

Virginie Uhlmann
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Swiss citizen



VITA

- 2018 - current European Bioinformatics Institute (EMBL-EBI), Cambridge, UK
Research Group Leader
- 2012 - 2017 École polytechnique fédérale de Lausanne (EPFL), Lausanne, Switzerland
PhD in Electrical Engineering
Project: Landmark Active Contours for Bioimage Analysis: A Tale of Points and Curves
Advisor: Prof. Michael Unser
- 2016 Ruprecht-Karls-Universität Heidelberg, Heidelberg, Germany
Collaboration project at the Heidelberg Collaboratory for Image Processing (HCI) in Prof. Fred Hamprecht's group
- 2011 - 2012 Broad Institute of MIT and Harvard, Cambridge, MA, USA
Master project at the Imaging Platform
Project: A segmentation-free image classifier for biological applications
Advisor: Dr. Anne Carpenter and Prof. John McKinney
- 2010 - 2012 École polytechnique fédérale de Lausanne (EPFL), Lausanne, Switzerland
MSc in Bioengineering
- 2007 - 2009 École polytechnique fédérale de Lausanne (EPFL), Lausanne, Switzerland
BSc in Life Sciences and Technology

HONOR AND AWARDS

- 2018 **Best Doctoral thesis in Electrical Engineering** (EPFL award)
- 2014 **Best student paper** (ICIP award)
- 2013 **Best teaching team** (EPFL School of Life Sciences award)
- 2012 **Best grade point average** for complete Master studies in EPFL School of Engineering ("SIA Vaudoise – Ingénieurs" award)
- 2012 **Best Master project** in Biomedical Technologies (EPFL award)
- 2012 **Best grade point average** in Bioengineering Master (EPFL award)
- 2010-2012 **Excellence fellowship** for Master studies (EPFL fellowship)

RESEARCH INTERESTS

Approximation Theory	Interpolation Methods
	Spline Theory
	Image Segmentation <i>Deformable models</i>
Image Processing	Object Recognition <i>Filtering, statistical and learning-based approaches</i>
	Feature Detection <i>Filter design, machine learning</i>
	Object Tracking <i>Shortest path approaches, graphical models</i>
	Translation of Mathematical Approaches into Softwares
Applications to Bioimage Analysis	User-friendly Implementation of Image Analysis Methods
	Development of Custom Image Analysis Pipelines

PUBLICATIONS

Journal:

1. J. Fageot, **V. Uhlmann**, M. Unser, "Gaussian and Sparse Processes Are Limits of Generalized Poisson Processes," under review [*preprint available at arXiv:1702.05003v1 [math.PR]*].
2. **V. Uhlmann**, C. Haubold, F.A. Hamprecht, M. Unser, "DiversePathsJ: Diverse Shortest Paths for Bioimage Analysis," *Bioinformatics*, vol. 34, no. 3, pp. 538-540, February 2018.
3. **V. Uhlmann**, P. Ramdya, R. Delgado-Gonzalo, R. Benton, M. Unser, "FlyLimbTracker: An Active Contour Based Approach for Leg Segment Tracking in Unmarked, Freely Behaving Drosophila," *PLoS ONE*, vol. 12, no. 4, pp. 1-21, April 28, 2017.
4. **V. Uhlmann**, S. Singh, A.E. Carpenter, "CP-CHARM: Segmentation-Free Image Classification Made Accessible," *BMC Bioinformatics*, vol. 17, no. 1, paper no. 51, December 2016.
5. **V. Uhlmann**, J. Fageot, M. Unser, "Hermite Snakes with Control of Tangents," *IEEE Transactions on Image Processing*, vol. 25, no. 6, pp. 2803-2816, June 2016.
6. A. Badoual, D. Schmitter, **V. Uhlmann**, M. Unser, "Multiresolution Subdivision Snakes," *IEEE Transactions on Image Processing*, vol. 26, no. 3, pp. 1188-1201, March 2017.
7. P. Pad, **V. Uhlmann**, M. Unser, "Maximally Localized Radial Profiles for Tight Steerable Wavelet Frames," *IEEE Transactions on Image Processing*, vol. 25, no. 5, pp 2275-2287, May 2016 [*joint first authorship*].

