

Fred Hohman

Data science + visualization researcher

I research how to enable **machine learning interpretability** at scale and for everyone, by designing and developing interactive interfaces to help people confidently understand data-driven systems. Besides building tools, I also create **data visualizations** and write interactive articles to simply communicate complex ideas.

I have collaborated with researchers, designers, developers, and artists while working at Apple, Microsoft Research, NASA Jet Propulsion Lab, and Pacific Northwest National Lab.

My research is supported by a NASA Space Technology Research Fellowship.

🏠 fredhohman.com

✉ fredhohman@gatech.edu

📄 [CV PDF](#)

🐦 [@fredhohman](https://twitter.com/fredhohman)

🔗 [@fredhohman](#)

🎓 [Google Scholar](#)

Education

Present — Aug. 2015

Ph.D. in Computational Science & Engineering

Georgia Institute of Technology, Atlanta, GA

Advisor: Duen Horng (Polo) Chau, Co-advisor: Alex Endert

Thesis: *Interactive Scalable Interfaces for Machine Learning Interpretability*

Committee: Duen Horng (Polo) Chau, Alex Endert, Chao Zhang, Nathan Hodas, Scott Davidoff, Steven Drucker

May 2018

M.S. in Computational Science & Engineering

Georgia Institute of Technology, Atlanta, GA

GPA: 4.00/4.00

May 2015 — Aug. 2011

B.S. in Mathematics, B.S. in Physics

University of Georgia, Athens, GA

Thesis: *3D Printing the Trefoil Knot and its Pages*

Overall GPA: 3.84/4.00, Magna Cum Laude, Area of Emphasis in Applied Mathematics

Industry Research Experience

Summer 2019

Apple, Seattle, WA

Research Intern, Turi Human-centered Machine Learning Group

Mentor: Kanit Wongsuphasawat, Kayur Patel

Designed and developed interactive visualizations for data iteration in machine learning, published at CHI 2020.

Summer 2018

Microsoft Research, Redmond, WA

Research Intern, Human-Computer Interaction Group

Mentor: Steven Drucker

Designed, developed, and deployed interactive interface for operationalizing machine learning interpretability, published at CHI 2019.

Summer 2017

NASA Jet Propulsion Lab, Pasadena, CA

Creative Computer Scientist, Human Interfaces Group

Mentor: Scott Davidoff, Arun Viswanathan

Joint work between NASA JPL, Caltech, and Art Center creating interactive data visualizations for current scientific research. Prototype presented to lab leadership and secured funding to be incorporated into Mars 2020 mission.

Summer 2016

Pacific Northwest National Lab, Richland, WA

National Security Ph.D. Intern, Data Sciences & Analytics Group

Mentor: Nathan Hodas

Built interactive tools that generate synthetic images to explain deep learning classifiers, published at CHI 2017.

Academic Research Experience

Present — Aug. 2016

Georgia Institute of Technology, Atlanta, GA

Graduate Research Assistant, School of Computational Science and Engineering

Advisor: Duen Horng (Polo) Chau, Alex Endert

Member of the Polo Club of Data Science where we bridge and innovate at the intersection of data mining and human-computer interaction to synthesize scalable, interactive, and interpretable tools that amplify human's ability to understand and interact with big data.

May 2016 — Aug. 2015

Georgia Institute of Technology, Atlanta, GA

Graduate Research Assistant, School of Computational Science and Engineering

Mentor: Surya Kalidindi

Conducted research in physical data science and material informatics by creating property-structure linkages using machine learning to predict material properties. Contributed to direction and code of PyMKS: Materials Knowledge Systems in Python.

May 2015 — Jan. 2013

University of Georgia, Athens, GA

Undergraduate Research Assistant, Department of Mathematics

Advisor: David Gay

Explored 3D printing and mathematical exposition in topology. Programmed, designed, and 3D printed 34-piece, color-coordinated, and magnetized 3D puzzle of the trefoil knot fibration. Led 3D printing research and education in mathematics department.

Summer 2014

REU in Mathematics and Computational Science, Fairfield, CT

Fairfield University, Department of Mathematics

Mentor: Shanon Reckinger

Directly compared numerical solutions from Navier-Stokes equations to designed lab-scale experiments to model specific ocean phenomena. Configured MIT General Circulation Model on CPU cluster to run parallel computational fluid dynamics simulations.

