Pittsburgh, PA (remote due to COVID-19)

Mark Heimann

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Current Position

Postdoctoral Researcher — **Lawrence Livermore National Laboratory** — **Aug 2020-Present**
Center for Applied Scientific Computing — Livermore, CA

- Ongoing work (papers in submission) on graph-based few-shot learning and self-supervised learning, topological image segmentation, multilevel graph comparison.

Education

University of Michigan — **Ann Arbor, MI** — **2015-2020**

- Ph.D in Computer Science. Research: graph data mining, multi-network analysis, node embedding

Washington University in St. Louis — **St. Louis, MO** — **2011-2015**

- M.S. in Computer Science with a certificate in data mining and machine learning.
- A.B. in Economics and Mathematics *cum laude* with high distinction in economics.

Publications

- Junchen Jin, **Mark Heimann**, Di Jin, and Danai Koutra. "Understanding and Evaluating Structural Node Embeddings." TKDD 2021. **Contributed talk at KDD MLG Workshop 2020**
- **Mark Heimann**, Xiyuan Chen, Fatemeh Vahedian, and Danai Koutra. "Refining Network Alignment to Improve Matched Neighborhood Consistency." *SDM 2021.*
- Jing Zhu*, Xingyu Lu*, **Mark Heimann**, and Danai Koutra. "Node Proximity is All You Need: A Unified Framework for Proximity-Preserving and Structural Node and Graph Embedding." *SDM 2021.*
- Jiong Zhu, Yujun Yan, Lingxiao Zhao, **Mark Heimann**, Leman Akoglu, and Danai Koutra. "Beyond Homophily in Graph Neural Networks: Current Limitations and Effective Designs." *NeurIPS 2020.*
- **Mark Heimann**, Goran Murić, and Emilio Ferrara. "Structural Node Embedding in Signed Social Networks: Finding Online Misbehavior at Multiple Scales." *Complex Networks 2020*.
- Kai Qin, Flora D. Salim, Yongli Ren, Wei Shao, **Mark Heimann** and Danai Koutra. "G-CREWE: Graph CompREssion With Embedding for Network Alignment." *CIKM 2020.*
- Xiyuan Chen, **Mark Heimann**, Fatemeh Vahedian, and Danai Koutra. "CONE-Align: Consistent Network Alignment with Proximity-Preserving Node Embedding." *CIKM 2020.* **Also presented at KDD MLG Workshop**
- **Mark Heimann**, Tara Safavi, and Danai Koutra. "Distribution of Node Embeddings as Multiresolution Features for Graphs." *ICDM 2019.* **Best Student Paper**
- Di Jin, **Mark Heimann**, Ryan Rossi, and Danai Koutra. "node2bits: Compact Time- and Attribute-aware Node Representations for User Stitching." *PKDD 2019.*
- Di Jin*, **Mark Heimann***, Tara Safavi, Mengdi Wang, Wei Lee, Lindsay Snider, and Danai Koutra. "Smart Roles: Inferring Professional Roles in Email Networks." *KDD 2019.*
- **Mark Heimann**, Haoming Shen, Tara Safavi, and Danai Koutra. "REGAL: Representation Learning-based Graph Alignment." *CIKM 2018.* **Taught in graduate classes at UMich, Purdue**
- **Mark Heimann***, Wei Lee*, Shengjie Pan, Kuan-Yu Chen, and Danai Koutra. "HashAlign: Hash-Based Alignment of Multiple Graphs." *PAKDD 2018.*
- Yujun Yan, **Mark Heimann**, Di Jin, and Danai Koutra. "Fast Flow-based Random Walk with Restart in a Multi-query Setting." *SDM 2018.*
- **Mark Heimann** and Danai Koutra. "On Generalizing Neural Node Embedding Methods to Multi-Network Problems." *KDD MLG Workshop, 2017*.

** equal contribution*

Teaching Experience

- University of Michigan (2016-19): Foundations of Computer Science (EECS 376, ~500 students), Introduction to Artificial Intelligence (EECS 492/592, ~200 students), Advanced Data Mining (EECS 576, ~50 students)
- Washington University in St. Louis (2014-15): Introduction to Machine Learning (CSE 417A, ~100 students), Multi-Agent Systems (CSE 516A, ~30 students), Fair Division (CSE/Pol Sci 245A, ~50 students)

WORK EXPERIENCE

Visiting Research Assistant — **Information Sciences Institute** — **Jun 2019-Aug 2019**
Artificial Intelligence Group — Marina Del Rey, CA
- Used node embeddings to identify cyberbullying in social media sessions. *Python*
- Theoretically analyzed algorithmically fair node embedding methods and proposed new techniques. *Python*

Data Science Research Intern — **Adobe Research** — **Jan 2019-Apr 2019**
Big Data Experience Lab — San Jose, CA
- Performed large-scale entity resolution on cross-device web log data with millions of users. *Python*

Graduate Research Intern — **Oak Ridge National Laboratory** — **Apr 2018-Aug 2018**
Computational Data Analytics Group — Oak Ridge, TN
- Developed dimensionality reduction algorithm with applications to unmixing of hyperspectral image data.
- Developed matrix factorization formulations for graph mining problems. *Python, Tensorflow, PyTorch*

Software Engineer Intern — **Algorithmia** — **Jun 2015-Aug 2015**
Algorithm Development Team — Seattle, WA
- Made cutting edge machine learning algorithms easy to use through a standardized API. *Python*
- Created applications to demonstrate their potential (Face Recognition demo in top 10 on Hacker News).

