Caleb Belth

4945 Bob and Betty Beyster Building
Ann Arbor, MI
Email: cbelth@umich.edu

Phone: 260-494-7633
Website: https://cbelth.github.io/
Twitter: https://twitter.com/cbelth

Education

PhD, Computer Science, University of Michigan, Ann Arbor, MI — 2018-Present
Advisors: Andries Coetzee and Danai Koutra

M.S., Computer Science, University of Michigan, Ann Arbor, MI — 2018-2019
4.0 GPA

B.S., Computer Science, Purdue University, West Lafayette, IN — 2014-2018
Minors: Philosophy, Mathematics
Research Advisors: Jennifer Neville, Dan Goldwasser, Daisuke Kihara
3.84 GPA

Research Interests

Phonology, Linguistic Representations, Psycholinguistics, Language Acquisition, Natural Language Processing

Awards and Honors

Rackham Graduate School Travel Award — 2022

Weinberg Institute of Cognitive Science Travel Award — 2022

Rackham Graduate School Travel Award — 2022

Weinberg Institute of Cognitive Science Travel Award — 2021

Richard F. and Eleanor A. Towner Prize for Distinguished Academic Achievement — 2021
Awarded to the outstanding graduate student in each degree program

Best paper candidate, IEEE ICDM — 2020

NSF Graduate Research Fellowship — 2020

NDSEG Fellowship (declined for NSF GRF) — 2020

Rackham Graduate School Travel Award, University of Michigan — 2019

ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD) Travel Award — 2019

Dean's List, Purdue — Fall 2015, Spring 2016, Fall 2016, Spring 2017, Fall 2017

Semester Honors, Purdue — Spring 2015, Fall 2015, Spring 2016, Fall 2016, Spring 2017, Fall 2017

Publications

8. **Caleb Belth**. In Press. A Learning-Based Account of Local Phonological Processes. *Phonology*.
7. **Caleb Belth,** Alican Büyükçakır, and Danai Koutra. 2022. A Hidden Challenge of Link Prediction: Which Pairs to Check? *Knowledge and Information Systems.* 64(3), 743-771.
6. **Caleb Belth**, Sarah Payne, Deniz Beser, Jordan Kodner, and Charles Yang. 2021. The Greedy and Recursive Search for Morphological Productivity. *CogSci*.
5. **Caleb Belth,** Alican Büyükçakır, and Danai Koutra. 2020. A Hidden Challenge of Link Prediction: Which Pairs to Check? *IEEE International Conference on Data Mining (ICDM).*
   Selected as one of the best papers at ICDM'20. Invited for publication at the KAIS Journal, Springer.

4. **Caleb Belth,** Xinyi Zheng, Danai Koutra. 2020. Mining Persistent Activity in Continually Evolving Networks. *ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD)*.
3. **Caleb Belth,** Xinyi Zheng, Jilles Vreeken, and Danai Koutra. 2020. What is Normal, What is Strange, and What is Missing in a Knowledge Graph: Unified Characterization via Inductive Summarization. *ACM The Web Conference (WWW).*
2. Tara Safavi, **Caleb Belth**, Lukas Faber, Davide Mottin, Emmanuel Muller, and Danai Koutra. 2019. Personalized Knowledge Graph Summarization: From the Cloud to Your Pocket. *IEEE International Conference on Data Mining (ICDM).*
1. **Caleb Belth**, Fahad Kamran, Donna Tjandra, and Danai Koutra. 2019. When to remember where you came from: Node representation learning in higher-order networks. *IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM).*

Peer-Reviewed Academic Presentations

9. **Caleb Belth**. 2023. A Learning-Based Account of Phonological Tiers. Penn Linguistics Conference.
8. **Caleb Belth**. 2022. Learning Non-Local Phonological Alternations via Automatic Creation of Tiers. *Linguistic Society of America.*
7. **Caleb Belth**. 2022. How a Proclivity for Adjacency can Drive the Learning of Non-Local Alternations. *MidPhon*.
6. **Caleb Belth**. 2022. Learning Non-Local Phonological Alternations via Automatic Creation of Tiers. 2022. *Cognitive Modeling and Computational Linguistics workshop at ACL*.
5. Sarah Payne, **Caleb Belth,** Jordan Kodner, and Charles Yang. 2022. Searching for Morphological Productivity. *Linguistic Society of America*.
4. {**Caleb Belth,** Sarah Payne}, Jordan Kodner, and Charles Yang. 2021. Searching for Morphological Productivity. *Boston University Conference on Language Development.*
3. Sarah Payne, **Caleb Belth**, Jordan Kodner, and Charles Yang. 2021. The Recursive Search for Morphological Productivity. *American International Morphological Meeting.*
2. **Caleb Belth**, Xinyi Zheng, Danai Koutra. 2020. Mining Persistent Activity in Continually Evolving Networks. *ACM SIGKDD Workshop on Mining and Learning with Graphs (MLG).*
1. **Caleb Belth**, Fahad Kamran, Donna Tjandra, and Danai Koutra. 2019. When to remember where you came from: Node representation learning in higher-order networks. *ACM SIGKDD Workshop on Mining and Learning with Graphs (MLG).*

