

# Shawn Newsam

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## EDUCATION

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Ph.D. in Electrical and Computer Engineering, University of California, Santa Barbara, 2004.

M.S. in Electrical and Computer Engineering, University of California, Davis, 1996.

B.S. in Electrical Engineering & Computer Science, University of California, Berkeley, 1991.

## RESEARCH EXPERIENCE

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Professor of Electrical Engineering & Computer Science, School of Engineering, University of California, Merced, Jul 2020-present.

Associate Professor of Electrical Engineering & Computer Science, School of Engineering, University of California, Merced, Jul 2012-Jun 2020.

Assistant Professor of Electrical Engineering & Computer Science, School of Engineering, University of California, Merced, Jul 2005-Jun 2012.

Postdoctoral Fellow, Center for Applied Scientific Computing, Lawrence Livermore National Laboratory, Sep 2003-Jun 2005.

## RESEARCH INTERESTS

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Image processing, computer vision, pattern recognition, and applied machine learning with a focus on geospatial data analysis.

## AWARDS AND HONORS

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SIGSPATIAL 10-Year Impact Award for paper from 2010 conference whose value and prescience have become apparent over a long period of time, 2020.

National Science Foundation Faculty Early Career Development (CAREER) Award, 2012

Presidential Early Career Award for Scientists and Engineers (PECASE), 2007

Department of Energy (DOE) Early Career Scientist and Engineer Award, 2007

The Sapphire Data Mining Software Library I contributed to as a postdoc at LLNL received a 2006 R&D 100 award recognizing it as one of the top 100 industrial innovations worldwide

Lockheed-Martin Fellowship in Remote Sensing, 2001-2003

Nominated for Teaching Award for Outstanding Graduate Students, UC Davis, 1996

General Motors Scholar, UC Berkeley, 1988-1990

Dean's Honor List, UC Berkeley, 1986-1990

## **GRANTS**

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### **Major Awards**

\$262,428 (\$59,053 to UC Merced), "California Informatics for Equitable Disaster Response and Recovery," University of California Multicampus Research Programs and Initiatives (UC MRPI), Jan 2021-Dec 2022, PI: H. Burton (UCLA), Co-PIs: S. Newsam, A. Eldawy (UC Riverside), and M. Allaire (UC Irvine).

\$90,533, "AI for Earth Innovation Grant: Bird Species Classification for Biodiversity Conservation," Microsoft and Global Wildlife Conservation, Jan 2020-Jun 2021, Sole PI.

\$1,148,140 (\$76,214 to UC Merced), "Soundscapes to Landscapes (S2L): Monitoring Animal Biodiversity from Space Using Citizen Scientists," The National Aeronautics and Space Administration (NASA), Jul 2018-Jul 2023, PI: M Clark (CSU Sonoma), Co-PIs: S. Goetz (Northern Arizona University), L. Micheli (Pepperwood Preserve), S. Newsam, and L. Salas (Point Blue Conservation Science).

\$199,373, "EAGER: Exploratory Research on Deriving Flight Information from Drone Imagery for Safety Compliance," National Science Foundation (NSF), Award IIS-1747535, Jan 2018-Dec 2020, Sole PI.

\$265,854, "ABI Development: Forest3D - An Open Source Platform for Lidar Applications in Forestry," National Science Foundation (NSF), Award DBI-1356077, Sep 2014-Aug 2018, PI: Q. Guo, Co-PI: S. Newsam.

\$497,208, "CAREER: Social Multimedia as Volunteered Geographic Information: Crowdsourcing What-Is-Where on the Surface of the Earth Through Proximate Sensing," National Science Foundation (NSF), Award IIS-1150115, Jul 2012-Jun 2019, Sole PI.

\$647,841, "RUI: New Tools for Characterizing Protein Dynamics," National Science Foundation (NSF), Award DBI-0960480, Sep 2010-Aug 2015, PI: S. Newsam, Co-PIs: M. Colvin and A. Gopinathan.

\$396,684, "III: Small: RUI: Integrating Image and Non-Image Geospatial Data," National Science Foundation (NSF), Award IIS-091706, Aug 2009-Jul 2013, Sole PI.

\$250,000, Department of Energy (DOE) Early Career Scientist and Engineer Award, Oct 2007-Sep 2012, Sole PI.

\$472,500, "MRI: Acquisition of Robotic Hardware for Humanoid Research in Cognitive Science and Engineering," National Science Foundation (NSF), Award BCS-0821766, Sep 2008-Sep 2011, PI: S. Carpin, Co-PIs: M. Kallmann, T. Matlock, S. Newsam, and D. Noelle.

\$250,000, “MRI: Acquisition of Equipment to Establish a Cognitive Sensorium and Visualization Facility at UC Merced,” National Science Foundation (NSF), Award CNS-0723281, Jul 2007-Jul 2010, PI: M. Kallmann, Co-PIs: T. Matlock and S. Newsam.

### **Other Awards**

\$25,596, Oakridge National Laboratory contract, “Overhead Image Segmentation,” May 2020-Aug 2020, Sole PI.

\$6,000, REU Supplement to NSF IIS-1747535 “EAGER: Exploratory Research on Deriving Flight Information from Drone Imagery for Safety Compliance,” Jun 2019-Aug 2019, Sole PI.

\$2,518, “Acquisition of Low-Cost Particulate Sensors to Support Various Research Efforts on Monitoring Air Pollution and Studying Its Public Health Effects,” UC Merced Committee on Research Faculty Research Grant, Apr 2018-Jun 2019, Sole PI.

\$29,715, “ACM SIGSPATIAL Conference 2016: Student Activities and U.S.-Based Students Support,” National Science Foundation (NSF), Award IIS-1644662, Jul 2016-Jun 2017, Sole PI.

\$15,900, REU Supplement to NSF Award IIS-1150115 “CAREER: Social Multimedia as Volunteered Geographic Information: Crowdsourcing What-Is-Where on the Surface of the Earth Through Proximate Sensing,” May 2016-Aug 2016, Sole PI.

\$52,658, “Optimal Design of Smart Urban Crowd-Sensing,” Center for Information Technology Research in the Interest of Society, Apr 2014-Jun 2016, PI: S. Newsam, Co-PI: A. Pozdnukhov (UC Berkeley).

\$39,027, “Community-Based Air Pollution Informatics,” Development Impact Lab, Blum Center for Developing Economies, Feb 2014-Jan 2015, PI: S. Newsam, Co-PI: S. Rameriz.

\$50,000, “An EMR-Based, Probabilistic Clinical Support System for the Diagnosis and Treatment of Sepsis Patients,” Center for Information Technology Research in the Interest of Society, Jul 2012-Jun 2014, PI: S. Newsam, Co-PI: I. Tagkopoulos (UC Davis).

Cluster computing time, “New Computational Tools for Analyzing Protein Dynamics,” Center for Information Technology Research in the Interest of Society, May 2012-May 2013, Sole PI.

50K node-hours on Anton, a special-purpose supercomputer for molecular dynamics (MD), “Application of New Tools for Characterizing Protein Dynamics to Intrinsically Disordered and Natively Folding Proteins,” The National Resource for Biomedical Supercomputing (NRBSC), Apr 2011-Aug 2011. PI: M. Colvin, Co-PIs: S. Newsam and J. L. Phillips.

\$5,000, “Visibility Cameras for Monitoring Particulate Pollution,” UC Merced Graduate & Research Council Faculty Research Grant, Mar 2011-May 2013, Sole PI.

200K SUs of high-performance computing time, “New Computational Tools for Analyzing Protein Dynamics,” National Science Foundation (NSF) TeraGrid, Oct 2010-Oct 2011, Sole PI.

\$67,138, Atmospheric Aerosols and Health Graduate Fellowship, UC Toxic Substances Research and Teaching Program, Sep 2008-Aug 2010 (declined second year of funding from Sep 2009-Aug 2010), PI: L. Xie, Co-PI: S. Newsam.

\$5,493, “REU Supplement for MRI: Acquisition of Equipment to Establish a Cognitive Sensorium and Visualization Facility at UC Merced,” National Science Foundation (NSF), Amendment to CNS-0723281, Jun 2008-Aug 2008, PI: M. Kallmann, Co-PIs: T. Matlock and S. Newsam.

\$99,290, “Terrestrial Remote Sensing for Monitoring Atmospheric Particulates,” Center for Information Technology Research in the Interest of Society, Oct 2007-Sep 2008 (extended to Sep 2009), Sole PI.

\$2,095, “Image Processing and Computer Vision Techniques for Measuring Respiratory Burst in Alveolar Macrophages,” UC Merced Graduate & Research Council Faculty Research Grant, Jul 2007-Jun 2008, Sole PI.

\$14,200, “Cognitive Animation Workshop,” IUCRP – Industry University Cooperative Research Program, UC Discovery Grants Opportunity Award dig06-428, Mar 2007, funded workshop organized at Yosemite Park in 2008, PI: M. Kallmann, Co-PIs: T. Matlock and S. Newsam.

\$2,403, “Localized Texture Analysis of Electron Microscopy Imagery,” UC Merced Graduate & Research Council Faculty Research Grant, Jul 2006-Jun 2007, Sole PI.

