Charless C. Fowlkes

Contact Information

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Academic Background

University of California, Berkeley — Berkeley, CA
Ph.D., Computer Science, Fall 2005
advisor: Jitendra Malik

California Institute of Technology — Pasadena, CA
BS with honor, Engineering and Applied Sciences, Spring 2000
advisor: Pietro Perona

Experience

Full Professor — 2018-
Associate Professor — 2013-2018
Assistant Professor — 2007-2013
Department of Computer Science, University of California, Irvine, CA.
Joint Appointment, Dept. of Cognitive Sciences
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
Member, Center for Computational Morphodynamics

Postdoctoral Scholar — 2005-2007
LBNL Life Sciences/UCB Computer Science, Berkeley, CA — Mark Biggin

Graduate Student Researcher — 2000-2005
Computer Science, University of California, Berkeley, CA — Jitendra Malik

Consultant — 1999-2000
Infospheres Corp, Oakland, CA — Mani Chandy

Research Intern — 1998-1999
NASA Jet Propulsion Laboratory, Pasadena, CA — Mike Burl

Research Intern — Summers 1995-1997
Plant Sciences, Montana State University, Bozeman, MT — Tom Blake

Awards and Honors

Chancellor's Fellow, UCI, 2019-2022

American Statistical Association Statistical Partnerships Among Academe, Industry, and Government (SPAIG) Award, 2018

Helmholtz Prize for fundamental contributions in Computer Vision, Int. 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, Int. 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, Southern California Biomedical Imaging and Machine Learning Symposium (2019)
- Co-Organizer, Southern California Biomedical Imaging and Machine Learning Symposium (2018)
- 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 Int. 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, 2019, 2020, 2021, 2023)
- Area Chair for Int. Conf. on Machine Learning (2022)
- Area Chair for Int. 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 (2006-2023)
- Program committee for IEEE Int. Conf. on Computer Vision (2007, 2009, 2011, 2013, 2015, 2017, 2019)
- 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 Int. Joint Conference on Artificial Intelligence (2009)
- Program committee for Int. Conference on Intelligent Systems for Molecular Biology (2009)
- Program committee for Int. Conference on Machine Learning (2009)
- Program committee for Int. 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: RI/Computer Vision/CAREER (2008,2014,2021,2022)
- Proposal reviewer for ARO (2012)
- Israel Science Foundation, Individual Research Grants (2011)

Advisory Roles

- Advisory board member, "SOLSTICE: Space Weather Modeling Meets Machine Learning" (NASA/NSF DRIVE Center) (2020-2022)
- Techical advisory board member, Miso Robotics

Panelist

- Working Group Member of FBI National Footwear Database Evaluation Study (2017-2020)
- 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 (2010,2011,2013,2014,2016-2023)

CS 117 : Project in Computer Vision (2009,2013,2015-2023)

CS 216 : Image Understanding (2010-2012,2014,2016,2017-2022)

CS 217 : Light and Geometry (2010,2012,2015,2019,2021,2023)

ICS 162 : Modeling and World Building (2012,2014,2015)

CS 295 : Image Understanding (2008)

CS 295 : Research topics in Computer Vision (2009,2010,2011)

CS 177 : Applications of Probability in Computer Science (2008)

Student Research Supervision and Advising

Graduate Theses

- Zhe Wang, PhD Thesis, 2021, "Robust Estimation of 3D Human Body Pose with Geometric Priors" (now at Cruise)
- Shu Kong, PhD Thesis, 2019, "Pixel-Level Prediction: Models and Applications" (now at CMU)
- Minhaeng Lee, PhD Thesis, 2019, "Geometric Reconstruction for Visual Data Interpretation" (now at Apple)
- Bailey Kong, PhD Thesis, 2018, "Learning Robust Features and Metrics for Image Classification and Matching" (now at Nelson Hall)
- 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 Amazon)
- 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 Verisk)
- Ragib Morshed, MS Thesis, 2011, "Learning Transformation Groups on Image Manifolds" (now at Amazon)
- 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 Toyota Research Institute)

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 U Penn)
- 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

