

Charless C. Fowlkes

CONTACT INFORMATION	4076 Donald Bren Hall University of California, Irvine 92697	949.824.6945 fowlkes@ics.uci.edu
ACADEMIC BACKGROUND	University of California, Berkeley Ph.D., Computer Science, Fall 2005 advisor: Jitendra Malik	Berkeley, CA
	California Institute of Technology BS with honor, Engineering and Applied Sciences, Spring 2000 advisor: Pietro Perona	Pasadena, CA
EXPERIENCE	Full Professor Associate Professor Assistant Professor Department of Computer Science, University of California, Irvine, CA. Joint Appointment, Dept. of Cognitive Sciences Member, Center for Computational Morphodynamics Member, Center for Machine Learning and Intelligent Systems Member, Institute for Genomics and Bioinformatics Member, Center for Complex Biological Systems Member, Mathematical, Computational and Systems Biology Program	2018- 2013-2018 2007-2013
	Postdoctoral Scholar LBNL Life Sciences/UCB Computer Science, Berkeley, CA	2005-2007 Mark Biggin
	Graduate Student Researcher Computer Science, University of California, Berkeley, CA	2000-2005 Jitendra Malik
	Consultant Infospheres Corp, Oakland, CA	1999-2000 Mani Chandy
	Research Intern NASA Jet Propulsion Laboratory, Pasadena, CA	1998-1999 Mike Burl
	Research Intern Plant Sciences, Montana State University, Bozeman, MT	Summers 1995-1997 Tom Blake
AWARDS AND HONORS	ASA Statistical Partnerships Among Academe, Industry, and Government (SPAIG) Award, 2018 Helmholtz Prize for fundamental contributions in Computer Vision, International Conference on Computer Vision, 2015 Award for Teaching Excellence in Undergraduate Education, UCI ICS, 2014 National Science Foundation CAREER Award, 2013 Marr Prize for Best Paper, International Conference on Computer Vision, 2009 National Science Foundation Graduate Research Fellowship, 2002-2005 University of California MICRO Fellowship, 2000-2001 Caltech Summer Undergraduate Research Fellowship, 1998 Caltech Merit Scholarship, 1996-1998 American Cancer Society Summer Fellowship, 1995	

PROFESSIONAL
ACTIVITIES

Conferences, Workshops, and Courses Organized

- Organizer and Instructor, NIH sponsored national short-course on “BigDIPA: Big Data Image Processing and Analysis”, UC Irvine (2016-2018)
- Organizing Committee, IEEE Winter Conference on Applications of Computer Vision (2015)
- Organizer, Annual Southern California Computer Vision Meetup (2008-2012)
- Co-Chair for 8th IEEE Workshop on Perceptual Organization in Computer Vision (2012)
- Co-Organizer for USA-Sino Computer Vision Summer School in Vision, Learning and Pattern Recognition (2012)
- Computer Vision Chair for 8th International Symposium on Visual Computing (2012)
- Co-organizer, “Workshop on Graph Based Image Segmentation”. IEEE Conf. on Computer Vision and Pattern Recognition (2004)

Conference Reviewing (senior program committee)

- Area Chair for IEEE Conf. on Computer Vision and Pattern Recognition (2010,2012,2016,2017)
- Area Chair for International Conf. on Computer Vision (2015,2017,2019)
- Area Chair for European Conf. on Computer Vision (2016,2018)
- Area Chair for Intelligent Systems for Molecular Biology (2016)

Conference Reviewing (program committee)

- Program committee for IEEE Conf. on Computer Vision and Pattern Recognition (2006-2019)
- Program committee for IEEE International Conf. on Computer Vision (2007,2009,2011,2013,2015,2017)
- Program committee for European Conf. on Computer Vision (2008-2018)
- Program committee for British Machine Vision Conf. (2015)
- Program committee for Conf. on Neural Information Processing Systems (2008-2013)
- Program committee for Conf. on Uncertainty in Artificial Intelligence (2008)
- Program committee for International Joint Conference on Artificial Intelligence (2009)
- Program committee for International Conference on Intelligent Systems for Molecular Biology (2009)
- Program committee for International Conference on Machine Learning (2009)
- Program committee for International Symposium on Visual Computation (2010)
- Program committee for Workshop on Egocentric Vision (2012)
- Program committee for Workshop on Perceptual Organization and Computer Vision (2010,2014)

Journal Reviewing

- Associate Editor, IEEE Transactions on Pattern Analysis and Machine Intelligence (2018-)
- Associate Editor, Computer Vision and Image Understanding (2016-)
- Associate Editor, IEEE/ACM Transactions on Computational Biology and Bioinformatics (2015-2018)
- Academic Editorial Board, PeerJ Computer Science (2015-)

- Reviewer for IEEE Trans. on Pattern Analysis and Machine Intelligence, Transactions on Neural Networks, Transactions on Signal Processing, Transactions on Image Processing, Transactions on Geoscience and Remote Sensing, Transactions on Circuits and Systems for Video Technology, ACM SIGGRAPH, Journal of Vision, Vision Research, Neural Computation, Pattern Recognition Letters, Machine Learning, Machine Vision and Applications Journal, BMC Cell Biology, Computer Vision and Image Understanding, Journal of Computer Science and Technology, The Visual Computer, Data Mining and Knowledge Discovery, Journal of Machine Learning Research, Nature Methods, BMC Bioinformatics, JOSA A