\$5,435, “Purchase a Multi-Format Film Drum Scanner,” UC Merced Graduate & Research Council Shared Equipment Grant, Jul 2006-Jun 2007, PI: J. Choi, Co-PIs: S. Newsam and D. Ojcius.

\$7,200, “Purchase Optical Filter Wheels for Ratiometric Fluorescence Measurement in Living Cells,” UC Merced Graduate & Research Council Shared Equipment Grant, Jul 2006-Jun 2007, PI: W.-C. Chin, Co-PIs: J. Choi and S. Newsam.

\$1,500, NASA California Space Grant, 2003, Sole PI.

\$10,000 stipend plus \$41,172 in-kind in the form of high-resolution satellite imagery, Lockheed-Martin Fellowship in Remote Sensing, 2001-2003, Sole PI.

## PUBLICATIONS<sup>1</sup>

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### Refereed Journal Publications

[J17] P. Dias, Y. Tian, **S. Newsam**, A. Tsaris, J. Hinkle, and D. Lungu “Model assumptions and data characteristics: Impacts on domain adaptation in building segmentation,” *IEEE Transactions on Geoscience and Remote Sensing*, 60, pp. 1-18, 2022.

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<sup>1</sup> Co-author names underlined or in *italics* indicate graduate or undergraduate students directly under my supervision respectively.

- [J16] R. Zhang, **S. Newsam**, Z. Shao, X. Huang, J. Wang, and D. Li, “Multi-scale adversarial network for vehicle detection in UAV imagery,” *ISPRS Journal of Photogrammetry and Remote Sensing*, 180, pp. 283-295, 2021.
- [J15] D. Chai, **S. Newsam**, and J. Huang, “Aerial image semantic segmentation using DCNN predicted distance maps,” *ISPRS Journal of Photogrammetry and Remote Sensing*, 161, pp. 309-322, 2020.
- [J14] D. Chai, **S. Newsam**, H. K. Zhang, Y. Qiu, and J. Huang, “Cloud and cloud shadow detection in Landsat imagery based on deep convolutional neural networks,” *Remote Sensing of Environment*, 225, pp. 307-316, 2019.
- [J13] Y. Zhu, X. Deng, and **S. Newsam**, “Fine-grained land use classification at the city scale using ground-level images,” *IEEE Transactions on Multimedia*, 21(9), pp. 1825-1838, 2019.
- [J12] W. Zhou, **S. Newsam**, C. Li, and Z. Shao, “Patternnet: A benchmark dataset for performance evaluation of remote sensing image retrieval,” *ISPRS Journal of Photogrammetry and Remote Sensing*, 145, pp. 197-209, 2018.
- [J11] X. Deng, W. Li, X. Liu, Q. Guo, and **S. Newsam**, “One-class remote sensing classification: one-class vs. binary classifiers,” *International Journal of Remote Sensing*, 39(6), pp. 1890-1910, 2018.
- [J10] W. Zhou, **S. Newsam**, C. Li, and Z. Shao, “Learning low dimensional convolutional neural networks for high-resolution remote sensing image retrieval,” *Remote Sensing*, 9(5), 20 pages, 2017.
- [J9] D. Leung and **S. Newsam**, “Land cover classification using geo-referenced photos,” *Multimedia Tools and Applications*, 74, pp. 11741-11761, 2015.
- [J8] N. Graves and **S. Newsam**, “Camera-based visibility estimation: Incorporating multiple regions and unlabeled observations,” *Ecological Informatics*, 23, pp. 62-68, 2014.
- [J7] Y. Yang and **S. Newsam**, “Geographic image retrieval using local invariant features,” *IEEE Transactions on Geoscience and Remote Sensing*, 51:2, pp. 818-832, 2013.
- [J6] J. L. Phillips, M. E. Colvin, and **S. Newsam**, “Validating clustering of molecular dynamics simulations using polymer models,” *BMC Bioinformatics*, 12:445, 23 pages, 2011.
- [J5] **S. Newsam**, “Crowdsourcing what is where: Community-contributed photos as volunteered geographic information,” *IEEE Multimedia: Special Issue on Mining Community-Contributed Multimedia*, 17(4), pp. 36-45, 2010.
- [J4] J. Yamada, J. L. Phillips, S. Patel, G. Goldfien, A. Calestagne-Morelli, H. Huang, R. Reza, J. Acheson, V. V. Krishnan, **S. Newsam**, A. Gopinathan, E. Y. Lau, M. E. Colvin, V. N. Uversky, and M. F. Rexach, “A bimodal distribution of two distinct categories of intrinsically-disordered structures with separate functions in FG nucleoporins,” *Molecular and Cellular Proteomics*, 9(10), pp. 2205-2224, 2010.

- [J3] **S. Newsam**, L. Wang, S. Bhagavathy, and B. S. Manjunath, "Using texture to analyze and manage large collections of remote sensed image and video data," *Journal of Applied Optics: Information Processing*, 43(2), pp. 210-217, 2004.
- [J2] **S. Newsam**, S. Bhagavathy, L. Fonseca, C. Kenney, and B. S. Manjunath, "Object based representations of spatial images," *Acta Astronautica*, 48(5-12), pp. 567-577, 2001.
- [J1] P. Wu, B. S. Manjunath, **S. Newsam**, and H. D. Shin, "A texture descriptor for browsing and similarity retrieval," *Journal of Signal Processing: Image Communication*, 16(1-2), pp. 33-43, 2000.

### Refereed Book Chapters

- [B2] **S. Newsam** and D. Leung, "Georeferenced social multimedia as volunteered geographic information," in *CyberGIS: Fostering a New Wave of Geospatial Discovery and Innovation*, GeoJournal Library, vol 118, pp. 225-246, Eds. S. Wang and M. Goodchild, Springer, Dordrecht, Netherlands, 2018.
- [B1] B. S. Manjunath, G. M. Haley, W. Y. Ma, and **S. Newsam**, "Multiband techniques for texture classification and segmentation," in *Handbook of Image and Video Processing*, Second Edition, pp. 455-470, Ed. A. Bovik, Academic Press, 2005.

### Refereed and Invited Publications in Proceedings of Conferences

- [C51] X. Deng, D. Sun, **S. Newsam**, and P. Wang, "DistPro: Searching a fast knowledge distillation process via meta optimization," *European Conference on Computer Vision (ECCV)*, 17 pages, 2022.
- [C50] S. Baligar and **S. Newsam**, "CoSSD - An end-to-end framework for multi-instance source separation and detection," *European Signal Processing Conference (EUSIPCO)*, 5 pages, 2022.
- [C49] X. Deng, P. Wang, X. Lian, and **S. Newsam**, "NightLab: A dual-level architecture with hardness detection for segmentation at night," *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 11 pages, 2022.
- [C48] H. Liang and **S. Newsam**, "A robust framework to estimate the spatial resolution of overhead images using off-the-shelf object detectors," *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, 4 pages, 2021.
- [C47] X. Deng, Y. Zhu, Y. Tian, and **S. Newsam**, "Scale aware adaptation for land-cover classification in remote sensing imagery," *IEEE Winter Conference on Applications of Computer Vision (WACV)*, 9 pages, 2021.
- [C46] X. Deng, Y. Tian, and **S. Newsam**, "Generalizing deep models for overhead image segmentation through Getis-Ord  $G_i^*$  pooling," *International Conference on Geographic Information Science (GIScience)*, 14 pages, 2021.

- [C45] Y. Tian, X. Deng, Y. Zhu, and **S. Newsam**, “Cross-time and orientation-invariant overhead image geolocalization using deep local features,” *IEEE Winter Conference on Applications of Computer Vision (WACV)*, 9 pages, 2020.
- [C44] Y. Zhu, K. Sapra, F. Reda, K. Shih, **S. Newsam**, A. Tao, and B. Catanzaro, “Improving semantic segmentation via video propagation and label relaxation,” *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 10 pages, 2019. (Oral paper.)
- [C43] H. Liang and **S. Newsam**, “Estimating the spatial resolution of overhead imagery using convolutional neural networks” *IEEE International Conference on Image Processing (ICIP)*, 5 pages, 2019.
- [C42] Y. Zhu, and **S. Newsam**, “Random temporal skipping for multirate video analysis,” *Asian Conference on Computer Vision (ACCV)*, 16 pages, 2018.
- [C41] Y. Zhu, J. Xue, and **S. Newsam**, “Gated transfer network for transfer learning,” *Asian Conference on Computer Vision (ACCV)*, 16 pages, 2018.
- [C40] Y. Zhu, Z. Lan, **S. Newsam**, and A. Hauptmann, “Hidden two-stream convolutional networks for action recognition,” *Asian Conference on Computer Vision (ACCV)*, 16 pages, 2018.
- [C39] X. Deng, Y. Zhu, and **S. Newsam**, “What is it like down there? Generating dense ground-level views and image features from overhead imagery using conditional generative adversarial networks,” *ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL GIS)*, 10 pages, 2018.
- [C38] X. Deng, Y. Zhu, and **S. Newsam**, “Spatial morphing kernel regression for feature interpolation,” *IEEE International Conference on Image Processing (ICIP)*, 5 pages, 2018.
- [C37] Y. Zhu and **S. Newsam**, “Learning optical flow via dilated networks and occlusion reasoning,” *IEEE International Conference on Image Processing (ICIP)*, 5 pages, 2018.
- [C36] Y. Zhu, Y. Long, Y. Guan, **S. Newsam**, and L. Shao, “Towards universal representation for unseen action recognition,” *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 10 pages, 2018.
- [C35] Y. Zhu, S. Liu, and **S. Newsam**, “Large-scale mapping of human activity using geo-tagged videos,” *ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL GIS)*, 4 pages, 2017.
- [C34] Yi. Zhu and **S. Newsam**, “DenseNet for dense flow,” *IEEE International Conference on Image Processing (ICIP)*, 5 pages, 2017.
- [C33] Yi. Zhu and **S. Newsam**, “Efficient action detection in untrimmed videos via multi-task learning,” *IEEE Winter Conference on Applications of Computer Vision (WACV)*, 10 pages, 2017.

