Benjamin Hoover

AI Researcher, Engineer, Student

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Google Scholar

Education

Machine Learning PhD Student *Aug 2021 - Present*
Georgia Tech, Atlanta, GA
Advisor: Duen Horng (Polo) Chau

Master of Engineering: Electrical and Computer Engineering *May 2018*
Duke University, Durham, NC

Bachelor of Science in Engineering: Biomedical Engineering *May 2017*
Duke University, Durham, NC

Industry Research Experience

IBM Research *Sep '18 - Present*
Visual AI Lab, Cambridge, MA
Mentors: Hendrik Strobelt • Dmitry Krotov

> Member of the Visual AI Lab where we use visualization to breathe insight and interactivity into powerful AI systems.

Medtronic Diabetes *Summer '17*
Algorithms R&D, Northridge, CA
Mentors: Peter Ajemba • Keith Nogueira

> Analyze trends in patient blood glucose levels for the sensor R&D team, developing algorithms that were incorporated into product by the end of the summer.

Academic Research Experience

Georgia Institute of Technology *Aug '21 - present*
Polo Club at School of Computational Science and Engineering, Atlanta, GA
Mentor: Polo Chau

> Member of the Polo Club of Data Science where we innovate scalable, interactive, and interpretable tools that amplify human's ability to understand and interact with billion-scale data and machine learning models.

International Genetically Engineered Machine (iGEM) *Apr '15 - May '17*
Lynch Lab, Durham, NC
Mentors: Eirik Adim Moreb • Michael D. Lynch

> Designed experiments to analyze CRISPR-Cas9 binding effects in bacteria, using machine learning to discover patterns in the data.

Awards and Honors

Best Poster Award *Mar. 2024*
Energy Transformer receives 2nd place in GATech's annual Graduate Poster Symposium

Best Paper Award, Honorable Mention
July 2023

DiffusionDB receives a Best Paper, Honorable Mention Award at ACL 2023

Spotlight Paper Award
Dec. 2022

HAMUX is spotlighted (top 5 submissions) at the Deep Learning and Differential Equation Workshop at NeurIPS 2022

Highlighted Reviewer
Apr. 2022

ICLR 2022

Best Poster Award
July 2020

RXNMapper wins Best Poster award at #IOPPoster 2020

Best Demo Award
Dec. 2020

LMdiff is Best Demo at NeurIPS 2020

(Runner Up) Best Demo
Dec. 2019

exBERT is runner up for Best Demo at NeurIPS 2019

Dean's List
2013-2017

In the highest one third of engineering class by GPA at Duke

Raul Buelvas Award
Apr. 2014

Given to one freshman at Duke University who "best exemplifies honor, optimism, and selflessness" as voted by peers and faculty

Publications

Conference

Dense Associative Memory through the Lens of Random Features

Benjamin Hoover, Polo Chau, Hendrik Strobelt, Parikshit Ram, Dmitry Krotov

Neural Information Processing Systems (NeurIPS '24). 2024.

(coming soon)

Transformer Explainer: Interactive Learning of Text-Generative Models

Aeree Cho, Grace C. Kim, Alexander Karpekov, Alec Helbling, Zijie J. Wang, Seongmin Lee, **Benjamin Hoover**, and Others

IEEE Transactions on Visualization and Computer Graphics (VIS). 2024.

Demo PDF Code Video Went Viral on X (❤ 1.9k+) #1 paper of the day🤗

Energy Transformer

Benjamin Hoover, Yuchen Liang, Bao Pham, Rameswar Panda, Hendrik Strobelt, Polo Chau, Mohammed J. Zaki, and Others

Conference on Neural Information Processing Systems (NeurIPS). 2023.

PDF Poster Home Code Video (5m) Video (45m)

ConceptEvo: Interpreting Concept Evolution in Deep Learning Training

Haekyu Park, Seongmin Lee, **Benjamin Hoover**, Austin Wright, Omar Shaikh, Rahul Duggal, Nilaksh Das, and Others

ACM International Conference on Information and Knowledge Management (CIKM). 2023.

PDF

Diffusion Explainer: Visual Explanation for Text-to-image Stable Diffusion

Seongmin Lee, **Benjamin Hoover**, Hendrik Strobelt, Zijie J. Wang, ShengYun Peng, Austin Wright, Kevin Li, and Others

IEEE Transactions on Visualization and Computer Graphics (VIS). 2024.

