrew Khalel *(Pan-sharpening using neural networks (Fusion of images of different resolutions and modalities))*, mainly supervised by Yuliya Tarabalka (Titane team, INRIA Sophia-Antipolis).

Mar. 2018 - Sep. 2018 : Mo Yang *(Hurricane trajectory prediction)*, co-supervised with Claire Monteleoni and Sophie Giffard-Roisin (LAL, Paris-Sud University).

Sep. 2018 - Mar. 2018 : Hugo Richard *(Analysis of videos using neural networks, with application to brain imagery)*, co-supervised with Bertand Thirion (Parietal team, INRIA Saclay / CEA / Neurospin).

Apr. 2017 - Sep. 2017 : Armand Zampieri *(Satellite images to cadaster maps registration)*, co-supervised with Yuliya Tarabalka (Titane team, INRIA Sophia-Antipolis).

Feb. 2017 - Jul. 2017 : Théophile Sanchez *(Neural networks for people genetics)*, co-supervised with Flora Jay (CNRS, BioInfo team, LRI, Univ. Paris-Sud).

Jan. 2017 - May 2017 : Priyanka Mandikal *(Neural networks for 3D medical image registration)*, in a collaboration with the startup Therapixel.

Apr. 2014 - Sep. 2014 : Emmanuel Maggiori *(Shape prior for image segmentation using binary partition trees)*, co-supervised with Yuliya Tarabalka.

Jan. 2011 - June 2011 : Kandan Ramakrishnan *(Detection and tracking dust particles in a fusion reactor)*, co-supervised with Vincent Martin (CEA).

Feb. 2010 - July 2010 : Ezequiel Cura *(Strategies for automatic model construction)*.

Oct. 2009 - Mar. 2010 : Anja Schnaars *(Texture-based segmentation)*.

Master 1, L3, other :

Jan. 2017 - June 2019 : Martin Toth *(Explanation of the decision taken by a neural net)*, in a collaboration with Hossein Khonsari (surgeon at Necker hospital).

June 2017 - Aug. 2017 : Louis Bethune *(Tracking paramecia with a motorized microscope using reinforcement learning)*, in collaboration with Romain Brette (Institut de la vision).

Apr. 2017 - Sep. 2017 : Raphaël Guegan *(Neural networks for crowd dynamics estimation)*, co-supervised with Emanuel Aldea (MOSS team, SATIE, Paris-Sud University).

June 2016 - July 2016 : Etienne Desbois *(Classification of skin diseases)*, in a collaboration with Hossein Khonsari.

July 2012 - Sep. 2012 : Sorana Capalnean *(Classification of gestures using a depth camera)*.

July. 2012 - Aug. 2012 : Bertrand Simon *(Classification of gestures using a depth camera)*, co-supervised with Olivier Clatz (Asclepios team, INRIA Sophia-Antipolis).

Publications

Thesis :

1. G. Charpiat, *Distance-based shape statistics for image segmentation with prior*, PhD Thesis, École Polytechnique, 12/2006.

Book chapters :

2. G. Charpiat, I. Bezrukov, Y. Altun, M. Hofmann and B. Schölkopf, *Machine Learning Methods for Automatic Image Colorization*, Computational Photography : Methods and Applications (R. Lukac ed.), CRC Press, 11/2010.

3. G. Charpiat, M. Hofmann and B. Schölkopf, *Kernel methods in medical imaging*, Handbook of Biomedical Imaging (N. Paragios, J. Duncan and N. Ayache, eds.), Springer, 12/2008.

4. G. Charpiat, O. Faugeras, R. Keriven and P. Maurel, *Approximations of shape metrics and application to shape warping and empirical shape statistics*, Statistics and Analysis of Shapes (H. Krim and A. Yezzi, eds.), Birkhäuser, 2006, pp. 363–395.

International Journals with Reviewing Board :

5. T. Sanchez, J. Cury, G. Charpiat and F. Jay, *Deep learning for population size history inference : design, comparison and combination with approximate Bayesian computation*, Molecular Ecology Resources, 2020.