- [C32] Y. Zhu and **S. Newsam**, “Spatio-temporal sentiment hotspot detection using geotagged photos,” *ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL GIS)*, 4 pages, 2016. (Best fast forward presentation runner up.)
- [C31] M. Divecha and **S. Newsam**, “Large-scale geolocalization of overhead imagery,” *ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL GIS)*, 9 pages, 2016.
- [C30] Y. Zhu and **S. Newsam**, “Land use classification using convolutional neural networks applied to ground-level images,” *ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL GIS)*, 4 pages, 2015. (Winner best poster award.)
- [C29] Y. Yang and **S. Newsam**, “Semi-supervised learning of geospatial objects through multi-modal data integration,” *IAPR/IEEE International Conference on Pattern Recognition (ICPR)*, pp. 4062-4067, 2014.
- [C28] Y. Yang and **S. Newsam**, “Estimating the spatial extents of geospatial objects using hierarchical models,” *IEEE Workshop on Applications of Computer Vision (WACV)*, pp. 305-312, 2012.
- [C27] Y. Yang and **S. Newsam**, “Spatial pyramid co-occurrence for image classification,” *IEEE International Conference on Computer Vision (ICCV)*, pp. 1465-1472, 2011.
- [C26] **S. Newsam**, *B. Edmunds*, and *A. Pierce*, “PedSeg: GPS tracks as priors for overhead image segmentation (demo paper),” *ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL GIS)*, pp. 533-536, 2011.
- [C25] N. Graves and **S. Newsam**, “Using visibility cameras to estimate atmospheric light extinction,” *IEEE Workshop on Applications of Computer Vision (WACV)*, pp. 577-584, 2011.
- [C24] Y. Yang and **S. Newsam**, “Bag-of-visual-words and spatial extensions for land-use classification,” *ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL GIS)*, pp. 270-279, 2010.
- [C23] **S. Newsam**, D. Leung, *O. Caballero*, *J. Floreza*, and *J. Pulido*, “CBGIR: Content-based geographic image retrieval (demo paper),” *ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL GIS)*, pp. 526-527, 2010.
- [C22] L. Xie, *M. Á. Carreira-Perpiñán*, and **S. Newsam**, “Semi-supervised regression with temporal image sequences,” *IEEE International Conference on Image Processing (ICIP)*, pp. 2637-2640, 2010.
- [C21] D. Leung and **S. Newsam**, “Proximate sensing: Inferring what-is-where from georeferenced photo collections,” *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, pp. 2955-2962, 2010. (Oral paper.)

- [C20] L. Xie, A. Chiu, and **S. Newsam**, “Estimating atmospheric visibility using general purpose-cameras,” *International Symposium on Visual Computing (ISVC)*, Lecture Notes in Computer Science (LNCS), Vol. 5359, pp. 356-367, 2008.
- [C19] **S. Newsam** and Y. Yang, “Integrating gazetteers and remote sensed imagery,” *ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL GIS)*, pp. 220-229, 2008.
- [C18] Y. Yang and **S. Newsam**, “Comparing SIFT descriptors and Gabor texture features for classification of remote sensed imagery,” *IEEE International Conference on Image Processing (ICIP)*, pp. 1852-1855, 2008.
- [C17] **S. Newsam** and Y. Yang, “Comparing global and interest point descriptors for similarity retrieval in remote sensed imagery,” *ACM International Conference on Advances in Geographic Information Systems (ACM GIS)*, pp. 59-66, 2007.
- [C16] **S. Newsam** and Y. Yang, “Geographic image retrieval using interest point descriptors,” *International Symposium on Visual Computing (ISVC)*, Lecture Notes in Computer Science (LNCS), Vol. 4842, pp. 275-286, 2007.
- [C15] J. Wright, S. Carpin, A. Cerpa, G. Gavilan, M. Kallmann, K. Laird, **S. Newsam**, and D. Noelle, “Collaboratory: An open source teaching and learning facility for computer science and engineering education”, *International Conference on Frontiers in Education: Computer Science and Computer Engineering (FECS) - part of World Congress in Computer Science, Computer Engineering, & Applied Computing (WORLDCOMP)*, pp. 368-373, 2007.
- [C14] **S. Newsam**, “Hierarchical texture motifs,” *SPIE International Symposium on Electronic Imaging - Image Processing: Algorithms and Systems VI*, Vol. 6497, 9 pages, 2007.
- [C13] **S. Newsam**, E. Pernice, J. Jasinski, and V. Leppert, “Using transmission electron microscopy to quantify the spatial distribution of nanoparticles suspended in a film,” *SPIE International Symposium on Electronic Imaging - Computational Imaging V*, Vol. 6498, 12 pages, 2007.
- [C12] **S. Newsam** and C. Kamath, “Comparing shape and texture features for pattern recognition in simulation data,” *SPIE International Symposium on Electronic Imaging, Image Processing: Algorithms and Systems IV*, Vol. 5672, pp. 106-117, 2005.
- [C11] C. Kamath, A. Gezahegne, **S. Newsam**, and M. Roberts, “Salient points for tracking moving objects in video,” *SPIE International Symposium on Electronic Imaging, Image and Video Communications and Processing*, Vol. 5685, pp. 442-453, 2005.
- [C10] E. Cantu-Paz, **S. Newsam**, and C. Kamath, “Feature selection in scientific applications,” *ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*, pp. 788-793, 2004.
- [C9] **S. Newsam** and C. Kamath, “Retrieval using texture features in high resolution multi-spectral satellite imagery,” *SPIE Defense and Security Symposium: Data Mining and Knowledge Discovery: Theory, Tools, and Technology VI*, Vol. 5433, pp. 21-32, 2004.

- [C8] **S. Newsam**, J. Tesic, L. Wang, and B. S. Manjunath, “Issues in managing image and video data,” *SPIE International Symposium on Electronic Imaging, Storage and Retrieval Methods and Applications for Multimedia*, Vol. 5307, pp. 280-291, 2004.
- [C7] **S. Newsam**, S. Bhagavathy, and B. S. Manjunath, “Object localization using texture motifs and Markov random fields,” *IEEE International Conference on Image Processing (ICIP)*, Vol. 2, pp. 1049-1052, 2003.
- [C6] **S. Newsam**, L. Wang, S. Bhagavathy, and B. S. Manjunath, “Using texture to annotate remote sensed datasets” *International Symposium on Image and Signal Processing and Analysis, Special Session on Texture Analysis and Synthesis*, Vol. 1, pp. 72-77, 2003.
- [C5] **S. Newsam**, S. Bhagavathy, and B. S. Manjunath, “Modeling object classes in aerial images using hidden Markov models,” *IEEE International Conference on Image Processing (ICIP)*, Vol. 1, pp. 860-863, 2002.
- [C4] S. Bhagavathy, **S. Newsam**, and B. S. Manjunath, “Modeling object classes in aerial images using texture motifs,” *IAPR/IEEE International Conference on Pattern Recognition (ICPR)*, Vol. 1, pp. 981-984, 2002.
- [C3] J. Tesic, **S. Newsam**, and B. S. Manjunath, “Scalable spatial event representation,” *IEEE International Conference on Multimedia and Expo (ICME)*, Vol. 2, pp. 229-232, 2002.
- [C2] **S. Newsam**, B. Sumengen, and B. S. Manjunath, “Category-based image retrieval,” *IEEE International Conference on Image Processing (ICIP), Special Session on Multimedia Indexing, Browsing and Retrieval*, Vol. 3, pp. 596-599, 2001.
- [C1] **S. Newsam**, S. Bhagavathy, L. Fonseca, C. Kenney, and B. S. Manjunath, “Object based representations of spatial images,” *International Aeronautical Congress of the International Astronautical Federation*, 11 pages, 2000.