Demo PDF Video Code

DiffusionDB: A Large-scale Prompt Gallery Dataset for Text-to-Image Generative Models

Zijie J. Wang, Evan Montoya, David Munechika, Haoyang Yang, **Benjamin Hoover**, Polo Chau

Association for Computational Linguistics (ACL). 2023.

Home Code Dataset PDF

Best Paper Award, Honorable Mention Went Viral Oral Presentation

Fairness Evaluation in Text Classification: Machine Learning Practitioner Perspectives of Individual and Group Fairness

Zahra Ashktorab, **Benjamin Hoover**, Mayank Agarwal, Casey Dugan, Werner Geyer, Hao Bang Yang, Mikhail Yurochkin

Conference on Human Factors in Computing Systems (CHI). 2023.

PDF

Interactive and Visual Prompt Engineering for Ad-hoc Task Adaptation with Large Language Models

Hendrik Strobelt, Albert Webson, Victor Sanh, **Benjamin Hoover**, Johanna Beyer, Hanspeter Pfister, Alexander Rush

IEEE Transactions on Visualization and Computer Graphics (VIS). 2022.

PDF Demo

Shared Interest: Measuring Human-AI Alignment to Identify Recurring Patterns in Model Behavior

Angie Boggust, **Benjamin Hoover**, Arvind Satyanarayan, Hendrik Strobelt

ACM Conference on Human Factors in Computing Systems (CHI). 2022.

Project Demo Video PDF Code

Can a Fruit Fly Learn Word Embeddings?

Yuchen Liang, Chaitanya K. Ryali, **Benjamin Hoover**, Leopold Grinberg, Saket Navlakha, Mohammed J. Zaki, Dmitry Krotov

International Conference for Learning Representations (ICLR). 2021.

Project PDF Poster Code

The Design and Development of a Game to Study Backdoor Poisoning Attacks: The Backdoor Game

Zahra Ashktorab, Casey Dugan, James Johnson, Aabhas Sharma, Dustin Ramsey Torres, Ingrid Lange, **Benjamin Hoover**, and Others

International Conference on Intelligent User Interfaces (IUI). 2021.

PDF

CogMol: Target-Specific and Selective Drug Design for COVID-19 Using Deep Generative Models

Enara Vijil, Payel Das, Samuel Hoffman, Hendrik Strobelt, Inkit Padhi, Kar Wai Lim, **Benjamin Hoover**, and Others

Neural Information Processing Systems (NeurIPS). 2020.

Project Demo PDF

exBERT: A Visual Analysis of Transformer Models

Benjamin Hoover, Hendrik Strobelt, Sebastian Gehrmann

Association for Computational Linguistics: System Demonstrations (ACL). 2020.

Project Demo PDF Video Code

Journal

Operational response simulation tool for epidemics within refugee and IDP settlements

Joseph Bullock, Carolina Cuesta-Lazaro, Arnau Quera-Bofarull, Anjali Katta, Katherine Hoffmann Pham, **Benjamin Hoover**, Hendrik Strobelt, and Others

Public Library of Science: Computational Biology (PLOS). 2021.

PDF

RXNMapper: Unsupervised Attention Guided Atom Mapping

Philippe Schwaller, **Benjamin Hoover**, JL Reymond, Hendrik Strobelt, Teodoro Laino

Science Advances (AAAS). 2020.

Project Demo PDF Video Code

Managing the SOS Response for Enhanced CRISPR-Cas-Based Recombineering in E. coli through Transient Inhibition of Host RecA Activity

Eirik Adim Moreb, **Benjamin Hoover**, Adam Yaseen, Nisakorn Valyasevi, Zoe Roecker, Romel Menacho-Melgar, Michael D. Lynch

American Chemical Society: Synthetic Biology (ACS). 2017.

PDF

Workshop

Memory in Plain Sight: A Survey of the Uncanny Resemblances between Diffusion Models and Associative Memories

Benjamin Hoover, Hendrik Strobelt, Dmitry Krotov, Judy Hoffman, Zsolt Kira, Polo Chau

NeurIPS Workshop on Associative Memory and Hopfield Networks (AMHN@NeurIPS). 2023.

