Curriculum Vitae

Kun Huang

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Areas of Expertise:

- Image processing and analysis
- Biomedical imaging and imaging informatics
- Bioinformatics and systems biology
- Cancer genomics
- Computer vision
- Machine learning
- High throughput data analysis

Education:

- University of Illinois at Urbana-Champaign, **Ph.D. in Electrical and Computer Engineering**, October 2004.
  Dissertation: *Geometric Principles of Visual Sensor Networks*
  Committee: P. R. Kumar (chair), Yi Ma (advisor), Thomas Huang, Robert Fossum, and Yizhou Yu.
- University of Illinois at Urbana-Champaign, **M.S. in Mathematics**, December 2002.
- University of Illinois at Urbana-Champaign, **M.S. in Electrical Engineering**, October 2000.
- University of Illinois at Urbana-Champaign, **M.S. in Physiology**, May 1998.
- Tsinghua University, Beijing, China, **B.S. in Biology**, July 1996.
- Tsinghua University, Beijing, China, **B.Engr. in Computer Science**, July 1996.

Academic Positions:

- Assistant Professor, Department of Biomedical Informatics, The Ohio State University, 2004 – Present.
- Adjunct Assistant Professor, Department of Computer Science and Engineering, The Ohio State University, 2005 – Present.
- Participating Assistant Professor, Department of Biomedical Engineering, The Ohio State University, 2005 – Present.
- Research Assistant, Department of Electrical and Computer Engineering, University of Illinois, 1999-2004.

- Teaching Assistant, Department of Electrical and Computer Engineering, University of Illinois, 2001-2002.
- Teaching Assistant, Department of Molecular and Integrative Physiology, University of Illinois 1996-1998.
- Research Assistant, Department of Molecular and Integrative Physiology, University of Illinois 1998.

Teaching:

- IBGP/BMI 731: Biomedical Informatics II, Winter 2008 (co-instructor).
- IBGP 705: Introduction to Bioinformatics, Winter 2008.
- IBGP/BMI 730: Biomedical Informatics I, Fall 2007.
- IBGP/BMI 731: Biomedical Informatics II, Winter 2007 (co-instructor).
- IBGP 705: Introduction to Bioinformatics, Winter 2007.
- IBGP/BMI 730: Biomedical Informatics I, Fall 2006.
- IBGP705: Introduction to Bioinformatics, Winter 2006.
- IBGP/BMI 731: Biomedical Informatics II, Winter 2006 (co-instructor).
- IBGP/BMI 731: Biomedical Informatics II, Winter 2005 (co-instructor).

Professional Activities:

- Reviewer for IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), IEEE Transactions on Robotics and Automation, IEEE Transaction on Image Processing (TIP), SPIE Optical Engineering, Journal of Image Engineering, Journal of Neuroscience Methods, Information Sciences, IEEE Signal Processing Letters, Journal of Optical Society American A, Journal of Biomedical Informatics, International Journal of Pattern Recognition, IJCV, ICCV, ECCV, CVPR, CDC, ICRA.
- Member of IEEE (1999 – Current).
- Member of ARVO (2006).
- Program committee of the 2005 IEEE International Conference in Computer Vision and Pattern Recognition (CVPR'05).
- Program committee of the Dynamical Vision Workshop of the 2005 International Conference in Computer Vision (ICCV'05).
- Program committee of the 2006 European Conference in Computer Vision (ECCV'06).
- Program committee of the 2006 IEEE International Conference in Computer Vision and Pattern Recognition (CVPR'06).
- Program committee of the Dynamical Vision Workshop of the 2006 European Conference in Computer Vision (ECCV'06).
- Program committee of the Dynamical Vision Workshop of the 2007 International Conference in Computer Vision (ICCV'07).
- Program committee of the 2007 International Conference in Computer Vision (ICCV'07).
- International program committee of the International Symposium on Volume Graphics (VG'07) in the 2007 EUROGRAPHICS Conference.
- Program committee of the Microscopic Image Analysis with Application in Biomedicine Workshop (MIAAB'07).

- Program committee of the IEEE Pacific Rim Symposium on Image Video and Technology (PSIVT'07).
- Program committee of the International Conference on Computer Vision Theory and Applications (VISAPP'07).
- Program committee of the 2008 IEEE International Conference in Computer Vision and Pattern Recognition (CVPR'08).