Other Reviewing

- NSF Panelist: Computer Vision (2008,2014)
- Proposal reviewer for ARO (2012)
- Israel Science Foundation, Individual Research Grants (2011)

Panelist

- Working Group Member of FBI National Footwear Database Evaluation Study (2017-)
- Workshop on Biological Collections as a Resource for Technical Innovation (Blacksburg, VA, March 2017)
- Workshop on Biological Collections as a Resource for Technical Innovation (Blacksburg, VA, October 2016)
- Workshop on Biological Collections as a Resource for Technical Innovation (Washington D.C., May 2016)
- NSF/CCC Brain Panel (Washington D.C., Dec. 2014)
- NSF Ideas Lab on Biological Imaging and Visualization (2010)

TEACHING

University of California, Irvine

- CS 116 : Computational Photography (Winter 2010,2011,2013,2014,2016,2017,2018,2019)
- CS 117 : Project in Computer Vision (Winter 2009, Fall 2013, Spring 2015,2016,2017,2018,2019)
- CS 216 : Image Understanding (Fall 2010-2012, Spring 2014, Winter 2016, Spring 2017, 2018)
- CS 217 : Light and Geometry (Spring 2010, Winter 2012, Spring 2015, Spring 2019)
- ICS 162 : Modeling and World Building (Fall 2012, Spring 2014, Fall 2015)
- CS 295 : Image Understanding (Fall 2008)
- CS 295 : Research topics in Computer Vision (Spring 2009, Winter 2010, Winter 2011)
- CS 177 : Applications of Probability in Computer Science (Spring 2008)

STUDENT RESEARCH SUPERVISION AND ADVISING

Graduate Theses

- Bailey Kong, PhD Thesis, 2018, “Learning Robust Features and Metrics for Image Classification and Matching”
- Phuc Nguyen, PhD Thesis, 2018, “Training and Evaluating Visual Recognition Systems with Limited Annotations’ (now at Google)
- Golnaz Ghiasi, PhD Thesis, 2016, “Recognizing and Segmenting Objects in the Presence of Occlusion and Clutter” (now at Google)
- Raul Diaz, PhD Thesis, 2016, “Strong Geometric Context for Scene Understanding” (now at HP)
- Sam Hallman, PhD Thesis, 2015, “Learning to Detect and Segment Objects in Images” (now at Amazon)

- Mathew Carathedathu, MS Thesis, 2013, “Texture Classification using Histograms of Sparse Representations” (now at Delphi)
- Julian Yarkony, PhD Thesis, 2012, “Planarity Matters: MAP Inference in Planar Markov Random Fields with Applications to Computer Vision”, (now at Experian Data Lab)
- Ragib Morshed, MS Thesis, 2011, “Learning Transformation Groups on Image Manifolds” (now at Adconion)
- Sangeeta Jha, MS Thesis, 2010, “Detection and Segmentation of Cell Nuclei in Medical Images” (now at Intel)
- Tony Tran, MS Thesis, 2009, “Multiple Object Tracking using Video Segmentation” (now at Uber)
- Dennis Park, MS Thesis, 2008, “Toward Object detection” (now at Vicarious)

Graduate Research Supervision

- Michael Chiang, PhD, 2011-2015, “Image cytometry” (PhD thesis with Olivier Cinquin, now at UC Irvine)
- Shaofei Wang, MS, 2014, “Learning Multi-target Tracking” (now at Beijing A&E Technologies)
- Samreen Anjum, MS, 2014, “Shape Based Segmentation” (now at Qatar Computing Research Institute)
- Hyeoungho Bae, PhD, 2012-2013, “Image Deblurring” (PhD thesis with Pai Chu, now at Microsoft)
- Shu-Chi Hsu, MS, 2012, “Video Segmentation”
- Yihang Bo, PhD, 2010-2011, “Parsing Images of Pedestrians” (visiting PhD, now at Beijing Film Academy)
- Nityananda Jayadevaprakash, MS, 2010, “Segmentation-based Spatial Pyramid Matching” (now at Apple)

Undergraduate Research Supervision

- Maharshi Patel, Honors Thesis, UROP SURP Fellow, 2017, “Optimizing Number of Images used for 3D Reconstruction using GPS and Machine Learning” (now at Microsoft)
- Matthew Footitt, Nathan Chan, Neeraj Shah, Brenden Vogt, Senior Design Project, UROP, 2017, “Full Size Self Parking Car”
- Jasmine Mao and Edmund Florendo, Independent Study, Multidisciplinary Design Program, 2016, “Automated Biological Image Analysis”
- Naren Sathiya, Jenny Hua, Yvonne Feng, Terry Feng and Kasean Herrera, Independent Study, 2015, “Face Detection for Photo Organization”, 1st Place 2015 Butterworth Product Development Competition
- Gio Borje, Honors Thesis, 2015, “Real-Time Projection Mapping” (now at LinkedIn)
- Robert Shapiro, Independent Study, 2013, “Light Compositing”
- Jason Lee, Honors Thesis, 2013, “Texture Synthesis to 2D Tile-Based Map Synthesis” (now at OCLARO)
- Mathew Nease, Honors Thesis, 2012, “Projection Correction” (now at Edmonds)
- Sam Hallman, Independent Study, UROP SURP Fellow, 2009, “An Artificial Vision System for ‘Seeing’ What is on the Web” (now at Amazon)