8. Z. Püspöki, **V. Uhlmann**, C. Vonesch, M. Unser, "Design of Steerable Wavelets to Detect Multifold Junctions," *IEEE Transactions on Image Processing*, vol. 25, no. 2, pp. 643-657, February 2016.
9. R. Delgado-Gonzalo, D. Schmitter, **V. Uhlmann**, M. Unser, "Efficient Shape Priors for Spline-Based Snakes," *IEEE Transactions on Image Processing*, vol. 24, no. 11, pp. 3915-3926, November 2015.
10. R. Delgado-Gonzalo, **V. Uhlmann**, D. Schmitter, M. Unser, "Snakes on a Plane: A Perfect Snap for Bioimage Analysis," *IEEE Signal Processing Magazine*, vol. 32, no. 1, pp. 41-48, January 2015.

Conference, symposium and workshops:

1. **V. Uhlmann**, "Mathematical Models for Bioimage Analysis," Bioimage Computing Workshop, 15th European Conference on Computer Vision, Munich, Germany, September 8-14, 2018.
2. **V. Uhlmann**, M. Unser, "Spline-based Models in Bioimage Analysis: Cells beyond Pixels," Trends in Microscopy: Bridging the Worlds, Düsseldorf, Germany, March 12-14, 2018.
3. **V. Uhlmann**, "Continuous Representations in Bioimage Analysis: a Bridge from Pixels to the Real World," 2nd NEUBIAS Conference, Szeged, Hungary, January 27-February 2, 2018.
4. C. Haubold, **V. Uhlmann**, M. Unser, F. Hamprecht, "Diverse M-best solutions by Dynamic Programming," Proceedings of the 39th German Conference on Pattern Recognition (GCPR'17), Basel, Switzerland, September 13-15, 2017, pp. 255-267.
5. **V. Uhlmann**, M. Unser, "Bioimage Segmentation with Active Contours," 4th Swiss Imaging Core Facility Day, Geneva, Switzerland, September 16, 2016.
6. **V. Uhlmann**, M. Unser, "Spline-based models for image segmentation," 1st European Machine Vision Forum, Heidelberg, Germany, September 8-9, 2016.
7. **V. Uhlmann**, D. Schmitter, M. Unser, "Shape-constrained Tracking with Active Contours," SIAM Conference on Imaging Science (IS'16), Albuquerque, NM, USA, May 23-26, 2016.
8. **V. Uhlmann**, R. Delgado-Gonzalo, M. Unser, P.O. Michel, L. Baldi, F.M. Wurm, "User-Friendly Image-Based Segmentation and Analysis of Chromosomes," Proceedings of the 13th IEEE International Symposium on Biomedical Imaging: From Nano to Macro (ISBI'16), Prague, Czech Republic, April 13-16, 2016, pp. 395-398.
9. **V. Uhlmann**, J. Fageot, H. Gupta, M. Unser, "Statistical Optimality of Hermite Splines," Proceedings of the 11th International Workshop on Sampling Theory and Applications (SampTA'15), Washington DC, USA, May 25-29, 2015, pp. 226-230.
10. **V. Uhlmann**, D. Sage, M. Unser, "Directional Image Analysis in Icy," 2nd Icy Coding Party, Paris, France, May 4-6, 2015.
11. **V. Uhlmann**, M. Unser, "Tip-Seeking Active Contours for Bioimage Segmentation," Proceedings of the 12th IEEE International Symposium on Biomedical Imaging: From

Nano to Macro (ISBI'15), Brooklyn NY, USA, April 16-19, 2015, pp. 544-547 [*nominated for best paper award*].

12. **V. Uhlmann**, M. Unser, "Open Active Contours with Tangent-Based Controls and Energies," 1st International Conference on Subdivision, Geometric and Algebraic Methods, Isogeometric Analysis and Refinability in Tuscany (SMART'14), Pontignano, Italy, September 28-October 1, 2014.
13. P. Pad, **V. Uhlmann**, M. Unser, "VOW: Variance-Optimal Wavelets for the Steerable Pyramid," Proceedings of the 2014 IEEE International Conference on Image Processing (ICIP'14), Paris, France, October 27-30, 2014, pp. 2973-2977.
14. C. Conti, L. Romani, **V. Uhlmann**, M. Unser, "Cardinal Hermite Exponential Splines: Theoretical Insights and Applications to Active Contours," Proceedings of the 8th International Conference Curves and Surfaces (ICCS'14), Paris, France, June 12-18, 2014, pp. 74.
15. **V. Uhlmann**, R. Delgado-Gonzalo, C. Conti, L. Romani, M. Unser, "Exponential Hermite Splines for the Analysis of Biomedical Images," Proceedings of the 39th IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP'14), Firenze, Italy, May 4-9, 2014, pp. 1650-1653.
16. **V. Uhlmann**, R. Delgado-Gonzalo, M. Unser, "Snakes with Tangent-Based Control and Energies for Bioimage Analysis," Proceedings of the 11th IEEE International Symposium on Biomedical Imaging: From Nano to Macro (ISBI'14), Beijing, China, April 29-May 2, 2014, pp. 806-809
17. O. Mariani, **V. Uhlmann**, D. Sage, M. Unser, "BisQuit: Open-Source Interactive Tool for Image Sequence Analysis," 2nd Swiss Image-Based Screening Conference (SIBSC'13), Lausanne, Switzerland, June 10-11, 2013
18. **V. Uhlmann**, S. Singh, C. Wählby, J. McKinney, A. Carpenter, "Whole Image-Based Classification Using CellProfiler," Proceedings of BioImage Informatics 2012 (BI'12), Dresden, Germany, September 16-19, 2012, pp. 59-60.

