

Eric Kim

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RESEARCH INTERESTS

Computer vision, machine learning, medical imaging. Specific applications: face recognition, tissue segmentation, visual modeling, and 3D reconstruction.

EDUCATION

University of California, Los Angeles Computer Science, M.S. (09/2013 – 06/2016)
Advisors: Professor Demetri Terzopoulos, Dr. M. Alex O. Vasilescu (Tensor Vision Technologies)
Thesis: “A Part-Based, Multiresolution, TensorFaces Approach to Image-Based Facial Verification”
University of California, Berkeley Computer Science, B.A. (08/2007 – 12/2011)

PUBLICATIONS

“Improved Support for Machine-Assisted Ballot-Level Audits,” Eric Kim, Nicholas Carlini, Andrew Chang, George Yiu, Kai Wang, David Wagner. *EVT/WOTE 2013*, August 2013.

Presented improvements to the OpenCount system, which significantly reduce operator effort. Our new techniques yield order-of-magnitude speedups compared to the previous system, and enable us to successfully process elections that would not have reasonably been feasible without these improvements.

“Operator-Assisted Tabulation of Optical Scan Ballots,” Kai Wang, Eric Kim, Nicholas Carlini, Ivan Motyashov, Daniel Nguyen, David Wagner. *EVT/WOTE 2012*, August 2012.

Designed and developed the OpenCount software, which allows an operator to efficiently create vote tallies of scanned voted ballots from an election. This is accomplished via a system that interleaves computer vision algorithms and operator assistance to achieve perfect (or near-perfect) accuracy. Successfully applied the tool on several California pilot audits in 2011.

“An Analysis of Write-in Marks on Optical Scan Ballots,” Theron Ji, Eric Kim, Raji Srikantan, Alan Tsai, Arel Cordero, and David Wagner. *EVT/WOTE 2011*, August 2011.

Developed a system to achieve automatic recognition of write-in marks on marked voter ballots. Evaluated the system on a large-scale election in Leon County, Florida, and studied the kinds of write-in marks that are seen in practice.

POSTERS

“OpenCount: Operator-Assisted Tabulation of Optical Scan Ballots”, Eric Kim, Nicholas Carlini, Andrew Chang, George Yiu, Zongheng Yang, Kai Wang, David Wagner. *NIST Future of Voting Systems Symposium*, February 2013.

EXPERIENCE

Software Engineer

Pinterest, Inc.

Applied computer vision and machine learning domain expertise to enhance visual search user experience.

January 2017 – Present

Discovery (Visual Search)

Graduate Researcher

University of California, Los Angeles

Tensor Vision Technologies

Developed a novel facial verification system. By analyzing faces in a multiresolution, part-based multilinear framework, we improved verification results by 13% on the “Labeled Faces in the Wild” dataset relative to a previous multilinear approach (79% overall).

This work matured into my MS thesis, titled: “A Part-Based, Multiresolution, TensorFaces Approach to Image-Based Facial Verification”. Advisors: Professor Demetri Terzopoulos (UCLA), Dr. M. Alex O. Vasilescu (Tensor Vision Technologies).

September 2014 – June 2016

Department of Computer Science

Research Programmer

University of California, Los Angeles

Developed a statistical model of shape and appearance to perform bone contour segmentation of 3D medical imaging data. The algorithm iteratively improves the contour by updating each landmark based on a learned model of local appearance, followed by a global shape constraint update. Enhanced accuracy

January 2016 – Present

School of Dentistry

of the model by extending the appearance model and the search algorithm to work well on 3D data. Applied 3D mesh algorithms to quantitatively determine facial surgery effects on facial structure. After achieving mesh correspondence by applying a nonrigid iterative closest point registration algorithm, I ran statistical tests on pre/post operation facial structure data to determine statistically significant regions of change.

Research Engineer	January 2012 – August 2013
Research Assistant	August 2010 – January 2012
<i>University of California, Berkeley</i>	<i>Department of Computer Science</i>

Designed and developed the election auditing software “OpenCount”. Involved the use of computer vision and image processing techniques: image registration, digit recognition, automatic visual barcode decoding, and “human-in-the-loop” processing for efficient data entry. Successfully performed several pilot audit programs in several California counties.

TEACHING EXPERIENCE

Teaching Assistant (CS 61A)	May 2012 – August 2012
Teaching Assistant (CS 61A)	August 2011 – December 2011
Teaching Assistant (CS 3L)	May 2011 – August 2011
Teaching Assistant (CS 61A)	January 2011 – May 2011
Teaching Assistant (CS 61A)	August 2010 – December 2010
Teaching Assistant (CS 61BL)	May 2010 – August 2010
<i>University of California, Berkeley</i>	<i>Department of Computer Science</i>
Teaching Assistant (CS 33)	April 2015 – June 2015
Teaching Assistant (PIC 10A)	January 2016 – March 2016
Teaching Assistant (PIC 10A)	March 2016 – June 2016
<i>University of California, Los Angeles</i>	<i>Department of Computer Science</i>

Taught several undergraduate computer science courses. Duties included holding weekly sections, writing and grading exams, holding office hours, and developing course material.

PROJECTS

- FourVoices: An automatic music generator. Utilizing artificial intelligence and music theory led to an elegant and extendable framework that consistently outputs pleasing music. I transformed the problem into a set of constraints and variables, and solved the resulting problem with a general-purpose constraint satisfaction solver. The project is hosted on GitHub, where I have also written documentation and tutorials. (Python)
- Handwriting recognition. Utilized adaptive splines to recognize handwritten characters. To recognize a handwritten character, a deformable spline model is fit to the character via an iterative deformation algorithm. The algorithm outputs a deformation cost which is used for recognition: the label of the spline model with smallest cost is declared the output label. (Matlab)
- Efficient barcode decoder for the Interleaved 2-of-5 format. (Python, OpenCV)
- Wrote a gentle tutorial to kernel methods as used in machine learning. Title: “*Everything You Wanted to Know about the Kernel Trick (But Were Too Afraid to Ask)*”. This article is the second search result returned for Google searches of “kernel trick”, as of 2016.
- Python 2.5 compiler targeting the x86 ISA, with the addition of strong typing support. (C++, Python)

KEY SKILLS

Technical Skills

Programming Languages: Python, Matlab, C, C++, Java, Javascript, HTML, CSS, php, Scheme, Assembly (MIPS, x86_64)
 Specializations: Face recognition, computer vision, medical imaging, machine learning, nonlinear optimization, automatic landmark detection, data analysis.
 Libraries: OpenCV, vlfeat, numpy, scipy, OpenGL
 Productivity: Version control (svn, git, mercurial), GDB, Wireshark, UNIX toolset, LaTeX

GRADUATE COURSEWORK

Machine Perception	Linear Programming	Convex Optimization
Reasoning with Partial Beliefs	Large Scale Optimization	Applied Probability
	Visual Modeling	

UNDERGRADUATE COURSEWORK

Algorithms
Machine Structures
Machine Learning
Linear Algebra

Discrete Math
Operating Systems
Compilers
Computer Networks

Data Structures
Artificial Intelligence
Computer Security
Computer Graphics