- Jared Apillanes, Honors Thesis, 2022, "Shoe Tread Shape Estimation from a Single Monocular Orthographic Image"

- Liyan Chen, Honors Thesis, 2019, "Geometric Pose Affordance: 3D Human Pose with Scene Constraints" (now at UT Austin)
- 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

CS AIML hiring search committee (Spring 2022)

CS AIML hiring search committee (Spring 2021)

ICS Executive Committee (Fall 2019-2020)

UCI Research Cyberinfrastructure Executive Committee (2019-)

CS bioinformatics hiring search committee (Spring 2019)

UCI Senate Committee on Rules and Jurisdiction (Winter 2019)

IMBS Executive Committee (2019-2022)

CS hiring vision committee (Spring 2018)

ICS Computer Game Science Steering committee (2010-2018)

CS Steering committee (2017-2018)

CS mid-career hiring committee (Fall 2016)

CS chair Search committee (Fall 2015)

CS graduate admissions committee (2008-2010,2014)

ICS Business office analyst search committee (Spring 2012)

ICS Strategic Planning Committee on Community and Culture (Spring 2011-2012)

CS chair advisory committee (Fall 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, 2016-2020 (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)

Discover Determinants of Individual Lifespan and Health, NIH, 2019-2024 (senior personnel)

Spatio-Temporal Attention for Adaptive Computation Depth in Video Recognition and Tracking, Qualcomm Research Gift Fund, 2019-2021

Neuro-Symbolic Dynamic Probabilistic Models: A Unifying Representation and Reasoning Tool For PTG, DARPA, 2021-

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. Rübel, 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. Rübel, 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. Rübel, 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. Keranen, 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. Hengenius, 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?", International Journal of Computer Vision, 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 Biomemetics 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

[J.33] P. Rajendran, R. Challis, C. Fowlkes, P. Hanna, J. Tompkins, M. Jordan, S. Hiyari, B. Gabris-Weber, A. Greenbaum, K. Chan, B. Deverman, H. Munzberg, J. Ardell, G. Salama, V. Gradinaru, K. Shivkumar, "Identification of peripheral neural circuits that regulate heart rate using optogenetic and viral vector strategies", Nature Communications 10:1944 (2019), DOI 10.1038/s41467-019-09770-1

[J.34] Z. Wunderlich, C. Fowlkes, K. Eckenrode, M. Bragdon, A. Abiri, A. DePace "Quantitative comparison of the anterior-posterior patterning system in the embryos of five Drosophila species", G3: GENES, GENOMES, GENETICS, (2019), DOI 10.1534/g3.118.200953

[J.35] N. Hayatbini, B. Kong, K-l Hsu, P. Nguyen, S. Sorooshian, G. Stephens, C. Fowlkes, R. Nemani, "Conditional Generative Adversarial Networks (cGANs) for Near Real-Time Precipitation Estimation from Multispectral GOES 16 Satellite Imagery", Remote Sensing 11:19, 2193 (2019), DOI 10.3390/rs11192193

[J.36] C. Huh, K. Abdelaal, K. Salinas, D. Gu, J. Zeitoun, D. Velez, J. Peach, C. Fowlkes, S. Gandhi, "Long-term monocular deprivation during juvenile critical period disrupts binocular integration in mouse visual thalamus", Journal of Neuroscience, 40:3, (2020), p. 585-604, DOI 10.1523/JNEUROSCI.1626-19.2019

[J.37] F. Zhou, S. Kong, C. Fowlkes, T. Chen, B. Lei "Fine-Grained Facial Expression Analysis Using Dimensional Emotion Model", Neurocomputing, 392:7 (2020), p. 38-49, DOI: 10.1016/j.neucom.2020.01.067

[J.38] H. Kashyap, C. Fowlkes, J. Krichmar, "Sparse Representations for Object and Ego-motion Estimation in Dynamic Scenes", IEEE Transactions on Neural Networks and Learning Systems, (2020), DOI:10.1109/TNNLS.2020.3006467

[J.39] L. Wang, C. Challis, S. Li, C. Fowlkes, S. Kumar, P-Q Yuan, Y. Tach, "Multicolor sparse viral labeling and 3D digital tracing of enteric plexus in mouse proximal colon using a novel adenoassociated virus capsid", Neurogastroenterology and Motility, Oct 2020, 00:e14014.