Honors and Awards

2019 **Best Paper at ACM CHI Conference**

For "Managing Messes in Computational Notebooks"

2018 **Best Paper, Honorable Mention at VISxAI Workshop at IEEE VIS**

For "The Beginner's Guide to Dimensionality Reduction"

2018 — 2021 **NASA Space Technology Research Fellowship**

For my Ph.D. work on "Understanding Deep Neural Networks Through Attribution and Interactive Experimentation"

2018 **Audience Appreciation Award, Runner Up at ACM SIGKDD Conference**

For "Shield: Fast, Practical Defense and Vaccination for Deep Learning using JPEG Compression"

2017 — 2018 **Microsoft Azure for Research Award: AI for Earth**

For our work on "Deep Learning for Fine-scale Population Maps"

2017 **Best Demo, Honorable Mention at ACM SIGMOD/PODS Conference**

For "Visual Graph Query Construction and Refinement"

2015 — 2019 **President's Fellowship at Georgia Institute of Technology**

Select number of 1st year doctoral students who bring exemplary levels of scholarship and innovation to their academic departments

2015 **Outstanding Poster at JMM Undergraduate Poster Session in Computational Math**

For "Experimental and Numerical Comparison of Oceanic Overflow"

2015 **UGA CURO Research Graduation Distinction**

Awarded to undergraduates who write a thesis, present at the CURO Symposium, and complete 9 research credit hours

2014 **UGA CURO Research Assistantship**

Stipend awarded to outstanding undergraduates that actively participate in faculty-mentored research

2011 — 2015 **Dean's List**

Achieved at least a 3.5 GPA during a semester with minimum 14 credit hours

2011 — 2015 **Georgia HOPE Scholarship**

Merit-based award to Georgia residents providing tuition assistance for their undergraduate degree

2011 **Mission of Blessed Trinity: Artistic Sensibility**

One of two students to receive the Mission Statement award upon high-school graduation

Publications

Selected: Latest & Greatest

CNN Explainer: Learning Convolutional Neural Networks with Interactive Visualization

Zijie J. Wang, Robert Turko, Omar Shaikh, Haekyu Park, Nilaksh Das, Fred Hohman, Minsuk Kahng, Duen Horng (Polo) Chau

IEEE Transactions on Visualization and Computer Graphics (TVCG). Salt Lake City, UT, USA, 2021.

[Project](#) [Demo](#) [PDF](#) [Video](#) [Code](#) [BibTeX](#) [★ Top of Github Trending](#)

Understanding and Visualizing Data Iteration in Machine Learning

Fred Hohman, Kanit Wongsuphasawat, Mary Beth Kery, Kayur Patel

ACM Conference on Human Factors in Computing Systems (CHI). Honolulu, HI, USA, 2020.

[Project](#) [PDF](#) [Video](#) [Preview](#) [Recording](#) [Slides](#) [BibTeX](#)

Summit: Scaling Deep Learning Interpretability by Visualizing Activation and Attribution

Summarizations

Fred Hohman, Haekyu Park, Caleb Robinson, Duen Horng (Polo) Chau

IEEE Transactions on Visualization and Computer Graphics (TVCG). Vancouver, Canada, 2020.

[Project](#) [Demo](#) [PDF](#) [Video](#) [Recording](#) [Slides](#) [Code](#) [BibTeX](#)

FairVis: Visual Analytics for Discovering Intersectional Bias in Machine Learning

Angel Cabrera, Will Epperson, Fred Hohman, Minsuk Kahng, Jamie Morgenstern, Duen Horng (Polo) Chau

IEEE Conference on Visual Analytics Science and Technology (VAST). Vancouver, Canada, 2019.

[Project](#) [Demo](#) [PDF](#) [Blog](#) [Recording](#) [Slides](#) [Code](#) [BibTeX](#)

Gamut: A Design Probe to Understand How Data Scientists Understand Machine Learning Models

Fred Hohman, Andrew Head, Rich Caruana, Robert DeLine, Steven Drucker

ACM Conference on Human Factors in Computing Systems (CHI). Glasgow, UK, 2019.

[Project](#) [Demo](#) [PDF](#) [Blog](#) [Video](#) [Preview](#) [Slides](#) [BibTeX](#) [★ Deployed at Microsoft Research](#)

Visual Analytics in Deep Learning: An Interrogative Survey for the Next Frontiers

Fred Hohman, Minsuk Kahng, Robert Pienta, Duen Horng (Polo) Chau

IEEE Transactions on Visualization and Computer Graphics (TVCG). Berlin, Germany, 2018.

[Project](#) [Demo](#) [PDF](#) [Blog](#) [Video](#) [Slides](#) [Code](#) [BibTeX](#)

All Publications

CNN Explainer: Learning Convolutional Neural Networks with Interactive Visualization

Zijie J. Wang, Robert Turko, Omar Shaikh, Haekyu Park, Nilaksh Das, Fred Hohman, Minsuk Kahng, Duen Horng (Polo) Chau

IEEE Transactions on Visualization and Computer Graphics (TVCG). Salt Lake City, UT, USA, 2021.