6. S. Giffard-Roisin, M. Yang, G. Charpiat, C. Kumler Bonfanti, B. Kégl and C. Monteleoni, *Tropical cyclone track forecasting using fused deep learning from aligned reanalysis data*, Frontiers in Big Data, 2020.

7. E. Maggiori, Y. Tarabalka, G. Charpiat and P. Alliez, *High-Resolution Aerial Image Labeling With Convolutional Neural Networks*, Transactions on Geoscience and Remote Sensing, 2017.

8. E. Maggiori, Y. Tarabalka, G. Charpiat and P. Alliez, *Recurrent Neural Networks to Correct Satellite Image Classification Maps*, Transactions on Geoscience and Remote Sensing, 2016.

9. G. Charpiat, G. Nardi, G. Peyré and F-X. Vialard, *Finsler Steepest Descent with Applications to Piecewise-regular Curve Evolution*, Interfaces and Free Boundaries, 2016.

10. E. Maggiori, Y. Tarabalka, G. Charpiat and P. Alliez, *Convolutional Neural Networks for Large-Scale Remote Sensing Image Classification*, Transactions on Geoscience and Remote Sensing, 2016.

11. Y. Tarabalka, G. Charpiat, L. Brucker and B. Menze, *Spatio-Temporal Video Segmentation with Shape Growth or Shrinkage Constraint*, Transactions on Image Processing, 2014.

12. A. Gamal Eldin, X. Descombes, G. Charpiat and J. Zerubia, *Multiple Birth and Cut Algorithm for Multiple Object Detection*, Journal of Multimedia Processing and Technologies, 2011.

13. M. Hofmann, F. Steinke, V. Scheel, G. Charpiat, J. Farquhar, P. Aschoff, M. Brady, B. Schölkopf and B. J. Pichler, *MR-based attenuation correction for PET/MR : A novel approach combining pattern recognition and atlas registration*, Journal of Nuclear Medicine, 11/2008.

14. G. Charpiat, P. Maurel, J.-P. Pons, R. Keriven and O. Faugeras, *Generalized gradients : Priors on minimization flows*, International Journal of Computer Vision, 2007.

15. G. Charpiat, O. Faugeras and R. Keriven, *Approximations of shape metrics and application to shape warping and empirical shape statistics*, Foundations of Computational Mathematics, 2005.

Other International Journals :

16. O. Faugeras, G. Adde, G. Charpiat, C. Chefd'Hotel, M. Clerc, T. Deneux, R. Deriche, G. Hermosillo, R. Keriven, P. Kornprobst, J. Kybic, C. Lenglet, L. Lopez-Perez, T. Papadopoulo, J.-P. Pons, F. Ségonne, B. Thirion, D. Tschumperlé, T. Viéville and N. Wotawa, *Variational, geometric, and statistical methods for modeling brain anatomy and function*, Special issue : Mathematics in Brain Imaging, NeuroImage 23S1, 2004.

Pre-prints :

17. P. Wolinski, G. Charpiat, Y. Ollivier, *Interpreting a Penalty as the Influence of a Bayesian Prior*, 2020.

18. P. Wolinski, G. Charpiat, Y. Ollivier, *Asymmetrical Scaling Layers for Stable Network Pruning*, 2020.

19. Y. Ollivier and G. Charpiat, *Training recurrent networks online without backtracking*, available on arXiv, invited as a poster to the Deep Learning Symposium at NIPS (2015).

International Conferences wih Reviewing Board and Proceedings :

20. G. Charpiat, N. Girard, L. Felardos, Y. Tarabalka, *Input similarity from the neural network perspective*, Thirty-third Conference on Neural Information Processing Systems, NeurIPS 2019.

21. N. Girard, G. Charpiat and Y. Tarabalka, *Noisy Supervision for Correcting Misaligned Cadaster Maps Without Perfect Ground Truth Data*, International Geoscience and Remote Sensing Symposium, IGARSS 2019.

22. S. Giffard-Roisin, M. Yang, G. Charpiat, B. Kégl and C. Monteleoni, *Deep Learning for Hurricane Track Forecasting from Aligned Spatio-temporal Climate Datasets*, Modeling and decision-making in the spatiotemporal domain workhop at NeurIPS 2018.

