Frederick Hohman

Doctoral Student

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Education

**Present —
Aug. 2015**

Ph.D. Computational Science and Engineering
Georgia Institute of Technology, Atlanta, GA

Advisor: Polo Chau, Co-advisor: Alex Endert
Research interests: Explainable artificial intelligence, visual analytics, machine learning, deep learning
Overall GPA: 4.00/4.00

**May 2015 —
Aug. 2011**

B.S. Mathematics, Area of Emphasis in Applied Mathematics
B.S. Physics
University of Georgia, Athens, GA

Thesis: "3D Printing the Trefoil Knot and its Pages"
Overall GPA: 3.84/4.00, Magna Cum Laude

Research Experience

**Present —
Aug. 2016**

Georgia Institute of Technology, Atlanta, GA
Graduate Research Assistant, School of Computational Science and Engineering

Member of the Polo Club of Data Science where we bridge data mining and machine learning techniques with principles from human-computer interaction and visualization to make interactive tools to help people understand and explore big data.

Summer 2017

NASA Jet Propulsion Lab (JPL), Pasadena, CA
Creative Computer Scientist, Data Visualization Program

Joint work between NASA JPL, Caltech, and Art Center creating interactive data visualizations for current scientific research.

Summer 2016

Pacific Northwest National Lab, Richland, WA
National Security Ph.D. Intern, Data Science and Analytics Group

Project: Understanding Deep Learning Models Via Visualization
Developed Python code using Keras to generate images from deep neural networks to explore image classifiers' ability to learn semantics.

**May 2016 —
Aug. 2015**

Georgia Institute of Technology, Atlanta, GA
Graduate Research Assistant, School of Computational Science and Engineering

Project: Material Informatics
Built data-driven surrogate model for computationally expensive material grain growth simulations. Created property-structure linkages using machine learning pipeline to predict material properties. Contributed to direction and code repository of PyMKS package: Materials Knowledge Systems in Python.

May 2015 — Jan. 2013	**University of Georgia**, Athens, GA

Undergraduate Researcher, Department of Mathematics

Undergraduate Thesis: "3D Printing the Trefoil Knot and its Pages"
Exploring 3D printing in topology. Programmed, designed, and 3D printed 34-piece, color-coordinated, and magnetized 3D puzzle of the trefoil knot fibration illustrating an open-book decomposition. Led 3D printing research and education in UGA mathematics department. Open-sourced and wrote about work (16,000+ views) and 3D printed models (11,000+ views, 2500+ downloads).

Summer 2014 **NSF REU in Mathematics and Computational Science**, Fairfield, CT
Undergraduate Researcher, Fairfield University, Department of Engineering

Project: Experimental and Numerical Comparison of Oceanic Overflow
Compared numerical solutions derived from the Navier-Stokes equations to designed lab-scale experiments to model specific ocean phoneme. Configured MIT General Circulation Model on computer cluster to parallel compute numerical simulations and created scientific data visualizations for interpretation.

Honors and Awards

2017	Best Demo, Honorable Mention at ACM SIGMOD/PODS Conference
2015-2019	President's Fellowship at Georgia Institute of Technology
2015	Outstanding Poster at JMM Undergraduate Poster Session in Computational Math
2015	UGA CURO Research Graduation Distinction
2014	UGA CURO Research Assistantship
2013	Presidential Scholar
2011-2015	Dean's List
2011-2015	Georgia HOPE Scholarship
2011	Mission of Blessed Trinity: Artistic Sensibility (one of two students to receive upon graduation)
2009	Eagle Scout Award

Publications

3D Exploration of Graph Layers via Vertex Cloning. James Abello*, Fred Hohman*, Duen Horng Chau. *Poster, IEEE Information Visualization (VIS). Oct 1-6, 2017. Phoenix, USA.*
* equal contribution

A Viz of Ice and Fire: Exploring Entertainment Video Using Color and Dialogue. Fred Hohman, Sandeep Soni, Ian Stewart, John Stasko. *Symposium on Visualization in Data Science (VDS) at IEEE VIS. Oct 1-6, 2017. Phoenix, USA.*

VIGOR: Interactive Visual Exploration of Graph Query Results. Robert Pienta, Fred Hohman, Alex Endert, Acar Tamersoy, Kevin Roundy, Chris Gates, Shamkant Navathe, Duen Horng Chau. *IEEE Transactions on Visualization and Computer Graphics (Proc. VAST'17). Jan 2018. Phoenix, USA.*

mHealth Visual Discovery Dashboard. Dezhi Fang, Fred Hohman, Peter Polack, Hillol Sarker, Minsuk Kahng, Moushumi Sharmin, Mustafa al'Absi, Duen Horng Chau. *Demo, ACM International Joint Conference on Pervasive and Ubiquitous Computing (UBICOMP). Sept 11-15, 2017. Maui, USA.*

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 Chau. *arXiv:1705.02900*. May 8, 2017.

