Curriculum Vitae

Kun Huang

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Areas of Expertise:

- 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.
- Co-Director, OSU Comprehensive Cancer Center Biomedical Informatics Shared Resources, 2008 – Present.
- Adjunct Assistant Professor, Department of Computer Science and Engineering, The Ohio State University, 2005 – Present.
- Adjunct Assistant Professor, Department of Biomedical Engineering, The Ohio State University, 2005 – Present.

- Graduate Faculty Member, Biophysics Graduate Program, The Ohio State University, 2008 – Present.
- Graduate Faculty Member, Department of Pathology, The Ohio State University, 2008 – Present.

Teaching:

- IBGP/BMI 730: Biomedical Informatics I, Fall 2008.
- 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).
- BMI representative in Graduate Interdisciplinary Specialization Comprehensive Engineering & Science of Biomedical Images(CESBMI), 2006 – present

Grants:

- **Ongoing**: PI - Informatics methods for identifying breast cancer control genes and proteins (multi-PI NIH R01, other PI – Jeffrey Parvin, Umit Catalyurek), 6/1/2009-4/30/2014..
- **Ongoing**: co-Investigator – Lymphocyte functions in the injured spinal cord (NIH R01, PI: Philips Popovich), 07/01/2009-1/31/2014.
- **Ongoing**: PI - Multi-Resolution Analysis and Visualization of ChIP-seq Data in Genome-Wide Study on the Roles of Estrogen Receptor in Breast Cancer (PhARMA Foundation Young Investigator Grant), 2/1/2009-1/31/2011.
- **Ongoing**: PI – Experimental and Computational Tools for Analyzing Microcircuitry Development of Ontogentic Radial Units in Mouse Neocortext (multi-PI NIH R21, other PI: Songhai Shi), 7/01/2008-5/31/2010.
- **Ongoing**: co-Investigator – Interrogating Epigenetic Changes in Cancer Genomes (NCI U54 CA113001-04 PPG Leader: Tim Huang) , 9/30/2004 - 2/28/2010.
- **Ongoing**: PI – Build 3D Models for Biomedical Samples at Micron Resolution (The Ohio Supercomputing Center Grant PAS0328-1, 2007, Award: 10000 Resource Units.).
- **Finished**: co-Investigator: NIH-BISTI grant, 2005-2006.

Publications:

- **Peer-reviewed journal papers**

1. Schwartzbaum J, **Huang K**, Lawler S, Ding B, Yu J. Allergy and inflammatory transcriptome is predominantly negatively correlated with CD133 expression, *accepted to Neuro-Oncology*, 2009.
2. Taslim C, Wu J, Yan P, Singer G, Parvin J, Huang T, Lin S, **Huang K**. Comparative study on ChIP-seq data: normalization and binding pattern characterization, *accepted to Bioinformatics, 2009*.

3. Cooper L, Sertel O, Kong J, **Huang K**, Gurcan M. Feature-based registration of distinct stained histopathology images: an application for computerized follicular lymphoma prognosis, *accepted to Computer Methods and Programs in Biomedicine*, 2009.
4. Yu J, Ershler M, Yu L, Wei M, Hackanson B, Yokohama A, Mitsui T, Liu C, Mao C, Liu S, Liu Z, Liu C-G, Liu X, **Huang K**, Visser J, Guido M, Plass C, Belyavsky A, Caligiuri M. TSC-22 contributes to hematopoietic stem cell proliferation and repopulation and is epigenetically silenced in large granular lymphocyte leukemia, *accepted to Blood*, 2009.
5. Rybaczyk L, Circle K, Grants I, Cooke H, Needleman B, Wunderlich JE, **Huang K**, Christofi FL. A New Comparative Analysis of Gene Expression and Selection (CAGES) Reveals Unique Purine Gene Dysregulation Profiles that Distinguish between Crohn's and Ulcerative Colitis, *accepted to Inflammatory Bowel Diseases*, 2009.
6. 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.
7. 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.
8. 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.
9. 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.
10. 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.
11. 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.
12. 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.
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. 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.
15. 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.
16. 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.

17. 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.
18. 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.
19. **Huang K**, Hong W, Ma Y. Symmetry-based photo editing, *Pattern Recognition*, 38(6): 825-834, 2004.
20. 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.
21. 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.