23. N. Girard, G. Charpiat and Y. Tarabalka, *Aligning and Updating Cadaster Maps with Aerial Images by Multi-Task, Multi-Resolution Deep Learning*, Asian Conference on Computer Vision, ACCV 2018.

24. A. Zampieri, G. Charpiat, N. Girard and Y. Tarabalka, *Multimodal image alignment through a multiscale chain of neural networks with application to remote sensing*, European Conference on Computer Vision, ECCV 2018.

25. S. Giffard-Roisin, D. Gagne, A. Boucaud, B. Kégl, M. Yang, G. Charpiat and C. Monteleoni, *The 2018 Climate Informatics Hackathon : Hurricane Intensity Forecast*, Climate Informatics, CI 2018.

26. S. Giffard-Roisin, M. Yang, G. Charpiat, B. Kégl and C. Monteleoni, *Fused Deep Learning for Hurricane Track Forecast from Reanalysis Data*, Climate Informatics, CI 2018.

27. H. Richard, A. L. Pinho, B. Thirion and G. Charpiat, *Optimizing deep video representation to match brain activity*, Conference on Cognitive Computational Neuroscience, CCN 2018.

28. E. Maggiori, Y. Tarabalka, G. Charpiat and P. Alliez, *Polygonization of remote sensing classification maps by mesh approximation*, International Conference on Image Processing, ICIP 2017.

29. E. Maggiori, Y. Tarabalka, G. Charpiat and P. Alliez, *High-resolution image classification with convolutional networks*, International Geoscience and Remote Sensing Symposium, IGARSS 2017.

30. E. Maggiori, Y. Tarabalka, G. Charpiat and P. Alliez, *Can semantic labeling methods generalize to any city ? The Inria aerial image labeling benchmark* International Geoscience and Remote Sensing Symposium, IGARSS 2017.

31. E. Maggiori, Y. Tarabalka, G. Charpiat and P. Alliez, *Fully Convolutional Neural Networks For Remote Sensing Image Classification*, International Geoscience and Remote Sensing Symposium, IGARSS 2016

32. E. Alberts, G. Charpiat, Y. Tarabalka, T. Huber, M.-A. Weber, J. Bauer, C. Zimmer and B. Menze, *A Nonparametric model for Brain Tumor Segmentation and Volumetry in Longitudinal MR Sequences*, MICCAI Brain Lesion Workshop, 2015.

33. E. Maggiori, Y. Tarabalka and G. Charpiat, *Optimizing Partition Trees for Multi-Object Segmentation with Shape Prior*, British Machine Vision Conference, BMVC 2015.

34. E. Maggiori, Y. Tarabalka and G. Charpiat, *Improved Partition Trees for Multi-Class Segmentation of Remote Sensing Images*, International Geoscience and Remote Sensing Symposium, IGARSS 2015.

35. R. Kumar, G. Charpiat and M. Thonnat, *Multiple Object Tracking by Efficient Graph Partitioning*, Asian Conference on Computer Vision, ACCV 2014.

36. R. Kumar, M. Thonnat and G. Charpiat, *Hierarchical Representation of Videos with Spatio-Temporal Fibers*, Winter Conference on Applications of Computer Vision, WACV 2014.

37. Y. Tarabalka, G. Charpiat, L. Brucker and B. Menze, *Enforcing Monotonous Shape Growth or Shrinkage in Video Segmentation*, British Machine Vision Conference, BMVC 2013.

38. A. Gamal Eldin, G. Charpiat, X. Descombes and J. Zerubia, *An efficient optimizer for simple point process models*, SPIE Computational Imaging XI, 2013.

39. Y. Tarabalka and G. Charpiat, *A Graph-Cut-Based Method for Spatio-Temporal Segmentation of Fire from Satellite Observations*, International Geoscience and Remote Sensing Symposium, IGARSS 2013.