[Project](#) [Demo](#) [PDF](#) [Video](#) [Code](#) [BibTeX](#) [★ Top of Github Trending](#)

Bluff: Interactively Deciphering Adversarial Attacks on Deep Neural Networks

Nilaksh Das*, Haekyu Park*, Zijie J. Wang, Fred Hohman, Robert Firstman, Emily Rogers, Duen Horng (Polo) Chau

IEEE Visualization Conference (VIS). Salt Lake City, UT, USA, 2020.

[Project](#) [Demo](#) [PDF](#) [BibTeX](#) *Authors contributed equally

mage: Fluid Moves Between Code and Graphical Work in Computational Notebooks

Mary Beth Kery, Donghao Ren, Fred Hohman, Dominik Moritz, Kanit Wongsuphasawat, Kayur Patel

ACM Symposium on User Interface Software and Technology (UIST). Minneapolis, MN, USA, 2020.

[Project](#) [PDF](#) [BibTeX](#)

Understanding and Visualizing Data Iteration in Machine Learning

Fred Hohman, Kanit Wongsuphasawat, Mary Beth Kery, Kayur Patel

ACM Conference on Human Factors in Computing Systems (CHI). Honolulu, HI, USA, 2020.

[Project](#) [PDF](#) [Video](#) [Preview](#) [Recording](#) [Slides](#) [BibTeX](#)

The Future of Notebook Programming Is Fluid

Mary Beth Kery, Donghao Ren, Kanit Wongsuphasawat, Fred Hohman, Kayur Patel

Extended Abstracts on ACM Human Factors in Computing Systems (CHI). Honolulu, HI, USA, 2020.

[Project](#) [PDF](#) [BibTeX](#)

CNN 101: Interactive Visual Learning for Convolutional Neural Networks

Zijie J. Wang, Robert Turko, Omar Shaikh, Haekyu Park, Nilaksh Das, Fred Hohman, Minsuk Kahng, Duen

Zijie J. Wang, Robert Turko, Omar Shaikh, Haekyu Park, Nilaksh Das, Fred Hohman, Minsuk Kahng, Duen Horng (Polo) Chau

Extended Abstracts on ACM Human Factors in Computing Systems (CHI). Honolulu, HI, USA, 2020.

[Project](#) [PDF](#) [Video](#) [Code](#) [BibTeX](#)

Massif: Interactive Interpretation of Adversarial Attacks on Deep Learning

Nilaksh Das*, Haekyu Park*, Zijie J. Wang, Fred Hohman, Robert Firstman, Emily Rogers, Duen Horng (Polo) Chau

Extended Abstracts on ACM Human Factors in Computing Systems (CHI). Honolulu, HI, USA, 2020.

[Project](#) [PDF](#) [BibTeX](#) *Authors contributed equally

Summit: Scaling Deep Learning Interpretability by Visualizing Activation and Attribution Summarizations

Fred Hohman, Haekyu Park, Caleb Robinson, Duen Horng (Polo) Chau

IEEE Transactions on Visualization and Computer Graphics (TVCG). Vancouver, Canada, 2020.

[Project](#) [Demo](#) [PDF](#) [Video](#) [Recording](#) [Slides](#) [Code](#) [BibTeX](#)

FairVis: Visual Analytics for Discovering Intersectional Bias in Machine Learning

Angel Cabrera, Will Epperson, Fred Hohman, Minsuk Kahng, Jamie Morgenstern, Duen Horng (Polo) Chau

IEEE Conference on Visual Analytics Science and Technology (VAST). Vancouver, Canada, 2019.

[Project](#) [Demo](#) [PDF](#) [Blog](#) [Recording](#) [Slides](#) [Code](#) [BibTeX](#)

TeleGam: Combining Visualization and Verbalization for Interpretable Machine Learning

Fred Hohman*, Arjun Srinivasan*, Steven Drucker

IEEE Visualization Conference (VIS). Vancouver, Canada, 2019.

[Project](#) [Demo](#) [PDF](#) [Preview](#) [Recording](#) [Slides](#) [Code](#) [BibTeX](#) *Authors contributed equally

ElectroLens: Understanding Atomistic Simulations through Spatially-resolved Visualization of High-dimensional Features

Xiangyun Lei, Fred Hohman, Duen Horng (Polo) Chau, Andrew Medford

IEEE Visualization Conference (VIS). Vancouver, Canada, 2019.

[Project](#) [PDF](#) [Code](#) [BibTeX](#)

Launching the Parametric Press

Matthew Conlen, Fred Hohman

Visualization for Communication at IEEE VIS (VisComm). Vancouver, Canada, 2019.