#### Refereed and Invited Publications in Proceedings of Workshops

- [W18] X. Deng, Y. Zhu, Y. Tian, and **S. Newsam** “AutoAdapt: Automated segmentation network search for unsupervised domain adaptation,” *IEEE Conference on Computer Vision and Pattern Recognition (CVPR): Workshop on Neural Architecture Search (NAS)*, 12 pages, 2021.
- [W17] H. Liang and **S. Newsam**, “Estimating the spatial resolution of very high-resolution overhead imagery,” *ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL GIS): Workshop on AI for Geographic Knowledge Discovery (GeoAI)*, 4 pages, 2019.
- [W16] J. Phillips, M. Colvin, and **S. Newsam**, “Dimensionality estimation of protein dynamics using polymer models,” *ACM Conference on Bioinformatics, Computational Biology, and Health Informatics (ACM BCB): Computational Structural Bioinformatics Workshop (CSBW)*, 6 pages, 2018.

- [W15] Y. Zhu, Z. Lan, **S. Newsam**, and A. Hauptmann “Guided optical flow learning,” *IEEE Conference on Computer Vision and Pattern Recognition (CVPR): Workshop on Brave New Motion Representations (BNMR)*, 5 pages, 2017.
- [W14] Z. Lan, Y. Zhu, A. Hauptmann, and **S. Newsam** “Deep local video feature for action recognition,” *IEEE Conference on Computer Vision and Pattern Recognition (CVPR): Workshop on Open Domain Action Recognition (ODAR)*, 7 pages, 2017.
- [W13] X. Deng and **S. Newsam**, “Quantitative comparison of open-source data for fine-grain mapping of land use,” *ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL GIS): Workshop Smart Cities and Urban Analytics*, 8 pages, 2017.
- [W12] Y. Zhu and **S. Newsam**, “Depth2Action: Exploring embedded depth for large-scale action recognition,” *European Conference on Computer Vision (ECCV): Workshop on Web-Scale Vision and Social Media (VSM)*, pp. 668-684, 2016.
- [W11] D. Leung and **S. Newsam**, “Can off-the-shelf object detectors be used to extract geographic information from geo-referenced social multimedia?” *ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL GIS): Workshop on Location Based Social Networks*, pp. 12-15, 2012.
- [W10] N. Graves and **S. Newsam**, “Visibility cameras: Where and how to look,” *ACM International Conference on Multimedia: Workshop on Multimedia Analysis for Ecological Data*, pp. 7-12, 2012.
- [W9] D. Leung and **S. Newsam**, “Exploring geotagged images for land-use classification,” *ACM International Conference on Multimedia: Workshop on Geotagging and Its Applications in Multimedia*, pp. 3-8, 2012.
- [W8] L. Xie and **S. Newsam**, “IM2MAP: Deriving maps from georeferenced community contributed photo collections,” *ACM International Conference on Multimedia: Workshop on Social Media*, pp. 29-34, 2011.
- [W7] D. Leung and **S. Newsam**, “Proximate sensing using georeferenced community contributed photo collections,” *ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL GIS): Workshop on Location Based Social Networks*, pp. 57-64, 2009.
- [W6] J. L. Phillips, M. E. Colvin, E. Y. Lau, and **S. Newsam**, “Analyzing dynamical simulations of intrinsically disordered proteins using spectral clustering,” *IEEE International Conference on Bioinformatics and Biomedicine: Workshop on Computational Structural Bioinformatics*, pp. 17-24, 2008.
- [W5] **S. Newsam**, K. Novini, B. Rich, A. Rinna, and H. J. Forman, “Measuring respiratory burst in alveolar macrophages,” *International Workshop on Multiscale Biological Imaging, Data Mining & Informatics*, pp. 69-70, 2006.

- [W4] **S. Newsam**, “Seeing and reading red: Hue and color-word correlation in images and attendant text on the WWW,” *ACM SIGKDD International Conference on Knowledge Discovery and Data Mining: International Workshop on Multimedia Data Mining*, pp. 101-106, 2005.
- [W3] **S. Newsam** and B. S. Manjunath, “Normalized texture motifs and their application to statistical object modeling,” *IEEE Conference on Computer Vision and Pattern Recognition: Workshop on Perceptual Organization in Computer Vision*, pp. 45-52, 2004.
- [W2] J. Tesic, **S. Newsam**, and B. S. Manjunath, “Mining image datasets using perceptual association rules,” *SIAM International Conference on Data Mining, Workshop on Mining Scientific and Engineering Datasets*, pp. 71-77, 2003.
- [W1] P. Wu, B. S. Manjunath, **S. Newsam**, and H. D. Shin, “A texture descriptor for image retrieval and browsing,” *IEEE Conference on Computer Vision and Pattern Recognition: Workshop on Content-Based Access of Image and Video Libraries*, pp. 3-7, 1999.

### Published Abstracts

- [A16] M. Clark, L. Salas, S. Goetz, P. Burns, S. Hancock, and **S. Newsam**, “Monitoring avian diversity with bioacoustics analysis, remote sensing and species distribution modeling,” *AGU Fall Meeting Abstracts*, 2021.
- [A15] **S. Newsam**, “Deep learning for geographic knowledge discovery in complex spatial data,” *AAG Annual Meeting: GeoAI and Deep Learning Symposium: Deep Learning in Geography*, 2019.
- [A14] **S. Newsam**, Y. Zhu, and X. Deng, “Geographic knowledge discovery using deep learning applied to ground-level images and videos,” *AAG Annual Meeting: Artificial Intelligence and Deep Learning Symposium: Deep Learning in Geography*, 2018.
- [A13] T. G. Connolly, D. Ando, **S. Newsam**, A. Gopinathan, and M. E. Colvin, “Universal metrics of interstructure distance for flexible and intrinsically disordered proteins,” *The 60th Annual Meeting of the Biophysical Society*, 2016.
- [A12] T. G. Connolly, D. Ando, R. L. Wang, A. Gopinathan, **S. Newsam**, M. E. Colvin, “Identifying local regions of order and disorder in FG-nucleoporins and partially disordered proteins using molecular dynamics simulations,” *The 58th Annual Meeting of the Biophysical Society*, 2014.
- [A11] R. L. Wang, T. G. Connolly, J. L. Phillips, A. V. Miguel, A. Gopinathan, **S. Newsam**, M. E. Colvin, “Comparison of metrics of inter-structure distance when applied to molecular dynamics simulations of intrinsically disordered proteins,” *The 58th Annual Meeting of the Biophysical Society*, 2014.
- [A10] D. Leung and **S. Newsam**, “Proximate sensing: Geographic knowledge discovery in community-contributed photo collections,” *AAG Annual Meeting: Knowledge Discovery in Cyberspace and Social Media*, 2013.

- [A9] **S. Newsam**, “Georeferenced social multimedia as volunteered geographic information,” *CyberGIS'12: The First International Conference on Space, Time, and CyberGIS*, 2012.
- [A8] **S. Newsam** and Y. Yang, “Multi-scale object models based on local invariant features with application to spatial extent estimation,” *International Conference on Geographic Information Science (GIScience): Workshop on Geographic Object Based Multi-Scale Analysis*, 2012.
- [A7] J. L. Phillips, A. Gopinathan, **S. Newsam**, and M. E. Colvin, “Dimensionality estimation of disordered protein dynamics,” *The 56th Annual Meeting of the Biophysical Society*, 2012.
- [A6] M. Rexach, M. E. Colvin, A. Gopinathan, V. V. Krishnan, E. Y. Lau, **S. Newsam**, J. L. Phillips, V. N. Uversky, and J. Yamada, “Sorting with disorder at nuclear pores,” *The 56th Annual Meeting of the Biophysical Society*, 2012.
- [A5] J. L. Phillips, E. Y. Lau, **S. Newsam**, and M. E. Colvin, “Probing the conformation landscape of the unfolded state: Do disordered and unfolded dynamics differ?” *The 55th Annual Meeting of the Biophysical Society*, 2011. (Selected for oral presentation during Platform Session)
- [A4] J. L. Phillips, E. Y. Lau, V. V. Krishnan, M. Rexach, **S. Newsam**, and M. E. Colvin, “Metric scaling for dimensionality reduction of disordered protein dynamics,” *The 54th Annual Meeting of the Biophysical Society*, 2010. (My Ph.D. student Joshua Phillips received a Research Achievement Award for this poster presentation)
- [A3] J. L. Phillips, E. Y. Lau, V. V. Krishnan, M. Rexach, **S. Newsam**, and M. E. Colvin, “Dynamics analysis of unstructured FG-Nucleoporins” *The 23rd Annual Symposium of the Protein Society*, 2009. (My Ph.D. student Joshua Phillips received a Best Student Poster Award for this poster presentation)
- [A2] J. L. Phillips, E. Y. Lau, V. V. Krishnan, M. Rexach, **S. Newsam**, and M. E. Colvin, “Characterizing intrinsically disordered FG-Nucleoporins using molecular dynamics,” *The 22nd Annual Symposium of the Protein Society*, 2008. (Poster presentation)
- [A1] **S. Newsam**, E. Cantu-Paz, and C. Kamath, “Texture feature selection for retrieval and classification of multi-spectral remote sensed imagery,” *Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting, Workshop on Data Mining and Predictive Modeling for the Earth Sciences and Earth Systems Engineering*, 2004. (Oral presentation)

#### Other Refereed Works

- [R1] **S. Newsam**, “Visual spatial search,” *Spatial Search Specialist Workshop hosted by spatial@ucsb*, 2014. (White paper)

#### Other Non-Refereed Works

- [O14] S. Gao, **S. Newsam**, L. Zhao, D. Lunga, Y. Hu, B. Martins, X. Zhou, and F. Chen, “GeoAI 2019 workshop report,” *SIGSPATIAL Special*, 11(3), 2 pages, 2020.