40. S. Bak, G. Charpiat, E. Corvée, F. Bremond and M. Thonnat, *Learning to Match Appearances by Correlations in a Covariance Metric Space*, European Conference on Computer Vision, ECCV 2012.

41. V. Martin, V. Moncada, J.-M. Travere, T. Loarer, F. Bremond, G. Charpiat and M. Thonnat, *A Cognitive Vision System for Nuclear Fusion Device Monitoring*, International Conference on Computer Vision Systems, ICVS 2011.

42. A. Gamal Eldin, X. Descombes, G. Charpiat and J. Zerubia, *A Fast Multiple Birth and Cut Algorithm using Belief Propagation*, International Conference on Image Processing, ICIP 2011.

43. G. Charpiat, *Exhaustive Family of Energies Minimizable Exactly by a Graph Cut*, Computer Vision and Pattern Recognition, CVPR 2011.

44. S. Chen, G. Charpiat and R.J. Radke, *Converting Level Set Gradients to Shape Gradients*, European Conference on Computer Vision, ECCV 2010.

45. G. Charpiat, *Learning Shape Metrics based on Deformations and Transport*, Second Workshop on Non-Rigid Shape Analysis and Deformable Image Alignment, at ICCV 2009.

46. G. Charpiat, M. Hofmann and B. Schölkopf, *Automatic image colorization via multimodal predictions*, European Conference on Computer Vision, ECCV 2008.

47. M. Hofmann, F. Steinke, V. Scheel, G. Charpiat, M. Brady, B. Schölkopf and B. J. Pichler, *MR-based PET attenuation correction – Method and validation*, Medical Imaging Conference, 2007.

48. G. Charpiat, O. Faugeras and R. Keriven, *Shape statistics for image segmentation with prior*, Conference on Computer Vision and Pattern Recognition, CVPR 2007.

49. G. Charpiat, R. Keriven, J.-P. Pons and O. Faugeras, *Designing spatially coherent minimizing flows for variational problems based on active contours*, International Conference on Computer Vision, ICCV 2005.

50. G. Charpiat, R. Keriven and O. Faugeras, *Image statistics based on diffeomorphic matching*, International Conference on Computer Vision, ICCV 2005.

51. G. Charpiat, O. Faugeras and R. Keriven, *Shape metrics, warping and statistics*, International Conference on Image Processing, ICIP 2003.

Other International Conferences with Proceedings :

52. G. Charpiat, P. Maurel, R. Keriven and O. Faugeras, *Distance-based shape statistics*, Special Session : Statistical Inferences on Nonlinear Manifolds with Applications in Signal and Image Processing, at ICASSP 2006.

Invited Talks

October 2020 :	« Deep Learning for Satellite Imagery » at *IGN Research Days*, at Champs-sur-Marne.
December 2019 :	« Deep Learning for Storm Trajectory Prediction and Remote Sensing » at the seminar *AI for Climate*, at Jussieu (Paris).
April 2019 :	« Deep Learning for Satellite Imagery » at LRDE lab (EPITA), at Kremlin-Bicêtre.
March 2019 :	« Deep Learning for Satellite Imagery » in the Imagine team (ENPC), at Champs-sur-Marne.
October 2018 :	« Recalage et mise à jour d'images à l'aide de réseaux de neurones » at the workshop day *Extraction d'attributs et apprentissage pour l'analyse des images de télédétection* organized by GDR ISIS.
May 2018 :	Introduction to neural networks, at the Mathematics of Imaging seminar in Paris.
November 2017 :	« Apprentissage profond pour la segmentation d'images satellite haute résolution », at the workshop Deep Learning / Télédétection / Temps, at ISEP, Issy-les-Moulineaux.
May 2017 :	Tutorial on neural network architectures, at the Mathematical Coffees, jointly organized by Huwaei and FSMP (Fondation Sciences Mathématiques de Paris).
December 2015 :	Invited poster « Learn As You Go ! Training Recurrent Networks Online Without Backtracking » at the *Deep Learning Workshop*, NIPS 2015, Montréal (Canada).
January 2015 :	« Shape matching, statistics, and piecewise rigidification » in the INRIA Morphéo team, Grenoble.
October 2013 :	« Lossless image compression » in the INRIA TAO team, Orsay.
October 2013 :	« Energies minimizable with graph cuts » in the INRIA Galen team, at Centrale, Châtenay-Malabry.
December 2011 :	« Estimating metrics suitable to an empirical manifold of shapes, using transport against the curse of dimensionality » at the *INRIA Workshop on Statistical Learning*, Institut Henri Poincaré, Paris.
June 2011 :	« Famille exhaustive des énergies minimisables globalement par une coupe dans un graphe » at the *Semaine optimisation et traitement des images* organized by the research groups GDR MOA & MSCP, La Londe-les-Maures.
April 2010 :	« Estimating Suitable Metrics for an Empirical Manifold of Shapes » at the workshop *Metric and Riemannian methods in Shape Analysis*, during the *SIAM Conference on Imaging Science*, Chicago (IL, USA).
July 2007 :	« Shape Statistics for Image Segmentation with Prior » at the workshop *Geometry and Statistics of Shape Spaces* at the Statistical and Applied Mathematical Sciences Institute (SAMSI), Research Triangle Park (NC, USA).
May 2006 :	« Distance-based shape statistics » at the *Special Session : Statistical Inferences on Nonlinear Manifolds with Applications in Signal and Image Processing*, at the International Conference on Acoustics, Speech, and Signal Processing (ICASSP 2006), Toulouse.

