

Marc Khoury

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Education

- 2013-
PRESENT **University of California, Berkeley**, Berkeley, CA
Ph.D., Computer Science
Advisor: Jonathan Shewchuk
- 2012-2013 **University of Cambridge**, Cambridge, England, UK
MASt, Mathematics
- 2008-2012 **The Ohio State University**, Columbus, Ohio
Bachelor of Science, Computer Science and Engineering
Summa cum laude with Honors Research Distinction

Experience

- 2013-PRES **University of California, Berkeley**
Department of Electrical Engineering & Computer Sciences
Advisor: Prof. Jonathan Shewchuk
Developed new algorithms for surface reconstruction in high dimensions and surface meshing with constrained segments in low dimensions, using Delaunay triangulations and Voronoi diagrams. Currently developing theoretical foundations for understanding robustness to adversarial examples in deep learning.
- 2016-2017 **Intel Labs**
Research Intern, Intelligent Systems Lab
Advisor: Dr. Vladlen Koltun
Developed a new approach for constructing local geometric feature descriptors for point cloud correspondences using deep learning.
- Summer
2014 **Twitter**
Software Engineer Intern
Developed applications that enable mobile developers to support advertisements.
- Summer
2012 **Microsoft Research**
Research Intern, RiSE Group
Advisor: Dr. Lev Nachmanson
Worked on a progressive graph data structure for interactive visualization of large graphs.

- 2009-2012 **The Ohio State University**
 Department of Computer Science and Engineering
 Advisor: Prof. Rephael Wenger
 Analyzed the complexity of isosurface construction using fractal dimension and developed new noise reduction techniques. Also conducted research in streamline visualization.
- Fall 2011 **Amazon.com**
 Software Engineer Intern
 Developed applications to collect, store, and analyze data for fraud investigations.
- Summer 2011 **AT&T Labs Research**
 Research Intern, Information Visualization Group
 Advisors: Dr. Carlos Scheidegger
 Developed a new algorithm for large graph visualization based on low-rank matrix approximations and Barnes–Hut simulations.

Publications

CONFERENCE AND JOURNAL ARTICLES

- [1] **Adaptive versus Standard Descent Methods and Robustness Against Adversarial Examples** Marc Khoury, CoRR, abs/1911.03784, 2019
- [2] **Approximation Bounds for Interpolation and Normals on Triangulated Surfaces and Manifolds** Marc Khoury, Jonathan Shewchuk, CoRR, abs/1911.03424, 2019
- [3] **Adversarial Training with Voronoi Constraints** Marc Khoury, Dylan Hadfield-Menell, SafeML Workshop, International Conference on Learning Representations (ICLR), 2019
- [4] **On the Geometry of Adversarial Examples** Marc Khoury, Dylan Hadfield-Menell, CoRR, abs/1811.00525, 2018
- [5] **Restricted Constrained Delaunay Triangulations** Marc Khoury, Jonathan Shewchuk, In Preparation
- [6] **Learning Compact Geometric Features** Marc Khoury, Qian-Yi Zhou, Vladlen Koltun, International Conference on Computer Vision (ICCV), 2017
- [7] **Supporting Ruled Polygons** Nicholas J. Cavanna, Marc Khoury, Donald R. Sheehy, Canadian Conference on Computational Geometry (CCCG), 2017
- [8] **Fixed Points of the Restricted Delaunay Triangulation Operator** Marc Khoury, Jonathan Shewchuk, Symposium on Computational Geometry (SoCG) 2016
- [9] **Drawing Large Graphs by Low-Rank Stress Majorization**, Marc Khoury, Yifan Hu, Shankar Krishnan, Carlos Scheidegger, Computer Graphics Forum, 2012 (Proceedings of EuroVis)

- [10] **On the Fractal Dimension of Isosurfaces**, Marc Khoury, Rephael Wenger, IEEE Transactions on Visualization and Computer Graphics, 2010 (Proceedings of Vis)

