Alec Helbling

Visualization and Machine Learning

I develop novel interfaces for controlling Generative AI. In particular, I leverage a combination of machine learning and interactive visualization to allow humans to control generative models.

I have worked with researchers and engineers at Georgia Tech, IBM Research, NASA Jet Propulsion Laboratory, Microsoft, and the University of Pittsburgh.

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Google Scholar

Education

Present — Aug. 2023

Ph.D. in Machine Learning

Georgia Institute of Technology, Atlanta, GA

Advisor: Duen Horng (Polo) Chau, Co-advisor: None

President's Fellowship

Dec. 2022 - Aug. 2018

B.S. in Computer Science

Georgia Institute of Technology, Atlanta, GA

Overall GPA: 3.91/4.00, Highest Honors, Threads in Intelligence and Theory

Industry Research Experience

Summer 2021, Summer 2022

IBM Research, Yorktown Heights, NY

AI Research Intern, Foundations of AI Reasoning Group

Mentor: Achille Fokoue, Tengfei Ma, Maria Chang

I worked on systems for summarizing natural language documents in a way that preserves their factuality.

Summer 2020

Microsoft, Redmond, WA

Software Engineering Intern, Microsoft Intune Insights and Analytics Group

Mentor: Durga Kumar Varanasi

Developed a system for automatically distributing service traffic across several database instances.

Summer 2019

NASA Jet Propulsion Lab, Pasadena, CA

Machine Learning Research Intern, Machine Learning and Instrument Autonomy Group

Mentor: Lukas Mandrake, Jack Lightholder

I worked on interactive interfaces allowing mission scientists without ML expertise to deploy powerful ML methods.

Academic Research Experience

Present — Aug. 2023

Georgia Institute of Technology, Atlanta, GA

Graduate Research Assistant, School of Computational Science and Engineering

Advisor: Duen Horng (Polo) Chau
I am a member of the Polo Club of Data Science. We focus on the intersection of machine learning, human computer interaction, and visualization.

Fall 2020-Spring 2023 **Georgia Institute of Technology**, Atlanta, GA

Student Researcher, SIPLab

Mentor: Chris Rozell, Kion Fallah, Matthew O'Shaughnessy
I worked on systems for controlling deep generative models for image generation by using simple pairwise feedback from people.

Spring 2015-Summer 2018 **University of Pittsburgh, School of Medicine**, Pittsburgh, PA

Student Researcher and Javascript Programmer, Koes Lab

Mentor: David Koes
I worked on methods for visualizing molecular structures in web browsers, applications of machine learning to computational drug discovery, and visualizations of machine learning models for drug discovery.

Honors and Awards

2023 Best Poster, IEEE VIS 2023
For "Manim ML: Communicating Machine Learning Architectures with Animation"

2023 — Present 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

2020, 2021 President's Undergraduate Research Fellowship (x2)
For "PrefGenML: Preference Guided Image Generation with Relative Attributes"

2018 Pittsburgh Science and Technology Academy Valedictorian
Top of my high school class

Publications

P1 **ManimML: Communicating Machine Learning Architectures with Animation**
Alec Helbling, Duen Horng (Polo) Chau
IEEE VIS: Visualization Conference (IEEE VIS). Melbourne, Australia, 2023.
Project PDF Code (1517 ⭐) BibTeX IEEE VIS 2023 Best Poster Award

J1 **Visualizing Convolutional Neural Network Protein-Ligand Scoring**
Joshua Hochuli, Alec Helbling, Tamar Skaist, Matthew Ragoza, David Ryan Koes
Journal of Molecular Graphics and Modeling (JMGM). 2018.
Project PDF BibTeX

P4 **ObjectComposer: Consistent Generation of Multiple Objects Without Fine-tuning**
Alec Helbling, Evan Montoya, Duen Horng (Polo) Chau
Arxiv (Arxiv). 2023.
Project PDF BibTeX

P3 **LLM Self Defense: By Self Examination, LLMs Know They Are Being Tricked**
Alec Helbling, Mansi Phute, Matthew Hull, Duen Horng (Polo) Chau
Arxiv (Arxiv). 2023.
Project PDF BibTeX

P2 **Manifold Contrastive Learning with Variational Lie Group Operators**

Kion Fallah, Alec Helbling, Kyle A. Johnsen, Christopher J. Rozell
Arxiv (Arxiv). 2023.
Project PDF BibTeX

P1 **PrefGen: Preference Guided Image Generation with Relative Attributes**
Alec Helbling, Christopher John Rozell, Matthew O'Shaughnessy, Kion Fallah
Arxiv (Arxiv). 2023.
Project PDF BibTeX

W1 **Oracle Guided Image Synthesis with Relative Queries**
Alec Helbling, Christopher John Rozell, Matthew O'Shaughnessy, Kion Fallah
ICLR Workshop on Deep Generative Models for Highly Structured Data (ICLR DGMHSD). 2022.
Project PDF BibTeX

Mentoring

Fall 2023 **Evan Montoya** at Georgia Tech
BS in Computer Science, Georgia Institute of Technology
Methods for enabling compositionality of text-to-image generation systems.

Grants and Funding

2021 **Controlling Deep Generative Models with Pairwise Comparisons**
President's Undergraduate Research Fellowship
Co-PIs: Chris Rozell
Funded $1500/semester for 2 semesters

References

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

Dr. Chris Rozell, Professor
School of Electrical & Computer Engineering
Georgia Institute of Technology
siplab.gatech.edu/rozell.html

Dr. Lukas Mandrake, Senior Researcher and Group Superviser
Machine Learning and Instrument Autonomy Group
NASA Jet Propulsion Lab
ml.jpl.nasa.gov/people/mandrake/mandrake.html

Dr. Achille Fokoue, Distinguished Research Staff Member
Foundations of AI Reasoning Group
IBM Research
researcher.watson.ibm.com/researcher/view.php?person=us-achille