UNIVERSITY
SERVICE

UCI Senate Committee on Rules and Jurisdiction (Winter 2019)
CS bioinformatics hiring committee (Spring 2019)
CS hiring vision committee (Spring 2018)
Computer Science Steering committee (2017-2018)
CS mid-career hiring committee (Fall 2016)
Computer Game Science Steering committee (Fall 2010-present)
CS Chair Search committee (Fall 2015)
CS graduate admissions committee (2008-2010,2014)
CS chair advisory committee (Fall 2011-2012)
ICS Business office analyst search committee (Spring 2012)
ICS Strategic Planning Committee on Community and Culture (Spring 2011-2012)
CS Chair Search committee (Spring 2010)

GRANTS

Context Driven Image Interpretation in Satellite Imagery, UC Labs Research Program, UCOP, 2009-2012 (PI)
Noise Attenuation During Boundary Sharpening in the Zebrafish Hindbrain, CCBS Opportunity Award, 2009 (co-PI)
A High-Content Screening Platform for Embryoid Bodies, Shrink Nanotechnologies, 2010 (PI)
Learning Robust Video Segmentation, Google Research Award, 2010 (PI)
UCI Academic Senate CORCLR Conference Travel Grant, 2010 (PI)
Collaborative Research: Biological Shape Spaces, Transforming Shape into Knowledge, NSF, 2010-2013 (PI)
CAREER: Combinatorial Inference and Learning for Fusing Recognition and Perceptual Grouping, NSF, 2013-2018 (PI)
Collaborative Research: ABI Innovation: Breaking through the taxonomic barrier of the fossil pollen record using bioimage informatics, NSF, 2013-2016 (PI)
Center for Excellence in Forensic Statistics, NIST, 2015-2020 (co-PI)
Big Data Image Processing and Analysis (BigDIPA) short course, NIH, 2015-2018 (PI)
Building Strong Geometric Priors for Total Scene Understanding, NSF, 2016-2019 (PI)
Adobe Research Gift Fund 2015 (PI)
Hardware Grant, NVIDIA, 2016 (PI)
UCI Academic Senate CORCL research award 2016 (PI)
Skin Biology Resource-based Center, UCI OR Seed Funding Program 2016-2018 (co-PI)
U54 Center for Cancer Systems Biology, UCI OR Seed Funding Program 2016-2018 (co-PI)
Comprehensive Structural and Functional Mapping of the Mammalian Cardiac Nervous System, NIH, 2016-2019 (co-PI)
Hardware Grant, NVIDIA, 2017 (PI)
Comprehensive Structural and Functional Mapping of Mammalian Colonic Nervous System, NIH, 2017-2020 (co-PI)
Systems Biology: A Foundation for Interdisciplinary Careers, NIH, 2017-2019 (senior personnel)
Hardware Grant, NVIDIA, 2018 (PI)

Sparse Predictive Coding for Energy Efficient Visual Navigation in Dynamic Environments, NSF, 2018-2021 (co-PI)

