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

Publications

- **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

Graduate Research Intern **Oak Ridge National Laboratory** **Summer 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** **Summer 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** **Summer 2014**
NSF REU Program Claremont, CA

- Designed and implemented algorithm to generate more harmonically structured jazz solos. *Java*

Researcher **University of North Carolina, Greensboro** **Summer 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** **Summer 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** **Summer 2010-2012**
Freelance instructor Pittsburgh, PA

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

Awards

- **KDD Travel Grant (2017):** Funding from conference 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.

External service

- Tutorial Co-Instructor: "Machine Learning in Materials Science: An Introduction through Python." Center for Nanophase Materials Science User Meeting, Oak Ridge National Laboratory. August 2018.
- Program Committee member, ICDM 2018 Demo Session
- Reviewer (2018) for IEEE Transactions on Computers
- Subreviewer (2017-) for:
    - *Journals*: IEEE Transactions on Multimedia, Data Mining and Knowledge Discovery (DAMI, Springer)
    - *Conference*: KDD, WWW, SDM, AAAI, ECML/PKDD

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

selected coursework

- Theory of Machine Learning (EECS 598)
- Randomness and Computation (EECS 598)
- Advanced Artificial Intelligence (EECS 592)
- Advanced Machine Learning (CSE 517A)
- Linear Statistical Models (STAT 600)
- Engineering Applications in the Media Arts (PAT 510)

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)