[Project](#) [Demo](#) [PDF](#) [Code](#) [BibTeX](#)

Gamut: A Design Probe to Understand How Data Scientists Understand Machine Learning Models

Fred Hohman, Andrew Head, Rich Caruana, Robert DeLine, Steven Drucker

ACM Conference on Human Factors in Computing Systems (CHI). Glasgow, UK, 2019.

[Project](#) [Demo](#) [PDF](#) [Blog](#) [Video](#) [Preview](#) [Slides](#) [BibTeX](#) ★ [Deployed at Microsoft Research](#)

Managing Messes in Computational Notebooks

Andrew Head, Fred Hohman, Titus Barik, Steven Drucker, Robert DeLine

ACM Conference on Human Factors in Computing Systems (CHI). Glasgow, UK, 2019.

[Project](#) [Demo](#) [PDF](#) [Video](#) [Preview](#) [Slides](#) [Code](#) [BibTeX](#) 🏆 [Best Paper](#)

Discovery of Intersectional Bias in Machine Learning Using Automatic Subgroup Generation

Angel Cabrera, Minsuk Kahng, Fred Hohman, Jamie Morgenstern, Duen Horng (Polo) Chau

Debugging Machine Learning Models Workshop at ICLR (Debug ML). New Orleans, LA, USA, 2019.

[Project](#) [PDF](#) [BibTeX](#)

NeuralDivergence: Exploring and Understanding Neural Networks by Comparing Activation Distributions

Haekyu Park, Fred Hohman, Duen Horng (Polo) Chau

Poster, IEEE Pacific Visualization Symposium (PacificVis). Bangkok, Thailand, 2019.

[Project](#) [Demo](#) [PDF](#) [Slides](#) [Poster](#) [BibTeX](#)

Atlas: Local Graph Exploration in a Global Context

James Abello*, Fred Hohman*, Varun Bezzam, Duen Horng (Polo) Chau

ACM Conference on Intelligent User Interfaces (IUI). Los Angeles, CA, USA, 2019.

[Project](#) [PDF](#) [Video](#) [Talk](#) [Slides](#) [Code](#) [BibTeX](#) *Authors contributed equally

Scalable K-Core Decomposition for Static Graphs Using a Dynamic Graph Data Structure

Alok Tripathy, Fred Hohman, Duen Horng (Polo) Chau, Oded Green

IEEE International Conference on Big Data (Big Data). Seattle, WA, USA, 2018.

[Project](#) [PDF](#) [BibTeX](#)

Visual Analytics in Deep Learning: An Interrogative Survey for the Next Frontiers

Fred Hohman, Minsuk Kahng, Robert Pienta, Duen Horng (Polo) Chau

IEEE Transactions on Visualization and Computer Graphics (TVCG). Berlin, Germany, 2018.

[🔗 Project](#) [▶ Demo](#) [📄 PDF](#) [📄 Blog](#) [📄 Video](#) [📄 Slides](#) [🔗 Code](#) [📄 BibTeX](#)

The Beginner's Guide to Dimensionality Reduction

Matthew Conlen, Fred Hohman

Workshop on Visualization for AI Explainability at IEEE VIS (VISxAI). Berlin, Germany, 2018.

[🔗 Project](#) [▶ Demo](#) [📄 Slides](#) [🔗 Code](#) [📄 BibTeX](#) 🏆 **Best Paper, Honorable Mention**

Shield: Fast, Practical Defense and Vaccination for Deep Learning using JPEG Compression

Nilaksh Das, Madhuri Shanbhogue, Shang-Tse Chen, Fred Hohman, Siwei Li, Li Chen, Michael E. Kounavis, Duen Horng (Polo) Chau

ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD). London, UK, 2018.

[🔗 Project](#) [📄 PDF](#) [📄 Video](#) [🔗 Code](#) [📄 BibTeX](#) 🏆 **Audience Appreciation Award, Runner Up**

Compression to the Rescue: Defending from Adversarial Attacks Across Modalities

Nilaksh Das, Madhuri Shanbhogue, Shang-Tse Chen, Fred Hohman, Siwei Li, Li Chen, Michael E. Kounavis, Duen Horng (Polo) Chau

Project Showcase, ACM SIGKDD Conference on Knowledge Discovery and Data Mining. London, UK, 2018.

[🔗 Project](#) [📄 PDF](#) [🔗 Code](#) [📄 BibTeX](#)

Interactive Classification for Deep Learning Interpretation

Angel Cabrera, Fred Hohman, Jason Lin, Duen Horng (Polo) Chau

Demo, Conference on Computer Vision and Pattern Recognition (CVPR). Salt Lake City, UT, USA, 2018.