TEACHING

Teaching Assistant:

Signals and Systems I & II (Autumn 2009 and Autumns 2012 to 2016)

Students Supervised:

2018	Julien Rüegg (co-advised with Prof. M. Unser) <i>Master Project:</i> Tracking animal behavior in neuroimaging studies
2018	Anna Song (co-advised with J. Fageot and Prof. M. Unser) <i>Master Project:</i> Analysis of planar shapes through shape dictionary learning with an extension to splines
2017	Julien Rüegg (co-advised with J. Fageot and Prof. M. Unser) <i>Semester Project:</i> A study of Hermite spline interpolation
2015	Gaëlle Thurre (co-advised with Prof. John McKinney) <i>Semester Project:</i> Modeling Single-Cell Behavior of Mycobacteria

- 2015 Bertrand Vermot (co-advised with J. Fageot and Prof. M. Unser)
Semester Project: Corner Detection based on PDE Methods
- 2015 Miryam Chaabouni (co-advised with J. Fageot, D. Schmitter and Prof. M. Unser)
Semester Project: Design of active contour models using NURBS
- 2015 Arik Girsault (co-advised with E. Bostan and Prof. M. Unser)
Semester Project: A nonlinear model of Phase Contrast Microscopy
- 2014 Lucas Amoudruz (co-advised with Prof. M. Unser)
Semester Project: Refining leg-movement extraction in high-speed videos of insect locomotion
- 2014 Lucas Vandroux (co-advised with P. Pad and Prof. M. Unser)
Semester Project: Detection and enhancement of blood flow in a video
- 2014 Amicie de Pierrefeu (co-advised with D. Sage, and Prof. M. Unser)
Semester Project: Tracking flagella undulations in microscopy images
- 2014 Laurène Donati (co-advised with Prof. M. Unser)
Semester Project: Modeling Mycobacteria behavior in time-lapse microscopy images
- 2014 Pritish Chakravarty (co-advised with Prof. M. Unser)
Semester Project: Designing Tip-Detectors
- 2013 Loïc Perruchoud (co-advised with Dr. C. Vonesch and Prof. M. Unser)
Semester Project: Tracking leg movements in high-speed videos of insect locomotion
- 2013 Olivia Mariani (co-advised with Prof. M. Unser)
Master Project: Segmentation and tracking of growing colony of mycobacteria

PROFESSIONAL ACTIVITIES

Reviewer for:

IEEE Transactions on Image Processing
 IEEE Signal Processing Magazine
 IEEE Signal Processing Letters
 IEEE Transactions on Computational Imaging
 IEEE Transactions on Instrumentation & Measurement.
 Journal of Computational and Applied Mathematics
 Signal Processing: Image Communication
 IEEE/ACM Transactions on Computational Biology and Bioinformatics
 The Visual Computer (International Journal of Computer Graphics)
 Journal of Mathematical Imaging and Vision
 IEEE ISBI 2013, 2014, 2015, 2016, 2017
 SampTA 2015
 IEEE GlobalSIP 2015
 MICCAI 2016 (Brainles Workshop)
 Journal of Histochemistry & Cytochemistry
 Microscopy Research and Technique

TECHNICAL SKILLS

<i>Software Development:</i>	Java, Python, C/C++, Perl
<i>Scientific Computing:</i>	Matlab, Mathematica, Maple
<i>Image Processing:</i>	ImageJ, Fiji, Icy, CellProfiler
<i>Graphical Design:</i>	Photoshop, Illustrator

LANGUAGES

French: Native
English: Fluent
German: B2 level

PERSONAL

Since 2007, active member of Valdésia, hundred-year-old student society in Lausanne
Consumer of French, German and English contemporary and classic literature
Amateur cartoonist
Mountaineering and rock climbing enthusiast