JOURNAL
PUBLICATIONS

- [J.1] C. Fowlkes, S. Belongie, F. Chung, J. Malik. "Spectral Grouping Using The Nyström Method", *IEEE Transactions on Pattern Analysis and Machine Intelligence* 26 (2), p.214-225, 2004.
- [J.2] D. Martin, C. Fowlkes, J. Malik. "Learning to Detect Natural Image Boundaries Using Local Brightness, Color and Texture Cues", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 26 (5) p.530-549, 2004.
- [J.3] C. Luengo-Hendriks, S. Keränen, C. Fowlkes, L. Simirenko, G. Weber, C. Henriquez, D. Kaszuba, B. Hamann, M. Eisen, J. Malik, D. Sudar, M. Biggin D. Knowles, "3D Morphology and Gene Expression in the Drosophila Blastoderm at Cellular Resolution I: Data Acquisition Pipeline", *Genome Biology*, 7:R123, 2006.
- [J.4] S. Keränen, C. Fowlkes, C. Luengo Hendriks, D. Sudar, D. Knowles, J. Malik, M. Biggin, "3D Morphology and Gene Expression in the Drosophila Blastoderm at Cellular Resolution II: Dynamics", *Genome Biology*, 7:R124, 2006.
- [J.5] C. Fowlkes, D. Martin, J. Malik. "Local Figure/Ground Cues are Valid for Natural Images", *Journal of Vision*, 7(8):2, p.1-9, 2007.
- [J.6] G. Weber, O. Rübél, M-Y. Huang, A. DePace, C. Fowlkes, S. Keränen, C. Luengo Hendriks, H. Hagen, D. Knowles, J. Malik, M. Biggin, B. Hamann. "Visual exploration of three-dimensional gene expression using physical views and linked abstract views", *IEEE/ACM Transactions on Computational Biology and Bioinformatics*, 6(2), p. 296-309, 2009.
- [J.7] X. Ren, C. Fowlkes, J. Malik, "Learning Probabilistic Models for Contour Completion in Natural Images", *International Journal of Computer Vision*, 77(1), p.47-63, 2008.
- [J.8] C. Fowlkes, C. Luengo Hendriks, S. Keränen, G. Weber, O. Rübél, M-Y Huang, S. Chatoor, A. DePace, L. Simirenko, C. Henriquez, A. Beaton, R. Weiszmann, S. Celniker, B. Hamann, D. Knowles, M. Biggin, M. Eisen, J. Malik "A quantitative spatio-temporal atlas of gene expression in the Drosophila blastoderm", *Cell*, 133(2), p. 364-374, 2008.
- [J.9] O. Rübél, G. Weber, M-Y Huang, E. Bethel, M. Biggin, C. Fowlkes, C. Luengo Hendriks, S. Keränen, M. Eisen, D. Knowles, J. Malik, H. Hagen, B. Hamann, "Integrating Data Clustering and Visualization for the Analysis of 3D Gene Expression Data", *IEEE/ACM Transactions on Computational Biology and Bioinformatics*, 7(1), p. 64-79, 2010.
- [J.10] J. Burge, C. Fowlkes, M. Banks, "Natural-Scene Statistics Predict How the Figure-Ground Cue of Convexity Affects Human Depth Perception", *Journal of Neuroscience*, 30(21), p. 7269-7280, 2010.
- [J.11] A. Aswani, S. Keränen, J. Brown, C. Fowlkes, D. Knowles, M. Biggin, P. Bickel, C. Tomlin, "Nonparametric identification of regulatory interactions from spatial and temporal gene expression data", *BMC Bioinformatics*, 11:413, 2010
- [J.12] P. Arbeláez, M. Maire, C. Fowlkes, J. Malik, "Contour Detection and Hierarchical Image Segmentation", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 33(5), p. 898-916, 2011.
- [J.13] J. Luna, J. Ciriza, M. Garcia-Ojeda, M. Kong, A. Herren, D. Lieu, R. Li, C. Fowlkes, M. Khine, K. McCloskey, "Multi-scale Biomimetic Topography for the Alignment of Neonatal and Embryonic Stem Cell-derived Heart Cells", *Tissue Engineering: Part C*, 17(5), p. 579-588, 2011
- [J.14] C. Desai, D. Ramanan, C. Fowlkes, "Discriminative Models for Multi-class Object Layout", *International Journal of Computer Vision*, 95(1), p. 1-12, 2011

- [J.15] C. Fowlkes, K. Eckenrode, M. Bragdon, M. Meyer, Z. Wunderlich, L. Simirenko, C. Leungo Hendriks, S. Keranen, C. Henriquez, D. Knowles, M. Biggin, M. Eisen, A. DePace, “A conserved developmental patterning network produces quantitatively different output in multiple species of *Drosophila*”, *PLoS Genetics*, 7(10):e1002346, 2011
- [J.16] A. Chen, D. Lieu, L. Freschauf, V. Lew, H. Sharma, J. Wang, D. Nguyen, I. Karakikes, R. Hajjar, A. Gopinathan, E. Botvinick, C. Fowlkes, R. Li, M. Khine, “Shrink-Film Configurable Multiscale Wrinkles for Functional Alignment of Human Embryonic Stem Cells and their Cardiac Derivatives”, *Advanced Materials*, 23(48), p. 5785-5791, 2011
- [J.17] J. Henggenius, M. Gribskov, A. Rundell, C. Fowlkes, D. Umulis, “Analysis of Gap Gene Regulation in a 3D Organism-Scale Model of the *Drosophila* Embryo”, *PLoS ONE*, 6(11):e26797, 2011
- [J.18] Y. Yang, S. Hallman, D. Ramanan, C. Fowlkes, “Layered Object Models for Image Segmentation”, *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 34(9), p. 1731-1743, 2012.
- [J.19] H. Kim, J. Park, J. Byun, W. Poon, C. Cotman, C. Fowlkes, N. Jeon, “Quantitative analysis of axonal transport by using compartmentalized and surface micropatterned culture of neurons”, *ACS Chemical Neuroscience*, 3(6), p. 433-438, 2012
- [J.20] D. Keator, J. Fallon, A. Lakatos, C. Fowlkes, S. Potkin, A. Ihler, “Feed-forward Hierarchical Model of the Ventral Visual Stream Applied to Functional Brain Image Classification”, *Human Brain Mapping*, (2012), DOI 10.1002/hbm.22149
- [J.21] L. Mander, M. Li, W. Mio, C. Fowlkes, S. Punyasena, “Classification of grass pollen through the quantitative analysis of surface ornamentation and texture” *Proc. R. Soc. B.* 280(1770), 2013
- [J.22] A. Chen, E. Lee, R. Tu, K. Santiago, A. Grosberg, C. Fowlkes, M. Khine, “Integrated Platform for Functional Monitoring of Biomimetic Heart Sheets Derived From Human Pluripotent Stem Cells”, *Biomaterials* 35(2):675-683
- [J.23] M. Staller, C. Fowlkes, M. Bragdon, J. Estrada, Z. Wunderlich, A. DePace, “A gene expression atlas of a bicoid-depleted *Drosophila* embryo reveals early canalization of cell fate”, *Development* 142, p 587-596, (2015), DOI 10.1242/dev.117796
- [J.24] X. Zhu, C. Vondrick, C. Fowlkes, D. Ramanan, “Do we need more training data?”, *IJCV*, p 1-17, March, (2015), DOI 10.1007/s11263-015-0812-2
- [J.25] J. B. Treweek, B. Yang, N. Flytzanis, K. Chan, B. Deverman, A. Greenbaum, A. Lignell, C. Xiao, L. Cai, M. Ladinsky, P. Bjorkman, C. Fowlkes, V. Gradinaru “Whole-Body Tissue Stabilization and Selective Extractions via Tissue-Hydrogel Hybrids for High Resolution Intact Circuit Mapping and Phenotyping”, *Nature Protocols*, 10 (11), 1860-1896, (2015), DOI 10.1038/nprot.2015.122
- [J.26] M. Chiang, S. Hallman, A. Cinquin, N. Reyes de Mochel, A. Paz, S. Kawauchi, A. Calof, K. Cho, C. Fowlkes, O. Cinquin, “Analysis of in vivo single cell behavior by high throughput, human-in-the-loop segmentation of three-dimensional images”, *BMC Bioinformatics*, 16:397, (2015), DOI 10.1186/s12859-015-0814-7
- [J.27] C. McCusker, A. Athippozhy, C. Diaz-Castillo, C. Fowlkes, D. Gardiner, S. Voss, “Positional Plasticity in Regenerating *Amybstoma mexicanum* Limbs Is Associated With Cell Proliferation and Pathways of Cellular Differentiation”, *BMC Developmental Biology*, 15:45, (2015), DOI 10.1186/s12861-015-0095-4
- [J.28] David K. Tcheng, Ashwin K. Nayak, Charless C. Fowlkes, Surangi W. Punyasena, “Visual Recognition Software for Binary Classification and Its Application to Spruce Pollen Identification”, *PLoS ONE* 11(2): e0148879. (2016) DOI 10.1371/journal.pone.0148879