[🔗 Project](#) [▶ Demo](#) [📄 PDF](#) [📄 Video](#) [🔗 Code](#) [📄 BibTeX](#)

VIGOR: Interactive Visual Exploration of Graph Query Results

Robert Pienta, Fred Hohman, Alex Endert, Acar Tamersoy, Kevin Roundy, Chris Gates, Shamkant Navathe, Duen Horng (Polo) Chau

IEEE Transactions on Visualization and Computer Graphics (TVCG). Phoenix, AZ, USA, 2018.

[🔗 Project](#) [📄 PDF](#) [📄 Video](#) [👁 Preview](#) [📄 BibTeX](#)

3D Exploration of Graph Layers via Vertex Cloning

James Abello*, Fred Hohman*, Duen Horng (Polo) Chau

Poster, IEEE Conference on Visual Analytics Science and Technology (VAST). Phoenix, AZ, USA, 2017.

[🔗 Project](#) [📄 PDF](#) [📄 Video](#) [📄 Poster](#) [📄 BibTeX](#) *Authors contributed equally

A Viz of Ice and Fire: Exploring Entertainment Video Using Color and Dialogue

Fred Hohman, Sandeep Soni, Ian Stewart, John Stasko

2nd Workshop on Visualization for the Digital Humanities at IEEE VIS (VIS4DH). Phoenix, AZ, USA, 2017.

[🔗 Project](#) [▶ Demo](#) [📄 PDF](#) [📄 Slides](#) [🔗 Code](#) [📄 Data](#) [📄 BibTeX](#)

A Deep Learning Approach for Population Estimation from Satellite Imagery

Caleb Robinson, Fred Hohman, Bistra Dilkina

1st ACM SIGSPATIAL Workshop on Geospatial Humanities (GeoHum.). Redondo Beach, CA, USA, 2017.

[🔗 Project](#) [▶ Demo](#) [📄 PDF](#) [🔗 Code](#) [📄 BibTeX](#) 🏆 **Microsoft AI for Earth Award**

mHealth Visual Discovery Dashboard

Dezhi Fang, Fred Hohman, Peter Polack, Hillol Sarker, Minsuk Kahng, Moushumi Sharmin, Mustafa al'Absi, Duen Horng (Polo) Chau

Demo, ACM International Joint Conference on Pervasive and Ubiquitous Computing (Ubicomp). Maui, HI, USA, 2017.

[🔗 Project](#) [📄 PDF](#) [📄 Video](#) [📄 Poster](#) [📄 BibTeX](#)

Visual Graph Query Construction and Refinement

Robert Pienta, Fred Hohman, Acar Tamersoy, Alex Endert, Shamkant Navathe, Hanghang Tong, Duen Horng (Polo) Chau

Demo, ACM International Conference on Management of Data (SIGMOD/PODS). Chicago, IL, USA, 2017.

[🔗 Project](#) [📄 PDF](#) [📄 Video](#) [📄 Poster](#) [📄 BibTeX](#) 🏆 **Best Demo, Honorable Mention**

ShapeShop: Towards Understanding Deep Learning Representations via Interactive Experimentation

Fred Hohman, Nathan Hodas, Duen Horng (Polo) Chau

Extended Abstracts on ACM Human Factors in Computing Systems (CHI). Denver, CO, USA, 2017.

[🔗 Project](#) [📄 PDF](#) [📄 Video](#) [📄 Poster](#) [🔗 Code](#) [📄 BibTeX](#)

Keeping the Bad Guys Out: Protecting and Vaccinating Deep Learning with JPEG Compression

Nilaksh Das, Madhuri Shanbhogue, Shang-Tse Chen, Fred Hohman, Li Chen, Michael E. Kounavis, Duen Horng (Polo) Chau

arXiv:1705.02900. 2017.

[Project](#) [PDF](#) [Code](#) [BibTeX](#)

The Effect of Numerical Parameters on Eddies in Oceanic Overflows: A Laboratory and Numerical Study

Shanon Reckinger, Thomas Gibson, Fred Hohman, Theresa Morrison, Scott Reckinger, Mateus Carvalho
International Journal of Computational Methods and Experimental Measurements (CMEM). 2019.

[Project](#) [PDF](#) [BibTeX](#)

Experimental and Numerical Comparison of Oceanic Overflow

Thomas Gibson, Fred Hohman, Theresa Morrison, Shanon Reckinger, Scott Reckinger

Abstract, American Physical Society Division of Fluid Dynamics (APS DFD). San Francisco, CA, USA, 2014.