Awards and Scholarships:

- Nominated for Packard Foundation Fellowship in Science and Engineering by OSU (two faculty members were nominated), 2007.
- IEEE Computer Society Student Travel Grant, 2004.
- Best Teaching Assistant Elected by Students, University of Illinois, 1998.
- Distinguished Graduate Medal, Tsinghua University, 1996.
- Outstanding Student Award in Science and Technology Areas, City of Beijing, 1995.
- Guanghua Scholarship, Tsinghua University, China, 1994.
- Excellent Student Scholarship, Tsinghua University, China, 1993.
- First Award in the 1st Chinese Mathematics Olympiad, 1991.

Grants:

- $2000 for Freshman Seminar Proposal, Fall 2007-03-09.
- PI: The Ohio Supercomputing Center Grant PAS0328-1, 2007.
  Title: *Build 3D Models for Biomedical Samples at Micron Resolution*
  Award: 10000 Resource Units.
- Co-I: NIH-BISTI grant, 2005-2006. 10% effort.

Publications:

- **Research papers**

1. Mosaliganti K, Machiraju R, Huang K. Geometry-driven visualization of microscopic structures, *accepted to the IEEE International Symposium of Biomedical Imaging (ISBI'08),* 2008.
2. Mosaliganti K, Janoos F, Sharp R, Ridgway R, Machiraju R, Huang K, Wenzel P, deBruin A, Leone G, Saltz J. Detection and visualization of surface-pockets to enable phenotyping studies. *IEEE Transactions on Medical Imaging*, 26(9):1283-1290, 2007.
3. Mosaliganti K, Cooper L, Sharp R, Machiraju R, Leone G, Huang K, Saltz J. Reconstruction of Cellular Biological Structures from Optical Microscopy Data, *accepted to IEEE Transactions on Visualization and Computer Graphics*, 2008.
4. Mosaliganti K, Sharp R, Machiraju R, Huang K, Leone G. Geometry-driven Visualization of Microscopic Structures in Biology, *accepted to Computer Graphics Forum, the International Journal of the Eurographics Association*, 2008.
5. Mosaliganti K, Janoos F, Irfanoglu O, Ridgway R, Machiraju R, Huang K, Saltz J, Leone G, Ostrowski M. Tensor Classification of *N*-point Correlation Function features for Histology Tissue Segmentation, *accepted to Special Issue on Medical Image Analysis with Applications in Biology, Journal of Medical Image Analysis,* 2008.
6. Janoos F, Mosaliganti K, Xu X, Machiraju R, Wong S, Huang K. Robust 3D Reconstruction and Identification of Dendritic Spines from Optical Microscopy Imaging, *accepted to Special*

Issue on Medical Image Analysis with Applications in Biology, Journal of Medical Image Analysis, 2008.