- [J.29] A. Cinquin, M. Chiang, A. Paz, S. Hallman, O. Yuan, I. Vysniauskaite, C. Fowlkes, O. Cinquin, “Intermittent stem cell cycling balances self-renewal and senescence of the *C. elegans* germ line”, *PLoS Genetics*. (2016) DOI 10.1371/journal.pgen.1005985
- [J.30] S. Wang, C. Fowlkes, “Learning Optimal Parameters for Multi-target Tracking with Contextual Interactions”, *Int. Journal of Computer Vision*, 122:484, (2016) DOI 10.1007/s11263-016-0960-z
- [J.31] R. Muller, N. Abaid, J. Boreyko, C. Fowlkes, A. Goel, C. Grimm, S. Jung, B. Kennedy, C. Murphy, N. Cushing, J-P Han, ”Biodiversifying Bioinspiration”, *Bioinspiration and Biomimetics* 13(5):053001, (2018)
- [J.32] B. Kong, J. Supancic, D. Ramanan, C. Fowlkes, ”Cross-Domain Image Matching with Deep Feature Maps”, *Int. Journal of Computer Vision*, (2019). DOI 10.1007/s11263-018-01143-3

BOOK CHAPTERS

- [BC.1] C. Fowlkes, Q. Shan, S. Belongie, J. Malik. “Extracting Global Structure from Gene Expression Profiles”, in *Methods of Microarray Data Analysis II*, S. M. Lin and K. F. Johnson, eds. Kluwer Academic Publishers, 2002.

EDITED VOLUMES AND PROCEEDINGS

- [ED.1] G. Bebis, R. Boyle, B. Parvin, D. Koracin, C. Fowlkes, W. Sen, C. Min-Hyung, S. Mantler, J. Schulze, D. Acevedo, K. Mueller, M. Papka, “Advances in Visual Computing”, 8th International Symposium, ISVC 2012, Rethymnon, Crete, Greece, July 16-18, 2012, Series: *Lecture Notes in Computer Science*, Vol. 7431, 2012.

REFEREED CONFERENCE PUBLICATIONS

- [C.1] M. Burl, C. Fowlkes, J. Roden, A. Stechert, and S. Muukhtar, “Diamond Eye: A distributed Architecture for Image Data Mining”, *Proc. of SPIE Conference on Data Mining and Knowledge Discovery*, p. 197-206, 1999
- [C.2] D. Martin, C. Fowlkes, D. Tal, J. Malik. “A Database of Human Segmented Natural Images and its Application to Evaluating Segmentation Algorithms and Measuring Ecological Statistics”, *Proc. IEEE Int. Conf. on Computer Vision (ICCV)*, p. 416-423, 2001.
- [C.3] C. Fowlkes, S. Belongie, J. Malik. “Efficient Spatiotemporal Grouping Using the Nyström Method”, *Proc. IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, p. 231-238, 2001.
- [C.4] S. Belongie, C. Fowlkes, F. Chung, J. Malik. “Spectral Partitioning with Indefinite Kernels using the Nyström Extension”, *Proc. European Conf. on Computer Vision (ECCV)*, p. 51-57, 2002.
- [C.5] D. Martin, C. Fowlkes, J. Malik. “Learning to Detect Natural Image Boundaries Using Brightness and Texture”, *Proc. Neural Information Processing Systems (NIPS)*, p. 1255-1262, 2002.
- [C.6] C. Fowlkes, D. Martin, J. Malik. “Learning Affinity Functions for Image Segmentation: Combining Patch-based and Gradient-based Approaches”, *Proc. IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, p. 54-61, 2003.
- [C.7] X. Ren, C. Fowlkes, J. Malik. “Scale-Invariant Contour Completion using Conditional Random Fields”, *Proc. IEEE Int. Conf. on Computer Vision (ICCV)*, 1214-1221, 2005.
- [C.8] X. Ren, C. Fowlkes, J. Malik. “Cue Integration for Figure/Ground Labeling”, *Proc. Neural Information Processing Systems (NIPS)*, p. 1121-1129, 2005.