[Project](#) [Blog](#) [Poster](#)

Talks

Interactive Scalable Interfaces for Machine Learning Interpretability

May 2020 IBM Research
Apr. 2020 Microsoft Research
Apr. 2020 Apple
Apr. 2020 Autodesk Research
Dec. 2019 Georgia Tech Thesis Proposal

Summit: Scaling Deep Learning Interpretability by Visualizing Activation and Attribution Summarizations

Mar. 2020 NVIDIA GTC
Oct. 2019 IEEE Visualization

TeleGam: Combining Visualization and Verbalization for Interpretable Machine Learning

Oct. 2019 IEEE Visualization

Gamut: A Design Probe to Understand How Data Scientists Understand Machine Learning Models

June 2019 Microsoft Machine Learning and Data Science Summit
May 2019 ACM Conference on Human Factors in Computing Systems

Explaining Machine Learning Models Using Interactive Visualization

Mar. 2019 Georgia Tech School of CSE Strategic Partnership Program Summit
Apr. 2019 Georgia Tech CSE 6242 Data and Visual Analytics
Mar. 2019 Symantec Research Labs
Mar. 2019 NASA Jet Propulsion Laboratory

Atlas: Local Graph Exploration in a Global Context

Mar. 2019 ACM Intelligent User Interfaces

Visual Analytics in Deep Learning: An Interrogative Survey for the Next Frontiers

Jan. 2019 Carnegie Mellon University
Oct. 2018 University of Georgia
Oct. 2018 IEEE Visualization

The Beginner's Guide to Dimensionality Reduction

Oct. 2018 VISxAI Workshop at IEEE Visualization

Comparing Interactive Local and Global Explanation Paradigms for Human-assisted Machine Learning Tasks

July 2018 Microsoft Research

Graph Playgrounds: 3D Exploration of Graph Layers via Vertex Cloning

Dec. 2017 AT&T Research Labs Graduate Student Symposium

A Viz of Ice and Fire: Exploring Entertainment Video Using Color and Dialogue

Oct. 2017 2nd Workshop on Visualization for the Digital Humanities at IEEE Visualization

Constellation: Visualizing Cybersecurity in Real Time

Aug. 2017 NASA Jet Propulsion Laboratory
Aug. 2017 California Institute of Technology

Visualizing Learned Semantics with Deep Learning

Nov. 2016 Georgia Tech Ph.D. Qualifying Oral Exam

Drawing Semantics with Deep Learning

2016 Pacific Northwest National Laboratory

3D Printing The Trefoil Knot And Its Pages

Mar. 2015 UGA Center for Undergraduate Research Symposium, included hands-on demo

Experimental and Numerical Studies of Oceanic Overflow

June 2015 AMS Conference on Atmospheric and Oceanic Fluid Dynamics
Jan. 2015 Joint Mathematics Meeting
Nov. 2014 APS Division of Fluid Dynamics
Aug. 2014 Invited and presented on behalf at Brown University, Los Alamos National Lab
July 2014 Northeast REU Mini-Conference at Yale University
July 2014 University of Rhode Island Bay Campus

3D Printing in Topology

Mar. 2014 UGA Center for Undergraduate Research Symposium, included hands-on demo

Press

July 2020 "Python in Visual Studio Code - VSCode Features You Need to Know", Tech With Tim
July 2020 "Python in Visual Studio Code – July 2020 Release", Microsoft Developer Blog
June 2020 "How Do Neural Networks Learn?", Two Minute Papers
Mar. 2020 "Visualizing Fairness in Machine Learning", Data Stories Podcast
Nov. 2019 "The Interactive News Platform for Everyone", Stack Overflow Blog
Oct. 2019 "Is this the dynamic web we were promised?", Hanselminutes Podcast
May 2019 "The Secret Life of a JPEG", Fast Company
Dec. 2018 "'Human Rights' May Help Shape Artificial Intelligence in 2019", Georgia Tech, College of Computing
Dec. 2018 "Designers, Programmers, and Researchers Join Forces to Create a New Kind of Digital Magazine Called the Parametric Press", Georgia Tech, College of Computing
June 2018 "Georgia Tech Teams up with Intel to Protect Artificial Intelligence from Malicious Attacks Using SHIELD", Georgia Tech, College of Computing
Dec. 2017 "Georgia Tech Team To Use Microsoft Grant to Study Human Migration Dynamics", Georgia Tech, College of Computing
Sept. 2015 "Georgia Tech PhD Student Puts Finishing Touches on 3D Printed Trumpety Trefoil", 3dprint.com
Spring 2015 "Student Profile: Fred Hohman", 2015 UGA Mathematics Department Newsletter
Feb. 2015 "Falling Water", MITgcm.org
Dec. 2014 "Mathematics/Physics Student Creates 3D Printed Puzzle of Trefoil Knot, Catches Mathematical Community's Interest", 3dprint.com
July 2014 "Day 311 - Trefoil Trumpet", Makerhome.com
Apr. 2014 "Mathematics with 3D Printing", Sketches of Topology

Teaching

Spring 2019 **Graduate Teaching Assistant**
Georgia Institute of Technology, Atlanta, GA
Information Visualization (CS 4460), Instructor: Alex Endert
Designed homeworks, held weekly office hours, and mentored student team projects for Information Visualization (CS 4460), an undergraduate course with 134 students enrolled.