November 2005 :	« Statistiques de formes et d'images » at the Physical Spectrometry laboratory seminarium, Joseph Fourier University, Grenoble (France).
June 2005 :	« Moyenne et statistiques de formes » at the special day *Optimisation de forme et analyse d'images* in Paris Dauphine University.
November 2004 :	« Shape and Image Statistics » in Guillermo Sapiro's team, in Minneapolis (MN, USA).

Other activities related to Research

Reviewer for :	- the main conferences in machine learning (NeurIPS, ICML, ICLR, ...) and in computer vision (CVPR, ICCV, ECCV, BMVC, MICCAI...), - the main journals in computer vision (IJCV, TPAMI, JMIV, CVIU, IVC, Proc. of the Royal Society, TIP, etc.).
Scientific life :	- organization of the Statistics/Learning days at Paris-Saclay in 2017 (with Sylvain Arlot) and 2018 (with Pierre Alquier), - co-organization of the 4-day summer school / workshop "ForMaL" (Machine Learning / Formal Methods) in June 2019, - of the workshop "WAISE" (Second International Workshop on Artificial Intelligence Safety Engineering) in September 2019, - of the inter-institutes DigiCosme working groups "Deep Net" (with Alexandre Allauzen) about neural networks, "vrAI" (with Zakaria Chihani, CEA-list) about formal verification and AI, "SNAP" (with Lionel Mathelin, LIMSI) about numerical simulations and machine learning, - organization of the TAU team seminars, as well as of the Stars team seminars previously, of inter-team seminars in Sophia-Antipolis, etc., - automation and maintenance of a satellite image segmentation benchmark : `https://project.inria.fr/aerialimagelabeling/`
Science popularization :	- A few articles, trainings and taking part in general audience seminars.
Expertise for :	- various selection committees (Cordi S PhD grant, professor position at École Centrale, lecturer-researcher positions, Gilles Kahn PhD prize, PhD thesis review, PhD defense committee, Digitéo project proposals, etc.), - GPU platforms : national Jean Zay GENCI platform, and Saclay Lab-IA.
Funding :	- taking part in various projects : PIA Adamme, ANR Epitome, IPL HPC-BigData, FP7 Vanaheim, CDS DeepGenetics... - and in various contracts : with CNES, Renault, and start-up Therapixel.
Administrative tasks :	- secretary of the INRIA Sophia-Antipolis Project Committee meetings during 3 years, - member of INRIA Saclay's Scientific Commission.

Misc.

Computer skills :	C/C++, HTML, LaTeX, Linux, basics in Python ;
Languages :	French (native), English (fluent), German (basics) ;
Other :	Driving licence ; Piano, music, lindy-hop.