Visual Graph Query Construction and Refinement. Robert Pienta, Fred Hohman, Acar Tamersoy, Alex Endert, Shamkant Navathe, Hanghang Tong, Duen Horn Chau. *Demo, ACM International Conference on Management of Data (SIGMOD/PODS) Conference*. May 14-19, 2017. Chicago, USA. *Best Demo, Honorable Mention*.

ShapeShop: Towards Understanding Deep Learning Representations via Interactive Experimentation. Fred Hohman, Nathan Hodas, Duen Horng Chau. *Late-Breaking Work, ACM Conference on Human Factors in Computing Systems (CHI)*. May 6-11, 2017. Denver, CO, USA.

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*. Nov 23-25, 2014. San Francisco, CA, USA.

Presentations

"Constellation: Visualizing Cybersecurity in Real Time"

Aug. 2017   NASA Jet Propulsion Lab (JPL).

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"

July 2016   Pacific Northwest National Laboratory. National Security Internship Program Research Symposium.

"3D Printing The Trefoil Knot And Its Pages"

Mar. 2015   UGA Center for Undergraduate Research Symposium. Hands on demo.

"Experimental and Numerical Studies of Oceanic Overflow"

June 2015   American Meteorological Society's 20th Conference on Atmospheric and Oceanic Fluid Dynamics.

Jan. 2015   Joint Mathematics Meeting. Outstanding Poster at Student Poster Session in Computational Math.

Nov. 2014   American Physical Society 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. Hands on demo.

Press

Sept. 2015   "Georgia Tech PhD Student Puts Finishing Touches on 3D Printed Trumpety Trefoil." 3dprint.com.

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.

April 2014   "Mathematics with 3D Printing". Sketches of Topology.

Teaching

Spring 2017 **Graduate Teaching Assistant**
Georgia Institute of Technology, Atlanta, GA
Assisted in teaching and administration for Data and Visual Analytics (CSE 6242), a graduate course
with 225+ 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.

Design

2017   **IDEA Workshop Proceedings Cover**
ACM SIGKDD Workshop on Interactive Data Exploration and Analytics (IDEA), Halifax, Canada
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.

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 Tourna-
ment that was given to the top scoring teams and participants.

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.

Technology Skills

OS: Mac OS X, Ubuntu, Unix Command Line, Windows
Programming: Python, Matlab, Mathematica, C
Web: HTML, CSS, JavaScript, D3, SQL, Bootstrap, LaTeX, Markdown, Jekyll, Git
Graphics: Affinity Designer, Pixelmator, Matplotlib, Blender, Keynote, Meshlab, MakerBot Desktop
HCI: Contextual Inquiry, Think-Alouds, User Personas, Rapid Paper Prototyping, Affinity Diagraming

Professional Activities

Reviewer

Symposium on Visualization in Data Science (**VDS**) at IEEE VIS 2017

IEEE Visual Analytics Science and Technology (**VAST**) 2017
ACM SIGKDD Conference on Knowledge Discovery and Data Mining (**KDD**) 2017
IEEE International Conference on Distributed Computing Systems (**ICDCS**) 2017
SIAM International Conference on Data Mining (**SDM**) 2017
ACM Conference on Human Factors in Computing Systems (**CHI**) 2017

Member

2016-Present   Association for Computing Machinery (**ACM**)

2016-Present   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**)

References

Dr. Polo Chau, Assistant Professor
School of Computational Science and Engineering
Georgia Institute of Technology
Atlanta, GA, USA
cc.gatech.edu/~dchau/

Dr. Alex Endert, Assistant Professor
School of Interactive Computing
Georgia Institute of Technology
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va.gatech.edu/endert/

Dr. Nathan Hodas, Senior Research Scientist
Data Sciences and Analytics Group
Pacific Northwest National Laboratory
Richland, WA, USA
signatures.pnnl.gov/bios/nathan-hodas

Dr. David Gay, Associate Professor
Department of Mathematics
University of Georgia
Athens, GA, USA
euclidlab.org/david-gay/

Dr. Shanon Reckinger, Assistant Teaching Professor
Mechanical and Industrial Engineering Department
Montana State University
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