Spring 2017 **Graduate Teaching Assistant**
Georgia Institute of Technology, Atlanta, GA

Data and Visual Analytics (CSE 6242 / CX 4242), Instructor: Duen Horng (Polo) Chau

Designed homeworks, held weekly office hours, and mentored student team projects for Data and Visual Analytics (CSE 6242 / CX 4242), a graduate course with 214 students enrolled.

2014 — 2015

Student Notetaker

University of Georgia, Athens, GA

Generated notes for undergraduate mathematics and physics courses for students with disabilities.

2012

Tutor

University of Georgia, Athens, GA

Specialized in tutoring calculus to undergraduates.

Mentoring

Present — Fall 2019

Omar Shaikh

B.S. in Computer Science, Georgia Institute of Technology

Visualization for machine learning education

Present — Fall 2019

Robert Turko

B.S. in Computer Science, Georgia Institute of Technology

Visualization for machine learning education

Present — Fall 2019

Rob Firstman

B.S. in Computer Science, Georgia Institute of Technology

Visualization for deep learning interpretability

Spr. 2020 — Spr. 2019

Will Epperson

B.S. in Computer Science, Georgia Institute of Technology

Visualization for machine learning fairness

🏆 Stamps President's Scholar

Now: PhD Student (HCI) at Carnegie Mellon University

Spr. 2020 — Spr. 2019

Siwei Li

B.S. in Computer Science, Georgia Institute of Technology

Visual graph analytics

🏆 Outstanding Undergraduate Researcher, College of Computing, Georgia Institute of Technology

🏆 President's Undergraduate Research Award

Now: Software Engineer II at Google

Spr. 2019 — Spr. 2018

Angel Alexander Cabrera

B.S. in Computer Science, Georgia Institute of Technology

Visualization for machine learning fairness, interactive classification for deep learning

🏆 National Science Foundation Graduate Research Fellowship Program (NSF GRFP)

🏆 Love Family Foundation Scholarship (most outstanding graduating senior), Georgia Institute of Technology

🏆 Stamps President's Scholar

Now: PhD Student (HCI) at Carnegie Mellon University

Spr. 2018 — Fall 2016

Dezhi Fang

B.S. in Computer Science, Georgia Institute of Technology

Visual motif discovery

🏆 Outstanding Undergraduate Researcher, College of Computing, Georgia Institute of Technology

🏆 Faculty Materials, Supplies, and Travel Grants for Undergraduate Research

🏆 Awarded President's Undergraduate Research Travel Award

Now: Software Development Engineer at Airbnb

Spr. 2018 — Fall 2017

Prasenjeet Biswal

M.S. in Computer Science, Georgia Institute of Technology

Deep learning attribution

Now: Software Development Engineer at Oath

Grants and Funding

2018 — 2021

Understanding Deep Neural Networks Through Attribution and Interactive Experimentation

NSTRF: NASA Space Technology Research Fellowship

Co-PIs: Duen Horng (Polo) Chau

Funded \$80,000/year for 3 years

2017 — 2018 **Deep Learning for Fine-scale Population Maps**

Microsoft Azure for Research Award: AI for Earth

Co-PIs: Caleb Robinson, Bistra Dilkina

Funded \$15,000

Fall 2014 **3D Printing the Trefoil Knot and its Pages**

UGA CURO Research Assistantship

Co-PIs: David Gay

Funded \$1,000

Interactive Articles

Present — Dec. 2018 **Parametric Press**

Matthew Conlen, Fred Hohman, Sara Stalla, Victoria Uren, Andrew Sass

An experimental, born-digital magazine dedicated to showcasing the expository power that's possible when the audio, visual, and interactive capabilities of dynamic media are effectively combined

May 2019 **The Myth of the Impartial Machine** on Parametric Press

Alice Feng, Shuyan Wu, Fred Hohman, Matthew Conlen, Victoria Uren

Wide-ranging applications of data science bring utopian proposals of a world free from bias, but in reality, machine learning models reproduce the inequalities that shape the data they're fed. Can programmers free their models from prejudice?, ★ [Top of Hacker News](#)

May 2019 **On Particle Physics** on Parametric Press

Riccardo Maria Bianchi, Fred Hohman, Matthew Conlen

A CERN particle physicist walks through the history and science of particle physics, and why you should care about it—even outside of the laboratory

May 2019 **Data Science for Fair Housing** on Parametric Press

Alyson Powell Key, Fred Hohman, Matthew Conlen, Sara Stalla

Cities across America covertly exclude racial minorities from majority-white residential neighborhoods, while gentrification drives people of color out of their homes. In Atlanta, a new nonprofit seeks to resist displacement by supporting the city's most vulnerable residents—but how effective is their project?

