

# Gary B. Huang

---

## CONTACT INFORMATION

Janelia Farm Research Campus      huangg@janelia.hhmi.org  
Howard Hughes Medical Institute      vis-www.cs.umass.edu/~gbhuang  
Ashburn, VA 20147 USA              www.janelia.org/people/scientist/gary-huang

## RESEARCH INTERESTS

Machine Learning, Computer Vision, Deep Learning, Graphical Models, Image Segmentation, Neural Circuit Reconstruction, Face Recognition

## EDUCATION

### University of Massachusetts, Amherst

Ph.D., Computer Science, 2012, Advisor: Erik Learned-Miller

GPA: 4.0 / 4.0

Coursework: Computer Vision, Bayesian Data Analysis, Information Retrieval, Advanced Algorithms, Computation Theory, Programming Languages

### Stanford University

M.S., specializing in Artificial Intelligence, Computer Science, 2006

GPA: 3.834 / 4.0

Coursework: Computational Biology, Convex Optimization, Geometric Models in Graphics, Information Theory, Mathematical Methods in Robotics and Vision, Computer Graphics, Digital Systems, Introductory Robotics, Machine Learning, Probabilistic Models in AI, Artificial Intelligence, Operating Systems, Algorithms, Compilers, Automata

B.S. with Distinction, Mathematics, 2005

GPA: 3.826 / 4.0

Coursework: Combinatorics, Real Analysis, Game Theory, Complex Analysis, Linear Algebra and Matrix Theory, Statistical Inference, Differential Geometry, Stochastic Processes, Functional Analysis, Probability, Modern Algebra, Fundamental Concepts of Analysis, Ordinary Differential Equations

## EXPERIENCE

### Janelia Farm Research Campus, Howard Hughes Medical Institute

*Software Engineer*

**2012 to present**

Conducted research in the Jain Lab on machine learning methods for automated analysis of electron microscopy images. Developed algorithms and software packages focused on deep architectures incorporating unsupervised feature learning. Contributions include a parallelized system for local boundary prediction that improves over previous state-of-the-art in both accuracy and computation time, a framework for fast semi-automated data collection using human-in-the-loop, and an unsupervised feature learning method that is competitive with hand-designed features for the problem of agglomeration of 3d neuron fragments.

### University of Massachusetts, Amherst

*CS Graduate Research Assistant*

**2006 to 2012**

Conducted research with Professor Erik Learned-Miller on computer vision and face processing. Extended the method of congealing to align complex image classes such as faces and cars. Developed Labeled Faces in the Wild (LFW), a database for studying face recognition algorithms under complex, unconstrained,

real world conditions. LFW has become the de facto standard for measuring performance on unconstrained face recognition, with the associated technical report being cited over four hundred times. Ph.D. dissertation focused on applying weakly supervised learning methods for improved unconstrained face processing. Specifically, by developing algorithms incorporating unsupervised feature learning using deep learning methods, state-of-the-art results were achieved for both face verification and face alignment on LFW.

## Mitsubishi Electric Research Laboratories

*Graduate Research Intern* **2008**

Conducted research on pose and lighting normalization for unconstrained face recognition with Dr. Michael Jones and Professor Erik Learned-Miller. Developed a patch-based warping algorithm to synthesize frontal face views, demonstrating increased performance when combined with existing face recognition systems, and optimized using an approximate nearest neighbor algorithm.

*Research Intern* **2002**

Conducted research on the application of wavelet analysis to distance fields, under Thouis Jones, as part of the Research Science Institute held at Massachusetts Institute of Technology.

## Stanford University

*CS Graduate Research Assistant* **2005 - 2006**

Conducted research with Professor Daphne Koller and Dr. Ben Taskar in computer vision and perception, on the problem of object recognition using a discriminative constellation semi-supervised approach, applied to the Caltech 101 data set.

*CS Graduate Teaching Assistant* **2005 - 2006**

Teaching assistant for CS 221 Artificial Intelligence, taught by Professor Daphne Koller and Professor Andrew Ng, with responsibilities including grading, preparing handouts, and teaching recitation sections.

*CS Undergraduate Research Program* **2003**

Conducted research with Professor Daphne Koller in detecting anomalous activity in social networks using Relational Markov networks to classify patterns and subgroups based on graph properties within large, heterogeneous relational data.

*Mathematics Undergraduate Research Program* **2003**

Conducted research in topology with Professor Gunnar Carlsson on the statistical behavior of Betti numbers of random points on a variety of different surfaces.