Researcher — **Harvey Mudd College** — **Jun 2014-Aug 2014**
NSF REU Program — Claremont, CA
- Designed and implemented an algorithm to generate more harmonically structured jazz solos. *Java*

Researcher — **University of North Carolina, Greensboro** — **Jun 2013-Jul 2013**
NSF REU Program — Greensboro, NC
- Resolved open mathematical questions with applications to computer science and biology. *Java*

Student Trainee — **Washington University School of Medicine** — **Jun 2012-Jul 2012**
NHLBI Summer Institute for Training in Biostatistics (SIBS) — St. Louis, MO
- Studied biostatistics and analyzed biomedical datasets as part of an accompanying practicum. *R*

AWARDS

- **Best Student Paper, ICDM 2019**: Best paper whose first author was a full-time student.
- **Travel grants (KDD 2017,2019,2020; CIKM 2018; SDM 2019; ICDM 2019):** Attend and present work.
- **Adam Smith Prize for Excellence in Economics (2015):** For writing an outstanding senior thesis.
- **Arnold J. Lien Scholarship (2011):** Four-year full-tuition merit scholarship.

MENTORING

- Samuel Leventhal (PhD, SP2021-present). Paper in preparation on topological analysis of scientific image data with graph neural networks. **Current**: PhD at University of Utah CS.
- Rakshith Subramanyam (PhD, SU2021). Paper in preparation on designing hierarchical knowledge graph structures for few-shot learning. **Current**: PhD at Arizona State University CS.
- Puja Trivedi (PhD, SU2021-present). Paper in preparation on self-supervised learning on graphs. **Current**: PhD at University of Michigan CSE.
- Jing Zhu (UG, SU2020, SU2021-present). Published lead-author paper on node and graph embedding. Second paper in preparation on multiscale network alignment. **Next**: PhD at University of Michigan CSE.
- Xingyu Lu (UG, SU2020). Published lead-author paper on node and graph embedding. *Applying to MS programs.*

- Xiyuan Chen (UG, FL2019-WN2020)**.** Wrote senior thesis and published two papers on network alignment, one as lead author. **Next:** MS at Stanford CS.
- Junchen Jin (UG, WN2019-WN2020)**.** Published paper on evaluating structural node embeddings. Journal version in preparation. **Next:** MS at Northwestern Data Science.
- Haoming Shen (MS, SU17-SU18). Published paper on network alignment. **Next:** PhD at UMich IOE.

Reviewing

- **Program Committee:** Webconf 2022, WebConf GLB Workshop 2022, SDM 2022, AAAI 2022, KDD 2021, WebConf 2021, SDM 2021, CIKM 2021, Complex Networks 2020-2021, CIKM Demos 2019-2020, PKDD GEM Workshop 2019-2021, ICANN 2019, ICDM Demos 2019
- **Reviewer:** WebConf GLB Workshop 2021, AAAI 2021, DAMI, KnoSys, TSIPN, Trans. on Computers, Trans. on Cybernetics, TKDE, KAIS, Neural Computation, SNAM

tutorials

- **Mark Heimann**, Junchen Jin, and Danai Koutra. "Embedding-based Role Discovery." SIAM International Conference on Data Mining. April 2022.
- Thomas Blum*, Srinivas Eswar*, Jeffrey Graves*, **Mark Heimann***, and Ramakrishnan Kannan. *Machine Learning in Materials Science: An Introduction through Python.* Center for Nanophase Materials Science User Meeting, Oak Ridge National Laboratory. August 2018.

Invited talks and lectures

- *Embedding-based Role Discovery.* Guest lecture, Department of Computer Science, Vanderbilt University, Nashville, TN (virtual). December 2021.
- *Refining Network Alignment to Achieve Matched Neighborhood Consistency.* SPIRAL Seminar, Northeastern University, Boston, MA (virtual). April 2021.
- *Introduction to Machine Learning.* Guest lecture, Department of Information Systems, Carnegie Mellon University, Pittsburgh, PA (virtual). October 2020.
- *Node Embedding on Multiple Networks.* 5th International Summer School on Data Science, Split, Croatia (virtual). September 2020.
- *REGAL: Representation Learning-based Graph Alignment.* NABD Conference, Criteo Labs, Ann Arbor, MI. May 2019.

other activities

- **Chess:** Active USCF Senior Master and FIDE Master (highest rating-based national and international titles). Multiple scholastic/collegiate national championship, state open championship titles. 10+ years teaching.
- **Other interests:** Powerlifting (USAPL competitor and state referee), music (experimental acoustic/electric)

References

- Available upon request.