7. Mosaliganti K, Pan T, Ridgway R, Sharp R, Cooper L, Culacy A, Sharma A, Irfanoglu O, Machiraju R, Kurc T, Wenzel P, deBruin A, Leone G, Saltz J, Huang K. An Imaging Workflow for Characterizing Phenotypical Change in Terabyte Sized Mouse Model Datasets, *accepted to Journal of Biomedical Informatics,* 2008.
8. Rybaczyk L, Bashaw M, Pathak D, Huang K. An Indicator of Cancer: Downregulation of Monoamine Oxidase-A in Multiple Organs and Species, *accepted to BMC Genomics*, 2008.
9. Ruiz A, Ujaldon M, Cooper L, Huang K. Non-rigid Registration for Large Sets of Microscopic Images on Graphics Processors, *accepted to Journal of Signal Processing Systems*, 2008.
10. Ruiz A, Ujaldon M, Andrades JA, Becerra J, Huang K, Pan T, Saltz J. The GPU on biomedical image processing for color and phenotype analysis, in *Proceedings of IEEE 7th Intl. Symposium on BioInformatics & BioEngineering (BIBE'07)*, Cambridge, Massachussets, October 2007.
11. Mosaliganti K, Chen J, Janoos F, Machiraju R, Xia W, Huang K. Automated quantification of colony growth in clonogenic assays, *in Proceedings of International Workshop on Microscopic Image Analysis with Applications in Biology (MIAAB'07)*, New Jersey, September 2007.
12. Cooper L, Naidu S, Leone G, Saltz J, Huang, K. Registering high resolution microscopic images with different histochemical stainings - a tool for mapping gene expression with cellular structures, *in Proceedings of International Workshop on Microscopic Image Analysis with Applications in Biology (MIAAB'07)*, New Jersey, September 2007.
13. Mosaliganti K, Janoos F, Sharp R, Ridgway R, Machiraju R, Huang K, Wenzel P, deBruin A, Leone G, Saltz J. Detection and visualization of surface-pockets to enable phenotyping studies. *IEEE Transactions on Medical Imaging,* 26(9):1283-1290, 2007.
14. Janoos F, Irfanoglu O, Mosaliganti K, Machiraju R, Huang K, Wenzel P, de Bruin A, Leone G. Multiple-resolution image segmentation using the 2-point correlation functions, in *Proceedings of the IEEE International Symposium on Biomedical Imaging*, Washington, DC, April 2007
15. Wenzel PL, Wu L, de Bruin A, Chong JL, Chen WY, Dureska G, Sites E, Pan T, Sharma A, Huang K, Ridgway R, Mosaliganti K, Sharp R, Machuraju R, Saltz J, Yamamoto H, Cross JC, Robinson ML, Leone G. *Rb* is Critical in a Mammalian Tissue Stem Cell Population. *Genes and Development*, 21:85-97, 2007.
16. Sharp R, Ridgway R, Mosalignati K, Wenzel P, Pan T, de Bruin A, Machuraju R, Huang K, Leone G, Saltz J. Volume rendering phenotype differences in mouse placenta microscopy data. *Computing in Science & Engineering,* 9(1):38-47, 2007.
17. Hong W, Wright J, Huang K, Ma Y. A multi-scale hybrid linear model for lossy image representation. *IEEE Transaction on Image Processing,* 15(12):3655-3671, 2006.
18. Mosaliganti K, Jonoos F, Xu X, Machuraju R, Wong STC, Huang K, Temporal matching of dentritic spines in confocal microscopy images of neuronal tissue, in *Proceedings of the Microscopic Image Analysis with Applications in Biology (MIAAB) Workshop in MICCAI,* October 2006.
19. Ridgeway R, Irfanoglu O, Machuraju R, Huang K. Image segmentation with tensor-based classification of N-point correlation functions, in *Proceedings of the Microscopic Image Analysis with Applications in Biology (MIAAB) Workshop in MICCAI,* October 2006.

20. Cooper L, Huang K, Sharma A, Mosaliganti R, Pan T. Registration vs. reconstruction: Building 3-D models from 2-D microscopy images, in *Proceedings of the Bioimage Informatics Workshop*, September 2006.
21. Huang K, Cooper L, Sharma A, Pan T. Fast automatic registration algorithm for large microscopy images, in *Proceedings of the IEEE/NLM Life Science Systems & Applications Workshop*, 128-129, July 2006.
22. Sharp R, Ridgway R, Mosalignati K, Irfanoglu O, Wenzel P, Machiraju R, Pan T, de Bruin A, Machuraju R, Leone G, Huang K, Saltz J. Examining Phenotype Differences in Mouse Placenta with Volume Rendering and Segmentation, in *Proceedings of the IEEE/NLM Life Science Systems & Applications Workshop*, 70-71, July 2006.
23. Prescott J, Clary M, Wiet G, Pan T, Huang K. Automatic registration of large set of microscopic images using high-level features, in *Proceedings of the IEEE International Symposium on Medical Imaging*, Arlington, VA, April 2006.
24. Mosaliganti R, Pan T, Sharp R, Ridgway R, Iyengar S, Gulacy A, Wenzel P, de Bruin A, Machiraju R, Huang K, Leone G, Saltz J. Registration and 3D visualization of large microscopy images, in *Proceedings of the SPIE Annual Medical Imaging Meetings*, February 2006.
25. Cooper L, Liu J, Huang K. Spatial segmentation of temporal texture using mixture linear models, in *Proceedings of the Dynamical Vision Workshop in the International Conference of Computer Vision*, Beijing, China, October 2005.
26. Hong W, Wright J, Huang K, Ma Y. A multi-scale hybrid linear model for lossy image representation, in *Proceedings of the IEEE International Conference on Computer Vision (ICCV)*, 1:764-771, Beijing, China, October 2005.
27. Pan T, Huang K. Virtual mouse placenta: tissue layer segmentation, in *Proceedings of the IEEE EMBC*, September 2005.
28. Yang AY, Rao S, Huang K, Hong W, Ma Y. Symmetry-based 3-D reconstruction from perspective images, *Computer Vision and Image Understanding (CVIU)*, 99(2):210-240, August 2005.
29. Hastings S, Ribeiro M, Langella S, Oster S, Catalyurek U, Pan T, Huang K, Ferreira R, Saltz J, Kurc T, XML database support for distributed execution of data-intensive scientific workflows, *ACM SIGMOD Record*, 34(3): 50-55, 2005.
30. Huang K, Hong W, Ma Y. Symmetry-based photo editing, *Pattern Recognition*, 38(6): 825-834, 2004.
31. Hong W, Yang AY, Huang K, Ma Y. On symmetry and multiple view geometry: structure, pose, and calibration from a single image, *International Journal Computer of Vision*, 60(3): 241-265, 2004.
32. Ma Y, Huang K, Vidal R, Kosecka J, Sastry S. Rank conditions of the multiple view matrix in multiple-view geometry, *International Journal of Computer Vision*, 59(2):115-137, 2004.
33. Huang K, Wagner A, Ma Y. Hybrid linear system identification via subspace embedding and segmentation, in *Proceedings of the 43th IEEE Conference on Decision and Control*, December 2004.
34. Huang K, Yang AY, Ma Y. Image representation with hybrid and adaptive linear models, in *Proceedings of the International Conference on Image Processing*, October 2004.
35. Huang K, Ma Y. Robust GPCA algorithm with applications in video segmentation via hybrid system identification, in *Proceedings of the Sixteenth International Symposium on Mathematical Theory of Networks and Systems (MTNS2004)*, Leuven, Belgium, July 2004.