PDF Poster Home

HAMUX: A Universal Abstraction for Hierarchical Hopfield Networks

Benjamin Hoover, Polo Chau, Hendrik Strobelt, Dmitry Krotov

Symbiosis of Deep Learning and Differential Equations II Workshop at NeurIPS (DLDE). 2022.

Code Project PDF Video

Preprints

Fairytailor: A multimodal generative framework for storytelling

Eden Bensaid, Mauro Martino, **Benjamin Hoover**, Hendrik Strobelt

ArXiv preprint (ArXiv). 2021.

PDF Demo

Talks

Hopfield Networks 2.0: Associative Memory for the Modern Era of AI

Physics Informed ML Workshop at Los Alamos National Laboratory (Invited) — *Sep 2024*

Plectics Lab Colloquium (Invited) — *May 2024*

Energy Transformer

McMahon Lab at Cornell University (Invited) — *Sep 2023*

HAMUX: Inventing Hopfield Networks 2.0

Georgia Tech CSE Hotseat — *Nov 2022*

Comparing Language Models with LMDiff

Demo at NeurIPS 2020 — *Dec 2020*

exBERT: Exploring Learned Embeddings in Transformer Models
System Demonstration at ACL 2020 *Jul 2020*
IBM Exposition Demo at ICLR 2020 *Apr 2020*
System Demonstration at NeurIPS 2019 *Dec 2019*

Unsupervised Attention Guided Atom Mapping with RXNMapper
ML Interpretability for Scientific Discovery Workshop at ICML 2020 *Jul 2020*
IBM Exposition Demo at ICML 2020 *Jul 2020*

Breaking the Wall of Black Box AI
Falling Walls Lab Boston" *Oct 2020*

The Inside Story
MEng Graduation elected speaker Invited *May 2018*

Using Matlab's PRT to Accelerate Algorithm Development
Medtronic Diabetes R&D *Jul 2017*

The Impact of Encouragement
Cary Christian School Valedictorian Speech Invited *May 2013*

Teaching

Graduate Teaching Assistant *Fall '23 - Spring '24*
Georgia Institute of Technology, Atlanta, GA
Instructors: Polo Chau • Mahdi Roozbahani
> Organized project teams, graded projects, and held weekly office hours for an online graduate course with 947 students enrolled.

Graduate Teaching Assistant *Spring '18*
Duke University, Durham, NC
Instructor: Patrick Wang
> Designed homeworks, supervised projects, and occasionally teach lectures.

Graduate Teaching Assistant *Spring '18*
Duke University, Durham, NC
Instructor: Jonathan Viventi
> Supervised and graded capstone projects where students designed and assembled 2-channel EEG readers

Graduate Teaching Assistant *Spring '18*
Duke University, Durham, NC
Instructors: Stacy Tantum • Paul Bendich
> As a TA, I helped setup class infrastructure (Python, jupyter) and initial curriculum for this 25 student pilot course for Duke's Data+ Program.

Undergraduate Teaching Assistant *Spring '17*
Duke University, Durham, NC
Instructor: Jonathan Viventi
> Prepared, supervised, and graded labs where students designed medical devices such as Ultrasound, ECGs, Baby Incubators, and functional FitBits.

Undergraduate Teaching Assistant *Jan '15 - May '18*
Duke University, Durham, NC
Instructor: Stacy Tantum
> Graded homeworks, held weekly office hours, supervised labs, and private tutored students.

Boeing Fellow *Jan '16 - May '17*
Duke University, Durham, NC
Instructor: Carmen Rawls
> Wrote STEM lesson plans to engage middle and high school students in the Durham area.

Service

Reviewer

Neural Information Processing Systems (**NeurIPS**) 2024 · 2023 · 2021

International Conference for Learning Representations (**ICLR**) 2025 · 2024 · 2023 · 2022

International Conference for Machine Learning (**ICML**) 2023 · 2022

Workshop on Associative Memory & Hopfield Networks at NeurIPS (**AMHN@NeurIPS**) 2023

Blogpost Track at ICLR (**BP@ICLR**) 2023

Workshop on the Symbiosis of Deep Learning and Differential Equations at NeurIPS (**DLDE@NeurIPS**) 2022

ACM Conference on Human Factors in Computing Systems (**CHI**) 2023

Committee

Associative Memory & Hopfield Network Workshop (**AMHN@NeurIPS**) 2023

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