- [O13] Y. Hu, S. Gao, D. Lunga, W. Li, **S. Newsam**, and B. Bhaduri, “GeoAI at ACM SIGSPATIAL: progress, challenges, and future directions,” *SIGSPATIAL Special*, 11(2), 11 pages, 2019.
- [O12] D. Lunga, H. Alemohammad, Y. Liu, **S. Newsam**, F. Pacifici, H. Santos-Villalobos, E. Shook, R. Stewart, S. Voisin, L. Yang, and B. Bhaduri, “The trillion pixel GeoAI challenge workshop,” *Workshop Report*, 2019.
- [O11] D. Leung and **S. Newsam**, “Proximate sensing: Geographic knowledge discovery in community-contributed photo collections,” *The Bay Area Vision Meeting (BAVM)*, 2012. (Poster presentation)
- [O10] D. Leung and **S. Newsam**, “Proximate sensing: Community contributed photographs as volunteered geographic information,” *The Bay Area Vision Meeting (BAVM)*, 2010. (Poster presentation)
- [O9] Y. Yang and **S. Newsam**, “Remote sensed image retrieval and classification using local descriptors,” *The Bay Area Vision Meeting (BAVM)*, 2010. (Poster presentation)
- [O8] L. Xie and **S. Newsam**, “Estimating atmospheric visibility using general-purpose cameras,” *UC Toxic Substances Research & Teaching Program Symposium*, 2009. (Poster presentation)
- [O7] **S. Newsam**, “Comparing shape and texture features for pattern recognition in simulation data,” *Center for Advanced Signal and Image Sciences (CASIS) Workshop*, Lawrence Livermore National Laboratory, UCRL-ABS-207325, 2004. (Oral presentation)
- [O6] E. Cantu-Paz, **S. Newsam**, and C. Kamath, “Feature selection in scientific applications,” *Center for Advanced Signal and Image Sciences (CASIS) Workshop*, Lawrence Livermore National Laboratory, UCRL-ABS-207635, 2004. (Oral presentation)
- [O5] R. White, **S. Newsam**, and C. Kamath, “Matching shape using local descriptors,” *Lawrence Livermore National Laboratory Summer Student Research Symposium*, UCRL-POST-205648, 2003. (Poster presentation)
- [O4] **S. Newsam**, “Texture features for image retrieval,” *Center for Advanced Signal and Image Sciences (CASIS) Workshop*, Lawrence Livermore National Laboratory, UCRL-ABS-200349, 2003. (Poster presentation)
- [O3] **S. Newsam**, “Exploiting implicit spatial relationships in remote sensed imagery to help bridge the semantic divide,” *National Center for Geographic Information and Analysis (NCGIA) Japan-US Workshop on Annotation and Resource Discovery of Geographic Image Data*, 2003. (Oral presentation)
- [O2] **S. Newsam**, J. Tesic, L. Wang, and B. S. Manjunath, “Mining images and video,” *Center for Discrete Mathematics and Theoretical Computer Science (DIMACS) Workshop on Video Mining*, 2002. (Oral presentation)

- [O1] J. Tesic, **S. Newsam**, and B. S. Manjunath, “Challenges in mining large image datasets,” *The Institute for Pure and Applied Mathematics (IPAM), Mathematical Challenges in Scientific Data Mining*, 2002. (Poster presentation)

### Theses

- [T2] “Texture motifs in remote sensed imagery,” Ph.D. Dissertation, University of California at Santa Barbara, Mar 2004. Supervisor: Prof. B. S. Manjunath.
- [T1] “Successive still image transmission based on focus of attention,” M.S. Thesis, University of California at Davis, Jun 1996. Supervisor: Prof. T. R. Reed.

### PATENTS AND STANDARDS

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- M. P. Meyer, M. Barlow, and **S. Newsam**, patent application, “High throughput cell assays,” 12/101,104, Regular, United States, submitted Apr 2008.
- M. P. Meyer, M. Barlow, **S. Newsam**, patent application, “Methods to identify clinically relevant microorganisms and effective antimicrobial therapies,” 61/018,870, Provisional, United States, submitted Jan 2008.
- H. Shin, B. S. Manjunath, B. Sumengen, and **S. Newsam**, patent application, “Database building method for multimedia contents,” 10/419,803, Regular, United States, submitted Apr 2003.
- MPEG 7 Multimedia Content Description Interface (ISO/IEC standard). Participated in and contributed to the standardization of the Homogeneous Texture and Texture Browsing Descriptors, 1998-2002.

### RESEARCH SUPERVISION

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#### Ph.D. Dissertation Committee Chair

- Shrishail Baligar, UC Merced, expected graduation Spring 2025.
- Haolin Liang, UC Merced, expected graduation Spring 2024.
- Yuxin Tian, UC Merced, expected graduation Spring 2023.
- Xueqing Deng, UC Merced, graduated Fall 2021.
- Yi Zhu, UC Merced, graduated Spring 2019.
- Daniel Leung, UC Merced, graduated Summer 2013.
- Yi Yang, UC Merced, graduated Fall 2012.
- Joshua Phillips, UC Merced, graduated Summer 2012.  
(Joshua was co-advised with Prof. Michael Colvin)

#### Ph.D. Dissertation Committee Member

- Maryam Khazaei Pool, UC Merced, expected graduation Spring 2025, advisor: Marcelo Kallmann.
- Miaomiao Liu, UC Merced, expected graduation Spring 2024, advisor: Prof. Wan Du.
- Zhixun He, UC Merced, expected graduation Spring 2024, advisor: Prof. Mukesh Singhal.
- Yi-Wen Chen, UC Merced, expected graduation Spring 2024, advisor: Prof. Ming-Hsuan Yang.
- Hsin-Ping Huang, UC Merced, expected graduation Spring 2024, advisor: Prof. Ming-Hsuan Yang.
- Tiantian Wang, UC Merced, expected graduation Spring 2023, advisor: Prof. Ming-Hsuan Yang.
- Ritesh Sharma, UC Merced, expected graduation Fall 2022, advisor: Marcelo Kallmann.

Taihong Xiao, UC Merced, expected graduation Fall 2022, advisor: Prof. Ming-Hsuan Yang.  
Laxmi Pandey, UC Merced, expected graduation Summer 2022, advisor: Prof. Ahmed Arif.  
Suryabhan Singh Hada, UC Merced, graduated Summer 2022, advisor: Pr. Miguel Carreira-Perpiñán.  
Wenqian Dong, UC Merced, graduated Spring 2022, advisor: Prof. Dong Li.  
Mahshid Montazer Qaem, UC Merced, graduated Summer 2021, advisor: Prof. Sungjin Im.  
Yujing Ma, UC Merced, graduated Summer 2021, advisor: Prof. Florin Rusu.  
Mohammad Ebrahimpour, graduated Summer 2020, advisor: Prof. David Noelle.  
Chun-Han Yao, UC Merced, expected graduation Fall 2023, advisor: Prof. Ming-Hsuan Yang.  
Xueting Li, UC Merced, graduated Fall 2021, advisor: Prof. Ming-Hsuan Yang.  
Hung-Yu Tseng, UC Merced, graduated Spring 2021, advisor: Prof. Ming-Hsuan Yang.  
Wei-Chih Hung, UC Merced, graduated Spring 2020, advisor: Prof. Ming-Hsuan Yang.  
Hsin-Ying Lee, UC Merced, graduated Spring 2020, advisor: Prof. Ming-Hsuan Yang.  
Wei-Sheng Lai, UC Merced, graduated Spring 2019, advisor: Prof. Ming-Hsuan Yang.  
Yijun Li, UC Merced, graduated Spring 2019, advisor: Prof. Ming-Hsuan Yang.  
Jacob Rafati, UC Merced, graduated Spring 2019, advisor: Prof. David Noelle.  
Ramin Raziperchikolaei, UC Merced, graduated Spring 2019, advisor: Prof. Paul Maglio.  
Christina Ma, UC Merced, graduated Summer 2018, advisor: Prof. Qinghua Guo.  
Tim Connolly, UC Merced, graduated Spring 2018, advisor: Prof. Michael Colvin.  
Sifei Liu, UC Merced, graduated Fall 2017, advisor: Prof. Ming-Hsuan Yang.  
Yi-Hsuan Tsai, UC Merced, graduated Summer 2017, advisor: Prof. Ming-Hsuan Yang.  
Angelo Kyrilov, UC Merced, graduated Spring 2017, advisor: Prof. David Noelle.  
Brandon Stark, UC Merced, graduated Spring 2017, advisor: Prof. YangQuan Chen  
Yanjun Su, UC Merced, graduated Spring 2017, advisor: Prof. Qinghua Guo.  
Zhe Hu, UC Merced, graduated Summer 2015, advisor: Prof. Ming-Hsuan Yang.  
Chih-Yuan Yang, UC Merced, graduated Spring 2015, advisor: Prof. Ming-Hsuan Yang.  
Carlo Camporesi, UC Merced, graduated Spring 2015, advisor: Prof. Marcelo Kallmann.  
Christiane Pailo, UC Merced, graduated Fall 2013, advisor: Prof. Miriam Barlow.  
Wenkai Li, UC Merced, graduated Spring 2013, advisor: Prof. Qinghua Guo.  
Oktar Ozgen, UC Merced, graduated Spring 2013, advisor: Prof. Marcelo Kallmann.