- [C.9] O. Rübél, G. Weber, S. Keränen, C. Fowlkes, C. Luengo Hendriks, N.Y. Shah, M.D. Biggin, H. Hagen, D.W. Knowles, J. Malik, D. Sudar and B. Hamann. “PointCloudXplore: Visual Analysis of 3D Gene Expression Data Using Physical Views and Parallel Coordinates”, in Proc. of EuroVis., p. 203-210, 2006.
- [C.10] X. Ren, C. Fowlkes, J. Malik. “Figure/Ground Assignment in Natural Images”, Proc. European Conf. on Computer Vision (ECCV), p. 614-627, 2006.
- [C.11] M. Maire, P. Arbeláez, C. Fowlkes, J. Malik. “Using Contours to Detect and Localize Junctions in Natural Images”, Proc. IEEE Conf. on Computer Vision and Pattern Recognition (CVPR), p. 1-8, 2008.
- [C.12] P. Arbeláez, M. Maire, C. Fowlkes, J. Malik. “From Contours to Regions: An Empirical Evaluation”, Proc. IEEE Conf. on Computer Vision and Pattern Recognition (CVPR), p. 2294-2301, 2009.
- [C.13] C. Desai, D. Ramanan, C. Fowlkes, “Discriminative Models for Multi-class Object Layout”, Proc. IEEE International Conference on Computer Vision (ICCV), p. 229-236, 2009.
- [C.14] H. Pirsiavash, D. Ramanan, C. Fowlkes, “Bilinear classifiers for visual recognition”, Proc. Neural Information Processing Systems (NIPS), p. 1482-1490, 2009.
- [C.15] J. Yarkony, C. Fowlkes, A. Ihler, “Covering Trees and Lower-bounds on Quadratic Assignment”, Proc. IEEE Conf. on Computer Vision and Pattern Recognition (CVPR), p. 887-894, 2010
- [C.16] Y. Yang, S. Hallman, D. Ramanan, C. Fowlkes, “Layered Object Detection for Multi-Class Segmentation”, Proc. IEEE Conf. on Computer Vision and Pattern Recognition (CVPR), p. 3113-3120, 2010
- [C.17] D. Park, D. Ramanan, C. Fowlkes, “Multiresolution models for object detection”, Proc. European Conf. on Computer Vision (ECCV), p. 241-254, 2010.
- [C.18] H. Pirsiavash, D. Ramanan, C. Fowlkes, “Globally-Optimal Greedy Algorithms for Tracking a Variable Number of Objects”, Proc. IEEE Conf. on Computer Vision and Pattern Recognition (CVPR), p. 1201-1208, 2011
- [C.19] Y. Bo, C. Fowlkes, “Shape-based Pedestrian Parsing”, Proc. IEEE Conf. on Computer Vision and Pattern Recognition (CVPR), p. 2265-2272, 2011
- [C.20] J. Yarkony, R. Morshed, A. Ihler, C. Fowlkes. “Tightening MRF Relaxations with Planar Subproblems”, Proc. of the 27th Conf. on Uncertainty in Artificial Intelligence (UAI), p. 770-777, 2011
- [C.21] J. Yarkony, A. Ihler, C. Fowlkes. “Planar Cycle Covering Graphs”, Proc. of the 27th Conf. on Uncertainty in Artificial Intelligence (UAI), p. 761-769, 2011
- [C.22] Y. Chen, A. Gelfand, C. Fowlkes, M. Welling, “Integrating Local Classifiers through Nonlinear Dynamics on Label Graphs with an Application to Image Segmentation”, Proc. IEEE International Conference on Computer Vision (ICCV), p. 2635-2642, 2011
- [C.23] X. Zhu, C. Vondrick, D. Ramanan, C. Fowlkes, “Do we need more training data or better models for object detection?”, Proc. of British Machine Vision Conference (BMVC), 2012, p. 80.1-80.11
- [C.24] J. Yarkony, A. Ihler, C. Fowlkes, “Fast Planar Correlation Clustering for Image Segmentation”, Proc. of European Conference on Computer Vision (ECCV), 2012, p. 568-581
- [C.25] H. Bae, C. Fowlkes, P. Chou, “Patch Mosaic for Fast Motion Deblurring”, Proc. of Asian Conference on Computer Vision (ACCV), 2012, p. 322-335
- [C.26] B. Andres, J. Yarkony, B.S. Manjunath, S. Kirchhoff, E. Turetken, C. Fowlkes, H. Pfister, “Segmenting Planar Superpixel Adjacency Graphs w.r.t. non-planar Superpixel Affinity Graphs”, Proc. of Intl. Conf. on Energy Minimization Methods in Computer Vision and Pattern Recognition (EMMCPVPR), 2013, p. 266-279

