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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. GPA: 3.77
  - 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 certificate in data mining and machine learning.
- A.B. in Economics and Mathematics *cum laude* with high distinction in economics.

Publications

- 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 Theoretical Computer Science (EECS 376, ~500 students), Introduction to Artificial Intelligence (EECS 492/592, ~200 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

- Using node embeddings to analyze network dynamics in online communities.

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.

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 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*

Chess Instructor **Freelance** **Feb 2010-Aug 2012**
Freelance instructor Pittsburgh, PA

- Designed and taught chess lessons to individuals and groups of students of varying ages and skill levels.

Awards

- **Travel grants (KDD 2017, CIKM 2018, SDM 2019):** From conferences, to 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.

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-):** Proposed 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*
- **Representation Learning for Graph Mining (2017-):** Designed novel node embedding algorithm, and developed formulations to use embeddings for graph alignment, node classification, and graph kernels. Collaborated with an Ann Arbor startup to use these techniques to infer corporate hierarchies from email communication patterns. Supervised undergraduate and masters' students. *Python, Tensorflow*

Skills

- **Languages:** Python, R, Java
- **Frameworks:** Tensorflow, PyTorch

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