#### **M.S. Committee Chair**

Jianan Chen, UC Merced, expected graduation Spring 2023.  
Akshay Bhatia, UC Merced, expected graduation Spring 2023.  
Jiaming Lin, UC Merced, graduated Spring 2021.  
Mehul Divecha, UC Merced, graduated Summer 2019.  
Ying Ding, UC Merced, graduated Fall 2017.  
Tapish Rathore, UC Merced, graduated Fall 2017.  
Atahan Eryol, UC Merced, graduated Fall 2015.  
Nathan Graves, UC Merced, graduated Fall 2011.  
Ling Xie, UC Merced, graduated Fall 2011.

#### **M.S. Committee Member**

Yang Liu, UC Merced, graduated Fall 2021, advisor: Prof. Alberto Cerpa.  
Puneet Soni, UC Merced, graduated Spring 2021, advisor: Prof. Mukesh Singhal.  
Neelam Sinha, UC Merced, graduated Fall 2020, advisor: Prof. Dong Li.  
Rakesh Jasti, UC Merced, graduated Fall 2020, advisor: Prof. Ming-Hsuan Yang.

Yu-Ding Lu, UC Merced, graduated Fall 2020, advisor: Prof. Ming-Hsuan Yang.  
Yu-Ting Chang, UC Merced, graduated Summer 2020, advisor: Prof. Ming-Hsuan Yang.  
Prashant Mishra, UC Merced, graduated Spring 2020, advisor: Prof. Mukesh Singhal.  
Monwen Shen, UC Merced, graduated Fall 2019, advisor: Prof. Wan Du.  
Michael Sanfilippo, UC Merced, graduated Fall 2019, advisor: Prof. Ming-Hsuan Yang.  
Nakul Agarwal, UC Merced, graduated Summer 2019, advisor: Prof. Ming-Hsuan Yang.  
Yuseke Niiro, UC Merced, graduated Spring 2019, advisor: Prof. Marcelo Kallmann.  
Han-Kai Hsu, UC Merced, graduated Fall 2018, advisor: Prof. Ming-Hsuan Yang.  
Andres Torres Garcia, UC Merced, graduated Fall 2018, advisor: Prof. Stefano Carpin.  
Jaspal Singh, UC Merced, graduated Fall 2018, advisor: Prof. Florin Rusu.  
Narjes Tahaei, UC Merced, graduated Summer 2018, advisor: Prof. David Noelle.  
Lorenzo Booth, UC Merced, graduated Spring 2018, advisor: Prof. Josh Viers.  
Hanbin Tao, UC Merced, graduated Summer 2017, advisor: Prof. Marcelo Kallmann.  
Simon Sarfar, UC Merced, graduated Fall 2014, advisor: Prof. Ming-Hsuan Yang.  
Gary Phelps, UC Merced, graduated Fall 2010, advisor: Prof. Qinghua Guo.

### **Undergraduate Research Supervision**

Kumaran Akilan, UC Merced, Aug 2018-Jan 2021.  
Daniel Maciel<sup>†</sup>, UC Merced, Jun 2019-Feb 2020.  
Jibram Jimenez-Loza<sup>†</sup>, UC Merced, Jan 2019-May 2019.  
Eddie Barton<sup>†</sup>, UC Merced, Jan 2018-Dec 2018.  
Daniel Martin, UC Merced, Jan 2018-May 2018.  
Chris Villanueva<sup>†</sup>, UC Merced, Summer 2017.  
Eduardo Hernandez<sup>†</sup>, UC Merced, Summer 2016.  
Aaron San Jose, UC Merced, Summer 2016  
Ai-Linh Alten<sup>†</sup>, UC Merced, May 2015-May 2017.  
Landon Taylor, UC Merced, May 2015-June 2016.  
Alex Kuznetsov, UC Merced, Jun 2013-May 2014.  
Kento Locatelli, UC Merced, Jun 2013-Dec 2013.  
Teresa Tan<sup>†</sup>, UC Merced, Jun 2013-Aug 2013.  
Robert Hewitt, UC Merced, Jun 2013-Aug 2013.  
Vibhor Jain, UC Merced, Jun 2012-Dec 2012.  
Andrew Pierce, UC Merced, May 2011-Dec 2012.  
Kemuel Clemente, UC Merced, May 2011-May 2012.  
Brent Edmunds, UC Merced, May 2011-Aug 2011.  
Heather Johnson<sup>†</sup>, UC Merced, Jan 2011-May 2011.  
Mercedes Ramirez<sup>†</sup>, UC Merced, Jan 2011-May 2011.  
Jesus Pulido<sup>†</sup>, UC Merced, May 2009-Aug 2010.  
Justin Floreza<sup>†</sup>, UC Merced, May 2009-May 2010.  
Nathan Graves, UC Merced, May 2009-Dec 2009.  
Alex Chiu, UC Merced, May 2008-May 2009.  
Johnson Cheung, UC Merced, May 2008-May 2009.  
Oscar Caballero<sup>†</sup>, UC Merced, May 2008-May 2009.

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<sup>†</sup> Indicates undergraduate student from groups underrepresented in STEM fields.

Eric Pernice, UC Merced, May 2006-May 2007.  
Khotan Novini†, UC Merced, May 2006-May 2007.

## **TEACHING**

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### **Courses Created and Taught**

CSE 107 Introduction to Digital Image Processing, taught at UCM Fall 2014, Fall 2015, Fall 2017, Fall 2018, Spring 2022.  
EECS 207 Digital Image Processing, graduate, taught at UCM Spring 2011, Spring 2014, Spring 2017, Spring 2019, Spring 2021.  
EECS 286 Advanced Topics in Computer Vision, graduate, taught at UCM Spring 2008, Spring 2010, Spring 2012.  
CSE 185 Introduction to Computer Vision, undergraduate, taught at UCM Fall 2007, Fall 2008, Fall 2009, Spring 2011, Spring 2012, Spring 2013.  
CSE 111 Database Systems, undergraduate, taught at UCM Fall 2006.  
CSE 21 Introduction to Computing II, undergraduate, taught at UCM Spring 2006.  
CSE 30 Introduction to Computer Science and Engineering I, taught at UCM Fall 2005.

### **Courses Taught**

EECS 274 Computer Vision, taught at UCM Spring 2018, Spring 2020.  
CSE 15 Discrete Mathematics, taught at UCM Fall 2016, Fall 2019.  
CSE 115/ENGR 160 Discrete Mathematics, taught at UCM Fall 2012, Fall 2013, Spring 2015.  
EECS 290 Electrical Engineering and Computer Science Seminar, graduate, taught at UCM Fall 2010, Spring 2015.  
ENGR 97/197 Service Learning: Engineering Projects in Community Service, undergraduate, taught at UCM Spring 2006, Fall 2006, Spring 2007, Fall 2007, Spring 2008, Fall 2008, Spring 2009, Spring 2010.  
COGS 250 Cognitive Science Graduate Seminar, graduate, taught at UCM Spring 2007.

## **PROFESSIONAL SERVICE**

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### **Professional Society Leadership**

Executive Committee Member (Elected), ACM SIGSPATIAL, Chair, 2020-23.  
Executive Committee Member (Elected), ACM SIGSPATIAL, Vice Chair, 2014-17.  
Executive Committee Member (Nominated), ACM SIGSPATIAL, Conference Venue Coordinator, 2011-14.

### **Editorial Boards**

Associate Editor (Founding), ACM Transactions on Spatial Algorithms and Systems, 2013-

### **Leadership Training**

Invited Participant, Computing Research Association (CRA) Computing Community Consortium (CCC) Leadership in Science Policy Institute (LiSPI), Washington, DC, 2015.

## **Organization of Conferences and Meetings**

- Program Committee Co-Chair, ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL), Seattle, 2020.
- Program Committee Co-Chair, ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL), Chicago, 2019.
- Co-Chair, International Workshop on AI for Geographic Knowledge Discovery (GeoAI), in conjunction with ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL), Chicago, 2019.
- Co-Chair, International Workshop on AI for Geographic Knowledge Discovery (GeoAI), in conjunction with ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL), Seattle, 2018.
- General Co-Chair, ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL), Redondo Beach, 2017.
- General Co-Chair, ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL), San Francisco, 2016.
- Co-Chair, Workshop on Geo-Spatial Computer Vision, in conjunction with the IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Las Vegas, 2016.
- Co-Chair, Workshop on Vision from Satellite to Street, in conjunction with the IEEE International Conference on Computer Vision (ICCV), Santiago, 2015.
- Co-Chair, Workshop on Computer Vision for Converging Perspectives, in conjunction with the IEEE International Conference on Computer Vision (ICCV), Sydney, 2013.
- Co-Chair, Workshop on Location-Based Social Networks (LBSN), in conjunction with the ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL), Redondo Beach, 2012.
- Local Arrangements Co-Chair, ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL), Chicago, 2011.
- Local Arrangements Co-Chair, ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL), San Jose, 2010.
- Chair, Special Session on High-Resolution Remote Sensed Image Understanding, International Conference on Geoinformatics, Washington DC, 2009.
- Session Chair, Image Segmentation IV, IEEE International Conference on Image Processing (ICIP), San Diego, 2008.
- Co-organizer of the Cognitive Animation Workshop, Yosemite National Park, 2008.