- [C.27] R. Diaz, S. Hallman, C. Fowlkes, “Detecting Dynamic Objects with Multi-View Background Subtraction”, Proc. of IEEE International Conference on Computer Vision (ICCV), 2013, p. 273-280
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- [A.60] S. Punyasena, S. Kong, C. Fowlkes, S. Jackson, “Reconstructing the extinction dynamics of *Picea critchfieldii*– the application of computer vision to fossil pollen analysis”, Inaugural Digital Data in Biodiversity Research Conference, Ann Arbor, MI, June 2017
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- [A.67] I. Romero, S. Kong, C. Fowlkes, M. Urban, C. D’Apolito, C. Jaramillo, F. Oboh-Ikuenobe, S. Punyasena “Novel Morphological Analysis of a Fossil Fabaceae Pollen Type, *Striatopollis Catatumbus* (Tribe Detariae)”, Geological Society of America Annual Meeting, Seattle Washington, Oct. 2017
- [A.68] S. Kong, C. Fowlkes, “Recurrent Scene Parsing with Perspective Understanding in the Loop”, Southern California Machine Learning Symposium, USC, Oct. 2017

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- [TR.2] C. Fowlkes, J. Malik. “How Much Does Globalization Help Segmentation?”, Technical Report CSD-04-1340, Division of Computer Science, University of California, Berkeley, (July 2004)
- [TR.3] C. Fowlkes “A Note on Planar Factor Graphs”, (Oct 2004)
- [TR.4] X. Ren, C. Fowlkes, J. Malik. “Mid-level Cues Improve Boundary Detection”, Technical Report CSD-05-1382, Division of Computer Science, University of California, Berkeley, (March 2005)
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- [TR.6] P. Arbeláez, M. Maire, C. Fowlkes, J. Malik. “Contour Detection and Hierarchical Image Segmentation”, Technical Report EECS-2010-17, EECS Department, University of California, Berkeley, (Feb 2010)
- [TR.7] S. Hallman, A. Skurikhin, C. Fowlkes. “Vehicle Detection on High-Resolution Commercial Satellite Imagery”, Technical Report LA-UR-10-05877, Los Alamos National Laboratory, (2010)
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- [TR.15] S. Wang, S. Wolf, C. Fowlkes, J. Yarkony, “Tracking Objects with Higher Order Interactions using Delayed Column Generation”, Technical Report, arXiv:1512.02413, (August 2016)
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- M. Philips, "Deciphering Development: Quantifying Gene Expression through Imaging", *BioScience* 57:648-652, September 2007
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- N. de Souza, "A map for fly explorers", *Nature Methods*, 5(6), p 466, June 2008
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- K. Khairy, P. Keller, "Reconstructing Embryonic Development", *Genesis*, 49(7), p 488-513, 2011

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TALKS

- "Building composite spatial maps of gene expression in *Drosophila* embryos", Caltech, Vision Group, March 2005
- "Perceptual organization and linear algebra", MSRI, PREP teaching workshop on mathematics of images, March 2005
- "Learning to detect boundaries in natural scenes", UCSD, Computer Science, March 2005
- "Perceptual organization and natural scenes", MSRI, Workshop on perceptual organization, April 2005
- "Learning to detect boundaries in natural scenes", CMU, Robotics Inst. June 2005
- "Learning to detect boundaries in natural scenes", U Penn, Computer Science, June 2005
- "Ecological statistics and perceptual organization", US-China Workshop on Mathematical, Computational, and Applied Aspects of Computer Vision and Pattern Recognition, Lotus Hill Research Institute, E-Zhou, China, Sept. 2005.
- "Constructing a quantitative spatiotemporal atlas of gene expression and morphology in *Drosophila*", Caltech, Center for Advanced Computing Research, Jan. 2007
- "Ecological statistics and perceptual organization", UC Merced, Mind, Technology, and Society Seminar, Feb. 2007
- "Constructing a quantitative spatiotemporal atlas of gene expression and morphology in *Drosophila*", UCSD, Computer Science, Feb. 2007
- "Computer vision for natural scenes and biological images", UC Irvine, March 2007
- "Constructing a quantitative spatiotemporal atlas of gene expression and morphology in *Drosophila*", U Penn, Computer Science, March 2007
- "Learning to detect boundaries in natural scenes", GIIF Geolunch Seminar, UC Berkeley, October 2007
- "A spatio-temporal atlas of gene expression in the *Drosophila* blastoderm", UCI Developmental Biology Center Retreat, March 2008
- "A spatio-temporal atlas of gene expression in the *Drosophila* blastoderm", UCI Center for Complex Biological Systems Retreat, March 2008
- "The Ecological Statistics of Figure-Ground", Caltech, Vision Group, May 2008
- "Understanding variation in embryonic patterning among *Drosophila* species using a spatiotemporal atlas of gene expression", UCI Developmental and Cell Biology Department Seminar, October 2008