[J.40] I. Romero, S. Kong, C. Fowlkes, C. Jaramillo, M. Urban, F. Oboh-Ikuenobe, C. D'Apolito, S. Punyasena, "Improving the taxonomy of fossil pollen using convolutional neural networks and superresolution microscopy", Proc. of the National Academy of Sciences (PNAS) Oct 2020, 202007324. DOI:10.1073/pnas.2007324117

[J.41] S. Punyasena, D. Haselhorst, S. Kong, C. Fowlkes, J. Moreno, "Automated identification of diverse Neotropical pollen samples using convolutional neural networks", Methods in Ecology and Evolution, (2022), 13, 2049 2064. doi:10.1111/2041-210X.13917

[J.42] C. Zhu, P. Rajendran, P. Hanna, I. Efimov, G. Salama, C. Fowlkes, K. Shivkumar, "High-resolution structure-function mapping of intact hearts reveals altered sympathetic control of infarct border zones", JCI Insight, (2022), 7(3):e153913. 10.1172/jci.insight.153913

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 Int. 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.

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[A.69] I. Romero, S. Kong, C. Fowlkes, M. Urban, S. Punyasena, "Automated Neotropical Fossil Pollen Fabaceae Analysis Using Convolutional Neural Networks", Geological Society of America, GSA Annual Meeting, Indianapolis, Indiana, 2018

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[A.74] L. Wang, C. Chalis, C. Fowlkes, P-Q Yuan, V. Gradinaru, Y. Tache, "Multicolor Sparse Labeling of Mouse Colonic Enteric Neurons Using a Novel AAV Capsid", 11th Congress of the Int. Society for Autonomic Neuroscience, July 2019

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Technical Reports

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[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.10] B. Kong, C. Fowlkes. "Fast Convolutional Sparse Coding", Technical Report, (May 2014)

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[TR.25] Z. Wang, L. Chen, S. Rathore, D. Shin, C. Fowlkes, "Geometric Pose Affordance : 3D Human Pose with Scene Constraints", (May 2019). arXiv:1905.07718

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[TR.31] Z. Li, A. Ravichandran, C. Fowlkes, M. Polito, R. Bhotika, S. Soatto "Representation Consolidation for Training Expert Students", Technical Report (July 2021), arXiv:2107.08039

Press Coverage

L. Flintoft, "Developmental networks in time and space", Nature Reviews Genetics 8, 88-89, Feb 2007

F. Frankel, "Expressing Genes", American Scientist, 95, p 69-71, Jan-Feb 2007

M. Philips, "Deciphering Development: Quantifying Gene Expression through Imaging", BioScience 57:648-652, September 2007

E. E. M. Furlong, "A Topographical Map of Spatiotemporal Patterns of Gene Expression", Developmental Cell, 14(5), p 639-640, May 2008

N. de Souza, "A map for fly explorers", Nature Methods, 5(6), p 466, June 2008

T. Burge, "A Real Science of Mind", New York Times, Opinionator, Dec. 19th, 2010

K. Khairy, P. Keller, "Reconstructing Embryonic Development", Genesis, 49(7), p 488-513, 2011

Invited 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, Int. 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, Febuary 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 Biomedical Imaging and Machine Learning Symposium, June 2018

"Active Testing", Caltech Vision Group, September 2018

"Mapping Neurons, Organs, and Animals", CVPR Bioimage Computing Workshop, June 2019

"Geometric Pose Affordance", IEEE Workshop on Analysis and Modeling of Faces and Gestures, June 2019

"Promises and Perils of Machine Learning in Biological Imaging", SoCal Biomedical Imaging and Machine Learning Symposium, October 2019

"Spatio-Temporal Attention for Adaptive Computation", Qualcomm AI Research, November 2019

"Geometric Context for Visual Scene Understanding", UCI IMBS Symposium, November 2019

PATENTS

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