36. Huang K, Vidal R, Ma Y. Minimum effective dimension for mixtures of subspaces: a robust GPCA algorithm and its applications, in *Proceedings of the IEEE International Conference on Computer Vision and Pattern Recognition (CVPR'04)*, June 2004.
37. Huang K, Hong W, Yang AY, Ma Y. Large baseline matching and reconstruction from symmetry cells, in *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA'04)*, 2:1418-1423, New Orleans, USA, April 2004.
38. Yang AY, Rao S, Huang K, Hong W, Ma Y. Geometric segmentation of perspective images based on symmetry groups, in *Proceedings of the International Conference on Computer Vision*, 2:1251-1258, Nice, France, October, 2003.
39. Huang K, Hong W, Ma Y. Symmetry-based photoediting, in *the International Conference on Computer Vision*, *Workshop on Higher Level Knowledge*, 21-28, Nice, France, October, 2003..
40. Brand M, Huang K. A unifying theorem for spectral embedding and clustering, in *Proceedings of the 9th International Conference on Artificial Intelligence and Statistics*, Key West, Florida, January, 2003.
41. Huang K, Fossum R, Ma Y. Generalized rank conditions in multiple view geometry with application to dynamic scenes, in *Proceedings of the 6th European Conference on Computer Vision*, Copenhagen, Denmark, May 2002.
42. Ma Y, Huang K, Yang Y. Classification of rank conditions for multiple views of dynamical scenes, in *6th European Conference on Computer Vision*, Workshop on Vision and Modeling of Dynamic Scenes, Copenhagen, Denmark, May 2002.
43. Ma Y, Kosecka J, Huang K. Rank deficiency condition of the multiple view matrix for mixed point and line features, in *Proceeding of the 5th Asian Conference on Computer Vision*, Melbourne, Australia, January 2002.
44. Huang K, Kumar PR. Hierarchical and integrated algorithms: comparison and applications in motion estimation and recognition, in *Proceedings of the 39th IEEE Conference on Decision and Control*, pp.674-9 vol.1, Sydney, Australia, December 2000.

- **Book chapters**

45. Huang K, Ma Y. A Survey on geometric vision, in *Handbook of Robotics*, to be published, CRC Press, 2004.

- **Peer reviewed abstracts**

46. Rybaczyk L, Wunderlich JE, Needleman B, Melvin S, Huang K, Christofi FL. Differential dysregulation of ADORA3, ADORA2A, ADORA2B expression profiles from 34 purine-genes in mucosal biopsies and peripheral blood mononuclear cells in inflammatory bowel diseases, May 2007.
47. Huang K, Sharma A, Cooper L, Pan T, Gurcan M, Saltz J. A novel image registration pipeline for 3-D reconstruction from microscopy images, *Advancing Practice, Instruction and Innovation Through Informatics (APIII),* Vancouver, Canada, August 2006.
48. Sharma A, Huang K, Pan T, Gurcan M, Saltz J. A parallel image registration framework for terabyte sized microscopy datasets, *Advancing Practice, Instruction and Innovation Through Informatics (APIII),* Vancouver, Canada, August 2006.
49. Pan T, Sharma A, Gurcan M, Huang K, Leone G, Saltz J. GridCAD Microscopy: A caBIG based system for image processing and quantitative analysis, *Advancing Practice, Instruction and Innovation Through Informatics (APIII),* Vancouver, Canada, August 2006.