## Bell Labs

*Research Intern* **2002**

Conducted research with Dr. Oskar Mencer on application optimization using a method for auto-configuring Field Programmable Gate Arrays by testing performance gain on a sample application of wavelet analysis.

## PUBLICATIONS

Gary B. Huang and Viren Jain. Deep and Wide Multiscale Recursive Networks for Robust Image Labeling. Working Paper.

John A. Bogovic, Gary B. Huang (joint first authors), and Viren Jain. Learned versus Hand-Designed Feature Representations for 3d Agglomeration. Working Paper.

Gary B. Huang. Weakly Supervised Learning for Unconstrained Face Processing. Ph.D. Thesis, University of Massachusetts, Amherst, 2012.

Gary B. Huang, Marwan Mattar, Honglak Lee, and Erik Learned-Miller. Learning to Align from Scratch. Advances in Neural Information Processing Systems (NIPS), 2012.

Gary B. Huang, Honglak Lee, and Erik Learned-Miller. Learning Hierarchical Representations for Face Verification with Convolutional Deep Belief Networks. IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2012.

Gary B. Huang, Andrew Kae, Carl Doersch, and Erik Learned-Miller. Bounding the Probability of Error for High Precision Optical Character Recognition. Journal of Machine Learning Research (JMLR), Volume 13, pp. 363-387, 2012.

Andrew Kae, Gary B. Huang, Carl Doersch, and Erik Learned-Miller. Improving State-of-the-Art OCR through High-Precision Document-Specific Modeling. IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2010.

Andrew Kae, Gary B. Huang, and Erik Learned-Miller. Bounding the Probability of Error for High Precision Recognition. Technical Report UM-CS-2009-031, Dept. of Computer Science, University of Massachusetts, Amherst, 2009.

Gary B. Huang and Erik Learned-Miller. Learning Class-Specific Image Transformations with Higher-Order Boltzmann Machines. In Structured Models in Computer Vision Workshop in CVPR, 2010.

Gary B. Huang, Michael J. Jones, and Erik Learned-Miller. LFW Results Using a Combined Nowak Plus MERL Recognizer. Faces in Real-Life Images Workshop in European Conference on Computer Vision (ECCV), 2008.

Gary B. Huang, Manjunath Narayana, and Erik Learned-Miller. Towards Unconstrained Face Recognition. Sixth IEEE Computer Society Workshop on Perceptual Organization in Computer Vision in Computer Vision and Pattern Recognition (CVPR), 2008.

Gary B. Huang, Vidit Jain, and Erik Learned-Miller. Unsupervised Joint Alignment of Complex Images. International Conference on Computer Vision (ICCV), 2007.

Gary B. Huang, Manu Ramesh, Tamara Berg, and Erik Learned-Miller. Labeled Faces in the Wild: A Database for Studying Face Recognition in Unconstrained Environments. University of Massachusetts, Amherst, Technical Report 07-49, October, 2007.

Gary B. Huang, Marwan Mattar, Tamara Berg, and Erik Learned-Miller. Labeled Faces in the Wild: A Database for Studying Face Recognition in Unconstrained Environments. Faces in Real-Life Images Workshop in European Conference on Computer Vision (ECCV), 2008.

#### HONORS AND AWARDS

- University of Massachusetts Amherst, Computer Science, Graduate Student Outstanding Dissertation Award, 2013

- Passed University of Massachusetts Amherst, Computer Science portfolio (candidacy exam) with distinction
- University of Massachusetts Amherst, Robin Popplestone Fellowship in Robotics & Artificial Intelligence, 2006
- ACM International Collegiate Programming Contest World Finals, 2004; Stanford team placed 13th out of 73
- ACM Pacific Northwest Regional Programming Contest, 2003; Stanford team placed 2nd out of 82
- ACM Programming Contest Stanford Team, 2003, placed in top three in local competition
- Stanford Undergraduate Research Internships, 2003
- Stanford University President's Scholar, 2001
- Intel Science Talent Search National Semi-Finalist, 2001
- Wisconsin Science Talent Search 1st place, 2001
- Lucent Global Science Scholar, 2001
- Research Science Institute, 2000
- USA Computing Olympiad Finalist, 1999

#### SERVICE

Reviewer for International Conference on Computer Vision (ICCV), 2011, 2013; Computer Vision and Pattern Recognition (CVPR) 2007-2013; European Conference on Computer Vision (ECCV) 2008; British Machine Vision Conference (BMVC) 2008; Pattern Analysis and Machine Intelligence (PAMI) Special Issue on Real-World Face Recognition, 2010; IEICE Transactions on Information and Systems, 2012.

Website Chair for Computer Vision and Pattern Recognition (CVPR), 2014, 2015.