POSTERS

- [11] **Exploring Flow Fields Using Fractal Analysis of Field Lines**, Abon Chaudhuri, Teng-Yok Lee, Han-Wei Shen, Marc Khoury, Rephael Wenger, IEEE Scientific Visualization Conference (SciVis) 2012, Seattle, WA, Oct 2012. **Best Poster Award**

MAGAZINE

- [12] **On Computable Functions**, Marc Khoury, Eureka (Cambridge), issue 63, 2014

TECH REPORTS

- [13] **Exploring Flow Fields Using Fractal Analysis of Field Lines**, Abon Chaudhuri, Teng-Yok Lee, Han-Wei Shen, Marc Khoury, Rephael Wenger, OSU-CISRC-4/11-TR15, 2011

THESES

- [14] **Barriers in Computational Complexity**, Part III Master's Essay, University of Cambridge
- [15] **The Nature of the Isosurface Fractal Dimension**, Undergraduate Thesis, The Ohio State University

GRANTS

- [16] **Geometric Sampling Theory and Robust Machine Learning Algorithms**, NSF Award CCF-1909235, \$400,000, PI: Jonathan Shewchuk, 2019, Based on my work in [4]; I contributed a significant fraction of the project ideas and text.

Invited Talks

On the Geometry of Adversarial Examples, Simons Institute for the Theory of Computing

On the Geometry of Adversarial Examples, Google Brain

Restricted Constrained Delaunay Triangulations, Inria Sophia Antipolis

Restricted Constrained Delaunay Triangulations, Simons Center for Geometry and Physics

The Fractal Dimension of Isosurfaces, Ohio Wesleyan University, Dept. of Mathematics and Computer Science

Teaching Experience

Summer
2019

University of California, Berkeley

Lecturer, CS 189, Introduction to Machine Learning

Lecturer for undergraduate course on machine learning. Prepared and presented lectures

on basic topics in supervised and unsupervised learning, optimization, and linear algebra. Led a team of 4 TAs and 7 readers to teach 107 students.

- Spring 2019 **University of California, Berkeley**
Head Graduate Student Instructor, CS 189, Introduction to Machine Learning
Head GSI for undergraduate course on machine learning. Led a team of 18 TAs and 16 readers to teach 744 students.
- Spring 2015 **University of California, Berkeley**
Co-lecturer, CS 274, Computational Geometry
Prepared and presented half of the lectures for graduate-level computational geometry.
- Spring 2014 **We Teach Science**
Volunteer Tutor
Private algebra tutor for middle school students in the Bay Area.
- 9/2010-6/2011 **The Ohio State University**
Math and Statistics Learning Center
Tutor for the introductory honors calculus sequence, discrete mathematics, foundations of higher mathematics, and linear algebra.

Service

Reviewer CVPR 2018, PAMI, ISAAC 2017, WinCompTop 2017, TVCG, GD 2015, EuroVis 2013

Software

CGF

Compact geometric features (CGF) learned from data that are significantly more precise and robust than previous hand-designed features for point cloud registration.

mars

A scalable graph drawing program that uses approximate linear algebra to make stress majorization feasible for large graphs.

Skills

Languages: Python, C++, Java, Mathematica
Graphics: OpenGL, GLSL, GLUI, Graphviz, OmniGraffle
Development: Unix, Git, \LaTeX
Machine Learning: PyTorch, TensorFlow

Honors and Awards

2015	Tong Leong Lim Pre-Doctoral Prize, UC Berkeley
2014	Finalist, Hertz Fellowship
2012	NSF Graduate Research Fellowship
2012	Churchill Scholarship
2012	EECS Chair's Excellence Award, UC Berkeley
2012	Honorable Mention, CRA Outstanding Undergraduate Researcher Award
2011	Computer Science Undergraduate Research Award, Ohio State University
2011-2012	Undergraduate Research Scholar in Engineering, Ohio State University
2011	Computer Science Department Founders Scholarship, Ohio State University