## **Program Committee Member**

- PC Member, Symposium on Frontiers in Geospatial Data Science, Association of American Geographers (AAG) Annual Meeting, 2019.
- PC Member, Workshop on Spatial Big Data and Machine Learning in GIScience, in conjunction with GIScience Conference, Melbourne, 2018.
- PC Member, International Workshop on AI for Geographic Knowledge Discovery (GeoAI), in conjunction with ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL), Redondo Beach, 2017.
- Senior PC Member, ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL), 2016.

Senior PC Member, ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL), 2015.  
PC Member, Asian Conference on Computer Vision (ACCV), 2014.  
PC Member, International Conference on CyberGIS and Geodesign, 2014.  
PC Member, IEEE International Conference on Image Processing (ICIP), 2014.  
PC Member, ACM International Conference on Multimedia (MM), 2013.  
PC Member, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2012.  
PC Member, International Conference on Advanced Geographic Information Systems, Applications, and Services (GEOProcessing), 2012, 2013, 2014, 2015.  
PC Member, IEEE Workshop on Applications of Computer Vision (WACV), 2012.  
PC Member, ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL), 2009, 2010, 2011, 2012, 2013, 2014.  
PC Member, ACM SIGSPATIAL International Workshop on Location-Based Social Networks, 2011, 2013, 2014, 2015.  
PC Member, IEEE International Conference Bioinformatics & Biomedicine: Computational Structural Bioinformatics Workshop, 2011.  
PC Member, IEEE International Conference on Computer Vision (ICCV), 2011  
PC Member, International Symposium on Visual Computing, Special Track on Computational Biology, 2009.  
PC Member, INSTICC International Conference on Computer Vision Theory and Applications (VISAPP), 2006, 2007, 2008.  
PC Member, IADIS International Conference WWW/Internet, 2006.  
PC Member, SIAM International Conference on Data Mining, 2005, 2006.

### **Reviewer of Research Proposals**

Review Panel Member, Computer & Information Science and Engineering (CISE) Directorate, National Science Foundation (NSF), 2019.  
Review Panel Member, Computer & Information Science and Engineering (CISE) Directorate, National Science Foundation (NSF), 2018.  
Proposal Reviewer, Computer & Information Science and Engineering (CISE) Directorate, National Science Foundation (NSF), 2017.  
Technical Review Committee, Department of Energy's Energy Policy and Systems Analysis (EPSA), Feb 2016.  
Proposal Reviewer, Advanced Research Projects Agency - Energy (ARPA-E), Dec 2014.  
Proposal Reviewer, Qatar National Research Fund, Apr 2013, Feb 2014.  
Proposal Reviewer, Computer & Information Science and Engineering (CISE) Directorate, National Science Foundation (NSF), 2013.  
Proposal Reviewer, Computer & Information Science and Engineering (CISE) Directorate, National Science Foundation (NSF), 2013.  
Review Panel Member, Computer & Information Science and Engineering (CISE) Directorate, National Science Foundation (NSF), 2012.  
Proposal Reviewer, Hong Kong Research Grant Council, Jun 2011.  
Proposal Reviewer, Netherlands Organisation for Scientific Research (NWO), Oct 2010.  
Review Panel Member, Computer & Information Science and Engineering (CISE) Directorate, National Science Foundation (NSF), 2009.  
Proposal Reviewer, UC Discovery Grant in Digital Media, Mar 2008.  
Proposal Reviewer, CITRIS Student White-Paper Competition, Mar 2007.

- Proposal Reviewer, Computer & Information Science and Engineering (CISE) Directorate, National Science Foundation (NSF), 2007.
- Proposal Reviewer, U.S. Department of Energy (DOE) Scientific Discovery through Advanced Computing (SciDAC), Apr 2006.
- Review Panel Member, Computer & Information Science and Engineering (CISE) Directorate, National Science Foundation (NSF), 2006.
- Review Panel Member, IGERT program, National Science Foundation (NSF), 2005.

## **UNIVERSITY SERVICE**

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### **System-Level Service**

- UC Merced representative to the Assembly of the Academic Senate, Aug 2017-Jun 2019.
- UC Merced representative to the UC Faculty Welfare Committee at UCOP, Fall 2014.
- Faculty representative, UC Day in DC, May 2013.
- Reviewer, UC Proof of Concept Commercialization Gap Grant, Feb 2013.
- Member, HathiTrust Research Center Working Group, represented UC system on working group charged with developing a call for proposals to develop HathiTrust Research Centers, Jun 2009-Dec 2009.
- Review committee member, UC Discovery Grant in Digital Media, Mar 2008.

### **Campus-Level Service**

- Member, Faculty Advisory Board, Undergraduate Research Opportunities Center, Sep 2020-Sep 2021.
- Faculty Sponsor, UC Merced ACM Student Chapter, Jan 2015-Jun 2020.
- Member, Divisional Council, Aug 2017-Jun 2019.
- Member, Executive Vice Chancellor and Provost Search Advisory Committee, Aug 2018-Dec 2018.
- Member, Chancellor's Academic Governance Cabinet, Aug 2017-Jun 2019.
- Reviewer, CCGA Application of UC Merced Graduate Program, Feb 2018-Mar 2018.
- Member, Search Committee for Faculty Liaison, Jan 2017-Mar 2017.
- Member, Faculty Welfare, Diversity, and Academic Freedom Committee, Aug 2014-Jun 2015.
- Panelist, UC Merced Grant Writing Institute—CAREER Awardee Panel, Apr 2014.
- Member, Salary Equity Committee, Dec 2012-Jun 2015.
- Member, Faculty Welfare Committee, Aug 2012-Jun 2014.
- Member, Office of Ombuds Services Advisory Committee, Aug 2012-Jun 2015.
- Member, Email, Calendaring, and Collaboration Committee, Oct 2011-May 2012.
- Co-founder/director (w/ Q. Guo and R. Mostern), UC Merced Spatial Analysis Research Center (SpARC), Sep 2010-Dec 2016.
- Member, UC Merced Mapping and Spatial Analysis Academic Planning Committee, Sep 2008-Sep 2010.
- Member, Graduate and Research Council, Sep 2009-Aug 2011.
- Member, Committee to establish Award for Excellence in Graduate Interdisciplinary Study (AEGIS) fellowship, Jul 2007-Jun 2008.
- Founding chair, Electrical Engineering and Computer Science Graduate Group (previously Computer and Information Systems Graduate Group), Jul 2005-Jun 2007 (member Jul 2007-present).
- Co-coordinator, Mind, Technology and Society Invited Speaker Series, Jul 2005-Jun 2007.

Member, Ad-hoc Committee for Community College Computer Science Curriculum Articulation, Jul 2005-Jun 2006.

Member, Ad-hoc Committee for Vetting General Education Across Schools, Jul 2005-Jun 2006.

### **School of Engineering- and Department-Level Service**

Chair, Computer Science and Engineering Department, 2021-

Faculty mentor for CSE Assistant Teaching Professor Santosh Chandrasekhar, 2020-

Chair, Electrical Engineering and Computer Science Graduate Program, 2020-2021.

Member, Electrical Engineering and Computer Science Graduate Program Executive Committee, Jan 2015-2020.

Search Committee Member for 1 Faculty Search, 2018-2019.

Member, Faculty Merit Review Committee (2), 2018-2019.

Chair, Faculty Merit Review Committee, 2017-2018.

Member, Electrical Engineering and Computer Science Graduate Program Admissions Committee, Jan 2015-Jun 2017

Search Committee Member for 1 Faculty Search, 2016-2017.

Member, Faculty Merit Review Committee (2), 2016-2017.

Member, Faculty Promotion Committee, 2015-2016.

Faculty Participant, School of Engineering Organizational Effectiveness & Visioning Process (Top 100 Project), Mar 2015

Chair, Faculty Merit Review Committee, 2014-2015.

Judge, Capstone Design ABET Assessment, May 2014.

Faculty Assessment Officer for CSE Program, Jul 2013-Jun 2014.

Chair, Faculty Mid-Career Appraisal Committee, 2013-2014.

Member, Faculty Merit Review Committee, 2013-2014.

Vice-Chair, School of Engineering Faculty, Aug 2012-May 2013.

Member, School of Engineering Executive Committee, Aug 2012-May 2013.

Member, Faculty Promotion Committee, 2012-2013.

Member, Faculty Advancement Committee, 2012-2013.

Search Committee Member for 1 Faculty Search, 2012-2013.

Member, Resources Committee, Sep 2008-May 2009 and Sep 2011-May 2012.