- **Peer-reviewed conference papers**

22. Kong J, Boyer K, Dunham P, Saltz J, **Huang K**. A new model-based estimation of ellipses for object representation, *accept to Proceedings of the IEEE Engineering in Medicine and Biology Conference*, 2009.
23. Zhang J, Xiang Y, Jin R, **Huang K**. Using Frequent Co-expression Network to Identify Gene Clusters for Breast Cancer Prognosis, to appear in *Proceedings of the ISIBM International Joint Conferences on Bioinformatics, Systems Biology and Intelligent Computing*, 2009.
24. Camerlengo T, Ozer HG, Zhang G, Joobeur T, Meulia T, Trgovcich J, **Huang K**. Computational challenges and solutions to the analysis of microRNA profiles in virally-infected cells derived by massively parallel sequencing, to appear in *Proceedings of the Ohio Collaborative Conference on Bioinformatics (OCCBIO)*, IEEE Press, 2009.
25. Ozer HG, Camerlengo T, Huang T, Parvin J, **Huang K**. A new method for mapping short DNA sequencing reads by using quality scores, to appear in *Proceedings of the Ohio Collaborative Conference on Bioinformatics (OCCBIO)*, IEEE Press, 2009.
26. Parvin J, Kais Z, Arora M, Kotian S, Zha A, Ransburgh D, Bozdag D, Catalyurek U, **Huang K**. Identification of a breast cancer associated regulatory network, to appear in *Proceedings of the Ohio Collaborative Conference on Bioinformatics (OCCBIO)*, IEEE Press, 2009.
27. Ozer H, Bozdag D, Camerlengo T, Wu J, Huang Y-W, Hartley T, Parvin J, Huang T, Catalyurek U, **Huang K**. A Comprehensive Analysis Workflow for Genome-Wide Screening Data from ChIP-Sequencing Experiments, to appear in *Proceedings of the First International Conference on Bioinformatics and Computational Biology, Lecture Notes in Computer Science*, Springer-Verlag, 2009.
28. Mosaliganti K, Machiraju R, **Huang K.** Geometry-driven visualization of microscopic structures, in *Proceedings of the IEEE International Symposium of Biomedical Imaging (ISBI'08),* 2008.
29. 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.
30. 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.

31. 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.
32. 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
33. 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.
34. 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.
35. 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.
36. **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.
37. 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.
38. 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.
39. 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.
40. 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.
41. 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.
42. Pan T, **Huang K**. Virtual mouse placenta: tissue layer segmentation, in *Proceedings of the IEEE EMBC*, September 2005.
43. **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.

44. **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.
45. **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.
46. **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.
47. **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.
48. 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.
49. **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..
50. 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.
51. **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.
52. 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.
53. 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.
54. **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**

55. **Huang K**, Mosaliganti K, Cooper L, Machiraju R. Quantitative phenotyping using microscopic images, in *Microscopic Image Analysis for Life Science Applications*, Artech House Publishers, 2008.
56. Cooper L, Ruiz A, Ujaldon M, **Huang K**. Scalable Image Registration and 3D Reconstruction at Microscopic Resolution, in *High Throughput Image Reconstruction and Analysis*, Artech House Publishers, 2008.
57. **Huang K**, Ma Y. A survey on geometric vision, in *Handbook of Robotics*, CRC Press, 2004.

- **Peer reviewed abstracts**

1. Xiang Y, Zhang J, Ruan N, Jin R, Parvin J, **Huang K**. A study on frequent co-expression networks in cancers, *AMIA Annual Summit on Translational Bioinformatics*, San Francisco, March 2009.

2. **Huang K**, Wu J, Zhang J, Huang T, Parvin J. GenomeScape: a universal 3D visualization tool for genomic data, *AMIA Annual Summit on Translational Bioinformatics*, San Francisco, March 2009.
3. Cooper L, Wright J, Singh S, Bluestein E, Ma Y, **Huang K**. GeneSubspace - a tool for clustering the gene expression profiles using mixture linear models, *AMIA Annual Summit on Translational Bioinformatics*, San Francisco, March 2009.
4. Rybaczyk L, Pathak D, Cooper L, Circle K, **Huang K**. Four common gene expression changes across multiple cancers in multiple species. *AACR annual meeting* (Abstract#4266), 2008.
5. Rybaczyk L, Wunderlich J, Circle K, Needleman B, Melvin S, Cardounel A, Grants I, **Huang K**, Christofi F: Differential Dysregulation of ADORA3, ADORA2A, ADORA2B, and P2RY14 Expression Profiles from 37 Purine Genes in Mucosal Biopsies and Peripheral Blood Mononuclear Cells in IBD, *Gastroenterology* 132: Suppl. 2, A-246, 2007.
6. Circle K, Rybaczyk L, Grants I, Wunderlich J, **Huang K**, Christofi F: A new comparative analysis of gene expression and selection (CAGES) reveals purine gene signature profiles that distinguish between crohn's and ulcerative colitis. *6th Annual Advances in the Inflammatory Bowel Diseases*, 2007.
7. **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.
8. 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.
9. 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.
10. **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.
11. 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**

1. **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.
2. Brand M, **Huang K**. A Unifying Theorem for Spectral Embedding and Clustering, *Technical Report of Mitsubishi Electric Research Laboratory*, TR2002-42, October, 2002.
3. Fossum R, **Huang K**, Ma Y. General Rank Conditions in Multiple View Geometry, *Technical Report*, UILU-ENG-01-2222, October 8,2001.
4. 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.
5. 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.

6. 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.
7. **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**

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