**Caleb Belth**

4945 Bob and Betty Beyster Building

Ann Arbor, MI

Email: [cbelth@umich.edu](mailto:cbelth@umich.edu)

Phone: 260-494-7633

Website: <https://quickshift.xyz>

Twitter: <https://twitter.com/cbelth>

**Education**

PhD, Computer Science, University of Michigan, Ann Arbor, MI 2018-Present

Advisor: Danai Koutra

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

Advisor: Danai Koutra

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**

Cognitive Science, Data Mining, Linguistics, Information Theory

**Awards and Honors**

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**

**Conference**

1. **Caleb Belth,** Alican Büyükçakır, Danai Koutra

*A Hidden Challenge of Link Prediction: Which Pairs to Check?* IEEE International Conference on Data Mining (ICDM), November 2020.

Selected as one of the best papers at ICDM’20. Invited for potential publication at the KAIS Journal, Springer.

1. **Caleb Belth,** Xinyi Zheng, Danai Koutra

*Mining Persistent Activity in Continually Evolving Networks.* ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD), August 2020.

1. **Caleb Belth,** Xinyi Zheng, Jilles Vreeken, Danai Koutra

*What is Normal, What is Strange, and What is Missing in a Knowledge Graph: Unified Characterization via Inductive Summarization.* ACM The Web Conference (WWW), April 2020.

1. Tara Safavi, **Caleb Belth**, Lukas Faber, Davide Mottin, Emmanuel Muller, Danai Koutra.

*Personalized Knowledge Graph Summarization: From the Cloud to Your Pocket*.

IEEE International Conference on Data Mining (ICDM), November 2019.

1. **Caleb Belth**, Fahad Kamran, Donna Tjandra, and Danai Koutra. *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), August 2019.

**Workshop**

1. **Caleb Belth,** Xinyi Zheng, Danai Koutra

*Mining Persistent Activity in Continually Evolving Networks.* ACM SIGKDD Workshop on Mining and Learning with Graphs (MLG), August 2020.

1. **Caleb Belth**, Fahad Kamran, Donna Tjandra, and Danai Koutra. *When to remember where you came from: Node representation learning in higher-order networks*. ACM

SIGKDD Workshop on Mining and Learning with Graphs (MLG), August 2019.

**Outreach**

International Summer School on Data Science September 2020

Tutorial Instructor

M-DICE, City of Detroit, World Economic Forum, The Knight Foundation 2019-present

Graduate student lead, project to make access to transportation more equitable

CSEG Wellness, University of Michigan 2019-present

Co-founder, organization to improve graduate student wellness

Explore Graduate Studies, University of Michigan October 2019

Volunteer, one-day workshop that aims to prepare undergraduates for the graduate

school application process and broaden participation in computer science

MIDAS Data Science Summer Camp for High School Students, University of Michigan July 2019

Instructor, week-long summer camp

**Student Mentoring**

Xueming Xu, Senior, University of Michigan 2020-present

Now applying to top tier PhD programs

Xinyi Zheng, Senior, University of Michigan 2019-2020

Incoming PhD student, Carnegie Mellon University CS

Mark Jin, Senior, University of Michigan 2018

Now applying to top tier MS programs

**Invited Talks**

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

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

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**

Association of Computing Machinery (ACM) Student Member 2019-Present

Institute of Electrical and Electronics Engineers (IEEE) Student Member 2020-Present

**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