Teaching

LING 111: Lenses into Language — Winter/Spring 2023
Graduate Student Instructor for undergraduate, introductory linguistics course

LING 347 / PSYCH 349: Talking Minds — Fall 2022
Graduate Student Instructor for undergraduate, 300-level course in psycholinguistics

International Summer School on Data Science — 2020
Tutorial Instructor

MIDAS Data Science Summer Camp for High School Students, University of Michigan — 2019
Instructor, week-long summer camp

Outreach

M-DICE, City of Detroit, World Economic Forum, The Knight Foundation — 2019-2021
Graduate student lead, project to make access to transportation more equitable

CSEG Wellness, University of Michigan — 2019-2021
Co-founder, organization to improve graduate student wellness

Explore Graduate Studies, University of Michigan 2019
Volunteer, workshop to broaden participation in computer science graduate programs

Student Mentoring

Xueming Xu, Undergraduate, University of Michigan 2020-2021
Now: M.S. student, University of Michigan CSE

Xinyi Zheng, Undergraduate, University of Michigan 2019-2020
Now: PhD student, Carnegie Mellon University CS

Invited Talks

ThinkB1G: Your Roadmap to Landing a Role at a Startup, Purdue University 2017

Poster Presentations

MIDAS Symposium Poster Session, University of Michigan November 2019
What is Normal, What is Strange, and What is Missing in a Knowledge Graph: Unified Characterization via Inductive Summarization

Michigan AI Symposium Poster Session, University of Michigan October 2019
When to remember where you came from: Node representation learning in higher-order networks

Purdue Undergraduate Research & Poster Symposium April 2017
Deep Learning for Protein Binding Ligand Prediction

Reviewing

CogSci Conference 2021
Reviewer

ACM The Web Conference (WWW) 2021
Subreviewer

ACM International Conference on Information and Knowledge Management (CIKM) 2020
PC member, posters and demos session

SIAM Workshop on Network Science (NS20) 2020
Subreviewer

ACM The Web Conference (WWW) 2020
Subreviewer

ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD) 2019
Subreviewer

IEEE International Conference on Data Science and Advanced Analysis (DSAA) 2019
Subreviewer

Funding

Facebook Research Award 2020
Persistent Activity Mining in Continually Evolving Networks
$50,000
Based on my research, and contributed to writing

Industry Experience

Applied Science Intern, Amazon, Seattle, WA (Remote; COVID-19) May-Aug 2020
Created an approach for discovering product attributes

Software Engineer Intern, Sift, San Francisco, CA May-Aug 2018
Developed and deployed a gradient tree-boosting algorithm for automated fraud detection

Software Engineer Intern, Handshake, San Francisco, CA May 2017-Aug 2017
Developed the university-facing side of a web platform for university students to find their ideal employers

Software Engineer Intern, Iris, Owosso, MI May-Aug 2016
Developed Android code to run computer vision inference on mobile

Software Engineer Intern, Covenant Eyes, Owosso, MI Jun-Aug 2015
Developed Android code

Software Development Intern, Enspire Software, Fort Wayne, IN May-Aug 2014
Developed Android code

Programming Languages in order of proficiency

Python, Java, C, C++, Bash Scripting, Ruby, Scala

Professional Membership

Linguistic Society of America (LSA) Student Member

Association of Computing Machinery (ACM) Student Member

Institute of Electrical and Electronics Engineers (IEEE) Student Member

Other Projects

Machine Learning Text and Network Joint Embeddings, Purdue University 2017-2018
Researched jointly embedding text and social network nodes into the same embedding space

Deep Learning for Protein Binding Ligand Prediction, Purdue University 2015-2018
Researched using deep learning to predict protein binding ligands for drug design