Member, Academic Personnel Committee, Sep 2010-May 2011.

Observer, Academic Personnel Committee, Sept 2009-May 2010.

Search Committee Member for 1 Faculty Search, 2008-2009.

Search Committee Member for 1 Faculty Search, 2007-2008.

Search Committee Chair for 2 Faculty Searches, 2006-2007.

Search Committee Member for 6 Faculty Searches, 2006-2007.

Search Committee Member for Computing Research Manager, 2006-2007.

Search Committee Member for Teaching Lab Manager, 2006-2007.

Chair, Committee on Committees, Jul 2006-Jun 2007.

Member, Executive Committee, Jul 2006-Jun 2007.

Search Committee Chair for 2 Faculty Searches, 2005-2006.

Search Committee Member for 6 Faculty Searches, 2005-2006.

Vice-Chair, School of Engineering Faculty, Jul 2005-Jun 2007.

Member, Ad-hoc Committee for Mid-Semester Teacher Assistant Evaluation, Jul 2005-Jun 2006.

## INVITED TALKS/PANELS/MEETINGS

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- Invited Talk, “Pixels and Location: Geographic Knowledge Discovery From (All Sorts Of) Geo-Referenced Imagery,” University of California, Riverside, May 2019 (host: Prof. Ahmed Eldawy).
- Invited Talk, “Deep Learning for Geographic Knowledge Discovery in Complex Spatial Data,” GeoAI and Deep Learning Symposium: Deep Learning in Geography, American Association of Geographers Annual Meeting, Washington, D.C., Apr 2019.
- Panelist, GeoAI and Deep Learning Symposium: Whether and How GeoAI will Transform Geospatial Research, American Association of Geographers Annual Meeting, Washington, D.C., Apr 2019.
- Panelist, Symposium on Frontiers in Geospatial Data Science: Geospatial Data Science: Frontiers and Opportunities, American Association of Geographers Annual Meeting, Washington, D.C., Apr 2019.
- Panelist, Symposium on Frontiers in Geospatial Data Science: CyberGIS and Geospatial Data Science Curriculum, American Association of Geographers Annual Meeting, Washington, D.C., Apr 2019.
- Keynote talk, “Computer Science Meets the Environment: Three Projects,” International Workshop on the Social Web for Environmental and Ecological Monitoring (SWEEM), in conjunction with the International AAAI Conference on Web and Social Media (ICWSM), Stanford University, Jun 2018.
- Panelist, Artificial Intelligence and Deep Learning Symposium: Whether and Wow Will AI Transform Geospatial Research I, American Association of Geographers Annual Meeting, New Orleans, Apr 2018.
- Invited Talk, “Geographic Knowledge Discovery Using Ground-Level Images and Videos,” University of Alabama, Apr 2018 (host: Prof. Zhe Jiang).
- Keynote talk, “Geographic Knowledge Discovery Using Ground-Level Images and Videos,” International Workshop on AI for Geographic Knowledge Discovery (GeoAI), in conjunction with ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL), Redondo Beach, Nov 2017.
- Keynote talk, “Geographic Knowledge Discovery Using Ground-Level Images and Videos,” International Workshop on Artificial Intelligence and Big Data Analysis, China, Dec 2017.
- Invited Attendee at Microsoft Research Faculty Summit, Theme: The Edge of AI, Redmond, Jul 2017.
- Invited Attendee at Dagstuhl Seminar “Computer Science Meets Ecology,” Schloss Dagstuhl, Germany, Feb-Mar 2017.
- Invited Attendee at Microsoft Research Faculty Summit, Redmond, Jul 2016.
- “Crowd-Sourced Images for Ag and Environmental Analytics,” E & J Gallo Winery Research Opportunity Meeting, UC Merced, Jan 2014.
- “Information Integration and Informatics at UC Merced,” UC Davis, Nov 2013 (host: Prof. Nina Amenta).
- “Knowledge Discovery in Complex Data (Turning Big Data into Big Knowledge),” Dean’s Advisory Board, School of Engineering, UC Merced, Apr 2013.
- “Georeferenced Social Multimedia as Volunteered Geographic Information,” *International Conference on Space, Time, and CyberGIS*, Plenary Address, University of Illinois at Urbana Champaign, Aug 2012.
- “Social Multimedia as Volunteered Geographic Information: Crowdsourcing What-Is-Where Through Proximate Sensing,” National Geospatial-Intelligence Agency (NGA), Apr 2012.
- “Social Multimedia as Volunteered Geographic Information: Crowdsourcing What-Is-Where Through Proximate Sensing,” Frontiers of Science and Engineering Lecture Series, The Challenger Learning Center of the San Joaquin Valley, Atwater, CA, Mar 2012.

- “Social Multimedia as Volunteered Geographic Information: Crowdsourcing What-Is-Where Through Proximate Sensing,” Geospatial Innovation Facility, UC Berkeley, Mar 2012 (host: Prof. Maggi Kelly).
- “Image-Based Visibility Estimation as a Proxy for Air Pollution,” ENGR 191 Professional Seminar, UC Merced, Jan 2012 (host: Prof. Dan Hirtleman).
- “Social Multimedia as Volunteered Geographic Information: Crowdsourcing What-Is-Where Through Proximate Sensing,” Mind, Technology, and Society Invited Speaker Seminar Series, UC Merced, Nov 2011 (host: Prof. Teenie Matlock).
- “Image Processing and Computer Vision (and Other Research) at UC Merced,” NSF Undergraduate Research and Mentoring Program for Computational Biology, UC Merced, Jun 2011.
- “Proximate Sensing: Inferring What-Is-Where From Georeferenced Photo Collections,” Computer Science Department Colloquium, University of Southern California, Apr 2011 (host: Prof. Cyrus Shahabi).
- “Proximate Sensing: Inferring What-Is-Where From Georeferenced Photo Collections,” University of Maryland Institute for Advanced Computer Studies (UMIACS), University of Maryland, Mar 2011 (hosts: Prof. Rama Chellappa and Prof. Hanan Samet).
- “Estimating Atmospheric Visibility Using Low-Cost Cameras,” The Center for Information Technology in the Interest of Society (CITRIS) Academic Review, UC Berkeley, Oct 2010.
- “Research Experiences for Undergraduates,” Student Orientation, UC Merced, Jul 2010.
- “Proximate Sensing Using Georeferenced Community Contributed Photo Collections,” EECS Seminar, UC Merced, Sep 2009.
- “Estimating Atmospheric Visibility Using Static Cameras,” National Center for Supercomputing Applications, University of Illinois, Jul 2008 (host: Dr. Peter Bajcsy).
- “Image Processing and Pattern Recognition Research at UC Merced,” Computer Science Department Colloquium, California State University, Fresno, Apr 2008.
- “The Future of Multimedia Search: Content Based Image Retrieval,” Center for Information Technology In the Interest of Society (CITRIS) Future of Search Conference, UC Berkeley, May 2007.
- “Multimedia Data Analysis,” Sun Microsystems Research Visit, UC Merced, Mar 2007.
- “Multimedia Data Analysis,” HP Research, Palo Alto, Feb 2007.
- “Texture Analysis of Remote Sensed Imagery,” Center for Information Technology In the Interest of Society (CITRIS) Research Exchange, UC Berkeley, Nov 2006.
- “Graduate Studies at the University of California at Merced,” Lawrence Livermore National Laboratory, Aug 2006.
- “The University of California at Merced: Is the New Campus Actually Happening? Just Where is Merced?” Lawrence Livermore National Laboratory, Aug 2005.
- “Intelligent Systems: Image Understanding and Motion Synthesis,” Student Orientation, UC Merced, Aug 2005.
- “Texture and Higher Order Spatial Relationships in Images,” UC Merced, Jan 2005.
- “Automated Annotation of Remote Sensed Imagery,” Center for Applied Scientific Computing, Lawrence Livermore National Laboratory, Feb 2003.
- “Computer Recognition of Patterns in Aerial Photographs,” Western Association of Map Libraries, UC Santa Barbara, Mar 2002.
- “Similarity Retrieval Using the MPEG-7 Homogeneous Texture Descriptor,” The National Center for Supercomputing Applications (NCSA), Defining a Motion Imagery Research and Development Program Workshop, Nov 2001.
- “Content Based Image Retrieval,” ECE181b-Introduction to Computer Vision, UC Santa Barbara, Feb 2001.

“Discovering Latent Spatial Relationships in Remote Sensed Imagery,” Sapphire Scientific Data Mining Project Team, Center for Applied Scientific Computing, Lawrence Livermore National Laboratory, Feb 2001.

“Image Features,” ECE268-Internet Computing and Web Technologies, UC Santa Barbara, Jan 2001.

## **INDUSTRY EXPERIENCE**

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Gallup and Associates, Inc., Systems Engineering, Berkeley, California USA

Vice President of Software, Jun 1996-Dec 1997

Software Engineer Consultant, Oct 1994-Jun 1996

Software Engineer, Jun 1990-Sep 1994

Delco Systems/Space Operations, Santa Barbara, California USA

General Motors Scholar Internship, May 1989-Sep 1989 and May 1988-Sep 1988