50. Huang K, Iyengar S, Radecki R, Mahmoud AM, Twa MD, Lembach RG, Roberts CJ. Comparison of Corneal Scattering Properties Pre- and Post-LASIK Using Orbscan Images, *in Proceedings of the 2006 Annual Meeting for Research in Vision and Ophthalmology (ARVO)*, Fort Lauderdale, FL, April 2006.
51. Pan T, Masaliganti K, Sharp R, Ridgeway R, Huang K, Machuraju R, Saltz J. Virtual placenta: computational phenotyping through image analysis, *Advancing Practice, Instruction and Innovation Through Informatics (APIII),* Vancouver, Canada, August 2005.

- **Technical reports**

52. Huang K, Hong W, Yang AY, Rao S, Ma Y. Symmetry-Based 3-D Reconstruction from Perspective Images (Part I and II), *Technical Report*, UILU-ENG-03-2204, April,2003.
53. Brand M, Huang K. A Unifying Theorem for Spectral Embedding and Clustering, *Technical Report of Mitsubishi Electric Research Laboratory*, TR2002-42, October, 2002.
54. Fossum R, Huang K, Ma Y. General Rank Conditions in Multiple View Geometry, *Technical Report*, UILU-ENG-01-2222, October 8,2001.
55. Ma Y, Huang K, Vidal R, Kosecka J, Sastry S. New Rank Conditions of the Multiple View Matrix in Multiple View Geometry, *Technical Report*, UILU-ENG-01-2214 (DC-220), June 18, 2001.
56. Ma Y, Vidal R, Huang K, Sastry S. New Rank Deficiency Condition for Multiple View Geometry of Point Features, *Technical Report*, UILU-ENG-01-2208 (DC-200), May 8, 2001.
57. Ma Y, Huang K, Kosecka J. New Rank Deficiency Condition for Multiple View Geometry of Line Features, *Technical Report*, UILU-ENG-01-2209 (DC-201), May 8, 2001.
58. Huang K, Moroz LL, Sudlow L, Gillette R. Nitric Oxide and 5-HT May Regulate Feeding Network Arousal State via Intracellular Ca2+ and H+ in *Pleurobranchae Californica*, in *Abstracts of 28th Annual Meeting of Society for Neuroscience*, Los Angeles, USA, October 1998.

- **Thesis and dissertations**

59. Huang K, Geometric principles of visual sensor networks, Ph.D. Dissertation, University of Illinois, 2004.
60. Huang K, Hierarchical and integrated algorithms: comparison and applications in motion estimation and recognition, Master Thesis, University of Illinois, 2000.
61. Huang K, Computer-aided analysis of electrophysiological signals, Bachelor Degree Thesis, Tsinghua University, 1996.

Presentations

- Registering high resolution microscopic images with different histochemical stainings - a tool for mapping gene expression with cellular structures, *the International Workshop on Microscopic Image Analysis with Applications in Biology (MIAAB'07)*, New Jersey, September 2007.
- Examining Phenotype Differences in Mouse Placenta with Volume Rendering and Segmentation, *the IEEE/NLM Life Science Systems & Applications Workshop*, NIH, July 2006.
- Registration and 3D Reconstruction. Work in Progress, Department of Biomedical Informatics, Ohio State University, May 2005.
- Microscopy Imaging Research in BMI. Tsinghua University, Beijing, April 2006.

- Biomedical Imaging Research in BMI. BISTI Microscopy Imaging Workshop, December 2005.
- Large Scale Microscopy Image Analysis. Department of Biomedical Engineering, Ohio State University, November 2005.
- Generalized Principal Component Analysis and Its Applications. Department of Computer Science and Engineering, Ohio State University, April 2005.
- Biomedical Imaging Research in BMI. Ohio Supercomputing Center Visualization Symposium, December 2004.
- Generalized Principal Component Analysis and Its Applications. Center of Image Sciences, Johns Hopkins University, October 2004.
- Large baseline matching and reconstruction from symmetry cells. IEEE International Conference on Robotics and Conference, New Orleans, May 2004.
- Classification of rank conditions for multiple views of dynamical scenes. The 6th European Conference on Computer Vision, Workshop on Vision and Modeling of Dynamic Scenes, Copenhagen, Denmark, May 2002.
- Robust Generalized Principal Component Analysis and Its Applications. Department of Electrical and Computer Engineering, Ohio State University, September 2004.