“The Ecological Statistics of Figure-Ground”, UCI Institute for Mathematical Behavioral Sciences Colloquium, January 2009

“Learning Models of Boundaries in Natural Images”, Computer Science Research Institute, Sandia National Labs, May 2009

“Learning Models of Boundaries in Natural Images”, Center for Non-linear Studies, Los Alamos National Labs, May 2009

“Characterizing Variation in Embryonic Patterning Among Drosophila Species Using a Spatio-Temporal Atlas of Gene Expression”, KITP Program on Morphodynamics, UC Santa Barbara, September 2009

“Layered Object Detection for Multi-Class Segmentation”, Workshop on Recent Trends in Computer Vision, University of Maryland, February 2010

“Building a spatio-temporal atlas of gene expression using image registration and virtual multiplexing”, ASME 5th Frontiers in Biomedical Devices Conference, Sept 2010

“Characterizing Variation in Embryonic Patterning Among Drosophila Species Using a Spatio-Temporal Atlas of Gene Expression”, Oregon Health Sciences University, Portland, November 2010

“Automating Biological Image Analysis”, Howard Hughes Medical Institute, Janelia Farm, November 2010

“Layered Object Detection for Multi-Class Segmentation”, UC Riverside EE Colloquium, November 2010

“Automated Image Analysis for Systems Biology”, National Short Course on Systems Biology, UC Irvine, January 2011

Google/Nature/O’Reilly Science Foo Camp, Mountain View, August 2011

“Adaptive Biological Image Analysis”, Howard Hughes Medical Institute, Janelia Farm, September 2011

“Automated Image Analysis for Systems Biology”, National Short Course on Systems Biology, UC Irvine, January 2012

“Dual-decomposition and inference in Planar Graphs”, Information Theory and Applications Workshop, San Diego, CA, February 2012

“Automatically Discovering Relations between Form and Function”, Annual Meeting of the Histochemical Society, Marine Biological Laboratory, Woods Hole, MA, March 2012

“Automating Biological Image and Shape Analysis”, USA-Sino Summer School in Vision, Learning and Pattern Recognition (VLPR), Shanghai, China, July 2012

“When does more training data improve object detector performance?”, Xi’an Jiaotong University, Xi’an, China, July 2012

“Visualizing Links between Shape and Gene Expression in Animal Development”, Radcliffe Exploratory Seminar, November 2012

“Characterizing Variation in Embryonic Patterning Among Drosophila Species Using a Spatio-Temporal Atlas of Gene Expression”, UC Riverside, Video Bioinformatics IGERT Seminar, November 2012

“Automated Image Analysis for Systems Biology”, National Short Course on Systems Biology, UC Irvine, January 2013

“How can object detectors exploit growing quantities of training data?”, UT Austin, Computer Science, July 2013

Panelist: 1st Workshop on Large Scale Visual Commerce, International Conference on Computer Vision, Sydney, December 2013

“Automated Image Analysis for Systems Biology”, National Short Course on Systems Biology, UC Irvine, January 2014

“Quantitative Bioimage Analysis”, UCSD Quantitative Biology (qBio) Summer Bootcamp, UCSD, July 2014

“Quantitative Bioimage Analysis”, Caltech BIONIC Center, October 2014

“Detecting Occluded Faces”, Caltech Vision Group, October 2014

“Atlas Building”, CCC/NSF Brain Panel Workshop, December 2014

“Learning to detect, segment and track biological structures”, Invited talk, IEEE Workshop on BioImage Computing, June 2015

Panelist at 2nd IEEE Workshop on Large Scale Visual Commerce, June 2015

“Adaptive tools for automatic tracing and mapping of whole cleared brains”, Invited Panelist at Society for Neuroscience symposium on Clearing and Labeling for High Resolution Imaging of Intact Biological Specimens, Oct. 2015

“Learning to detect, segment and track biological structures”, Invited talk, Bioimage Computing workshop, European Conf. on Computer Vision 2016

“Statistical Models for the Generation and Interpretation of Shoeprint Evidence”, Invited talk, NIST, November 2016

“Bioimage analysis for mapping cardiac neuroanatomy”, Invited talk, 3rd UCLA Cardiac Autonomic Control in Health and Disease Symposium, February 2017

“Learning to detect, segment and track biological structures”, Invited talk, Quantitative Imaging Course, Cold Spring Harbor Labs, April 2017

“Contextual Mapping for Image Understanding”, Computer Science Department Showcase, UC Irvine, May 2017

”Strong Geometric Context and Pixel-labeling Architectures for Scene Understanding”, Invited talk, Dept. of Mathematik und Informatik, University of Basel, Switzerland, July 2017

“The machine learning revolution”, CalIT2 Ignite Symposium on The Future of Machine Learning, May 2018

“Optically mapping microanatomy in the peripheral nervous system”, SoCal Bioimaging Symposium, June 2018

“Active Testing”, Caltech Vision Group, September 2018

PATENTS

E. Bax, C. Fowlkes, L. Cisnero, “Technique for Extracting Data from Structured Documents”, U.S. Patent 7689906, March 30, 2010