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Mark Heimann

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Education

University of Michigan **Ann Arbor, MI** **2015-Present**

- Ph.D candidate in Computer Science. Advisor: Danai Koutra.
  - Scalable data mining methods for large networks
  - Nonlinear dimensionality reduction and representation learning

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

- **Mark Heimann**, Tara Safavi, and Danai Koutra. "Distribution of Node Embeddings as Multiresolution Features for Graphs." *IEEE International Conference on Data Mining (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." *European Conference on Principles and Practice of Knowledge Discovery in Databases (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." *Conference on Knowledge Discovery and Data Mining (KDD), 2019.*
- **Mark Heimann**, Haoming Shen, Tara Safavi, and Danai Koutra. "REGAL: Representation Learning-based Graph Alignment." *International Conference on Information and Knowledge Management (CIKM), 2018.*
- **Mark Heimann***, Wei Lee*, Shengjie Pan, Kuan-Yu Chen, and Danai Koutra. "HashAlign: Hash-Based Alignment of Multiple Graphs." *Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD), 2018.*
- Yujun Yan, **Mark Heimann**, Di Jin, and Danai Koutra. "Fast Flow-based Random Walk with Restart in a Multi-query Setting." *SIAM International Conference on Data Mining (SDM), 2018.*
- **Mark Heimann** and Danai Koutra. "On Generalizing Neural Node Embedding Methods to Multi-Network Problems." *KDD Workshop on Mining and Learning with Graphs (MLG), 2017.*

** equal contribution*

Teaching Experience

- University of Michigan (2016-17): 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)

Other 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 Ann Arbor, MI

- Helped developed algorithms for compact embeddings on dynamic heterogeneous networks and applied them to 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 2017/19, 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.

selected talks

- *REGAL: Representation Learning-based Graph Alignment.* NABD Conference, Criteo Labs, Ann Arbor, MI. May 2019.
- *Machine Learning in Materials Science: An Introduction through Python.* Tutorial (co-instructor), Center for Nanophase Materials Science User Meeting, Oak Ridge National Laboratory. August 2018.

Selected Projects

- **Nonlinear Dimensionality Reduction (2018-):** Developed approximation algorithm for Isomap based on calculating low-dimensional embeddings from a coarsened similarity graph and extrapolating back to the entire dataset using a graph convolutional neural network. *Python, Tensorflow*
- **Detecting Cyberaggression with Structural Embedding of Signed Social Networks (2019-):** Formulated structural node embedding algorithms for signed networks and used them to detect cyberaggression on Instagram at the level of individual users (nodes) and media sessions (graphs). *Python*

other activities

- **Chess:** Active USCF Senior Master and FIDE Master (highest rating-based national and international titles). Multiple scholastic and collegiate national championship and state open championship titles.
- **Other interests:** Music (experimental acoustic and electronic genres), powerlifting (USAPL)

References

- Danai Koutra. *Assistant Professor of Computer Science, University of Michigan.* dkoutra@umich.edu
- Ramakrishnan Kannan. *Research Scientist, Oak Ridge National Laboratory.* kannanr@ornl.gov
- Emilio Ferrara. *Assistant Research Professor, Information Sciences Institute, University of Southern California*. emilio.ferrara@gmail.com