Nov. 2018 **Blueberry Pancakes**

Caleb Robinson, Fred Hohman

A toy algorithms problem

July 2018 **The Beginner's Guide to Dimensionality Reduction**

Matthew Conlen, Fred Hohman

Explore the methods data scientists use to visualize high-dimensional data, ★ [VISxAI Best Paper, Honorable Mention](#)

June 2018 **The Math of Card Shuffling**

Fred Hohman

Riffing from factory order to complete randomness, ★ [Top of Hacker News, twice](#)

Oct. 2017 **A Viz of Ice and Fire**

Fred Hohman, Sandeep Soni, Ian Stewart, John Stasko

Exploring and visualizing Game of Thrones using color and dialogue

Service

Organizer

Workshop on Visualization for AI Explainability (**VISxAI**) at IEEE VIS 2020, 2019

Program Committee

Debugging Machine Learning Models Workshop (**DebugML**) at ICLR 2019

ACM International Conference on Intelligent User Interfaces (**IUI**) 2019

Symposium on Visualization in Data Science (**VDS**) at IEEE VIS 2018

Workshop on Visualization for AI Explainability (**VISxAI**) at IEEE VIS 2018

Workshop on Interactive Data Exploration and Analytics (**IDEA**) at KDD 2018

Reviewer

IEEE Visualization (**VIS**) 2020, 2019, 2018, 2017
 ACM Conference on Human Factors in Computing Systems (**CHI**) 2020, 2019, 2018, 2017
 ACM User Interface Software and Technology Symposium (**UIST**) 2020
 Symposium on Visualization in Data Science (**VDS**) at IEEE VIS 2020, 2019, 2018
 Distill Research Journal (**Distill**) 2019
 ACM SIGKDD Conference on Knowledge Discovery and Data Mining (**KDD**) 2019, 2017
 ACM Conference on Computer Supported Cooperative Work and Social Computing (**CSCW**) 2019
 Human-Centered Machine Learning Perspectives Workshop (**HCMLP**) 2019
 1st Deep Learning and Security Workshop (**DLS**) at IEEE SP 2018
 IEEE International Conference on Distributed Computing Systems (**ICDCS**) 2017
 SIAM International Conference on Data Mining (**SDM**) 2017

Institutional

Georgia Tech CSE Graduate Student Association, Vice President, 2018 - 2020
 Georgia Tech CSE Chair Search Committee, 2019 - 2020

Member

Present — 2016 Association for Computing Machinery (**ACM**)
 Present — 2016 Institute of Electrical and Electronics Engineers (**IEEE**)
 2012 — 2015 UGA Mathematics Club
 2012 — 2013 Society of Physics Students, UGA Chapter (**SPS**)
 2011 — 2015 National Society of Collegiate Scholars (**NSCS**)

Design

2017 — 2018 **IDEA Workshop Proceedings Cover (2017, 2018)**
ACM SIGKDD Workshop on Interactive Data Exploration and Analytics (IDEA)
 Designed workshop poster and conference proceedings cover

2017 **Brad Myers Advisee Tree**
ACM Conference on Human Factors in Computing Systems (CHI), Denver, USA
 Designed and implemented an interactive visualization of Brad Myers's advisee tree shown during his CHI 2017 Lifetime Research Award talk; designed accompanying ribbon worn by attendees at the conference

Aug. 2014 **3D Printed Cube Decomposition Trophy**
University of Georgia Mathematics Department, Athens, USA
 Designed, modeled, and 3D printed cube decomposition trophy for annual UGA High School Math Tournament that was given to the top scoring teams and participants

Aug. 2014 **3D Printed UGA Keychain**
University of Georgia Lamar Dodd School of Art, Athens, USA"
 Created 3D printed UGA keychain and presentation notes given at Experience UGA: a interdisciplinary event that exposes middle-school and high-school students to hands-on learning activities

References

Dr. Polo Chau, Associate Professor
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 School of Interactive Computing
 Georgia Institute of Technology
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Dr. Scott Davidoff, Senior Manager
 Human-Centered Design Group
 NASA Jet Propulsion Lab
scottdavidoff.com

Dr. Steven Drucker, Partner and Research Manager
 Visualization and Interactive Data Analysis Group

visualization and interactive Data Analysis Group

Microsoft Research

microsoft.com/en-us/research/people/sdrucker

Dr. Nathan Hodas, Senior Research Scientist

Data Sciences and Analytics Group

Pacific Northwest National Laboratory

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