AMEL AWADELKARIM

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EDUCATION

Ph.D. in Computational and Mathematical Engineering, Stanford University　　　　Sept 2017 - Dec 2023
Advised by: Johan Ugander. *NSF Graduate Research Fellow.*

M.S. in Engineering Science and Mechanics, The Pennsylvania State University　　Aug 2016 - Dec 2017
B.S. in Engineering Science and Mechanics, The Pennsylvania State University　　Aug 2012 - Dec 2016

TECHNICAL HIGHLIGHTS

Research Interests	Personalization & recommender systems, network science, computational social science
Relevant Courses	Machine Learning, Applied Statistics, Numerical Linear Algebra, Numerical Optimization
Languages & Tools	Python (Numpy, pandas, PyTorch, NetworkX, Matplotlib, Jupyter notebook), SQL, C++, Git, Hive, Presto

WORK EXPERIENCE

Meta, Research Scientist Intern　　　　　　　　　　　　　　　　　　　　　　Oct 2023 - present
Menlo Park, CA

- Working within Central Applied Science (CAS) to engineer features for ads-ranking models, in use across Meta's Family of Apps, based on Facebook comment-engagement signals.
- Building features that leverage comment and ad metadata, text (processed at a large-scale using Meta's large language model, LLaMA), and graph-based features of the user-ads bipartite comment network.
- Querying data sources in Hive using Presto SQL for feature generation, and writing feature pipelines using Python.

Stanford University, Research Assistant

Statistical modeling of partial orders　　　　　　　　　　　　　　　　　　　　Apr 2023 - Oct 2023

- Developed two approaches for modeling partial orders: *composite* models, which view a partial order as a truncation of a total order, and *augmented* models, which model a ranking as a sequence of choices, including the choice of END.
- Evaluated models predictive performance and ability to generate realistic synthetic datasets using real-world preferences from school choice and ranked choice voting settings.

Preference modeling for school choice　　　　　　　　　　　　　　　　　　　　Jan 2021 - Jul 2023

- Applied recent advancements in discrete choice and ranking models in PyTorch to improve preference models for school choice research, in partnership with the San Francisco Unified School District.
- Improved goodness-of-fit (measured via NLL loss) by 15% by incorporating context effects—effects of already-chosen items on down-rank choices—and further enhanced top-choice prediction accuracy by 14% via model stratification.

Prioritized restreaming algorithms for balanced graph partitioning　　　　　　　　May 2018 - Feb 2020

- Developed a taxonomy of modern scalable algorithms for constrained graph partitioning, contributing a new family of algorithms with state-of-the-art performance.
- Our method improves on the min-cut objective by up to 9% over existing graph partitioning techniques such as Google's Linear Embedding algorithm, providing benchmarking that was previously void in the literature.

Training a playlist curator based on user taste　　　　　　　　　　　　　　　　Sept 2018 - Dec 2018

- Built a playlist classifier using PyTorch, mapping a list of unclassified songs to user-created playlists based on similarity.
- Performed feature engineering: collected features from Spotify's API like song metadata and artist genre tags, and computed artist embeddings from related-artists data using NetworkX and Stanford SNAP's implementation of node2vec.
- Tested various supervised ML models for the classification task on Spotify-generated and real-user playlists with a shallow neural network reporting the lowest test NLL loss.

Stanford University, Teaching Assistant, *Networks*　　　　　　　　　　　　　　Jan 2021 - Mar 2022

- Supported instruction of an undergraduate course on graph theory; social & information networks; the aggregate behavior of markets, auctions, and crowds; information diffusion; and popular concepts such as the "friendship paradox".

Google, Software Engineering Intern　　　　　　　　　　　　　　　　　　　Jun 2019 - Sept 2019

- Developed an alternative score to the average star-rating of Google Maps features based on Bayesian rating systems.
- Average star-ratings suffer from the cold-start problem – our score better captures quality of scarcely-rated features by leveraging head-to-head comparisons of similar features within the same user's ratings.
- The score improves accuracy by up to 10% in predicting binary comparisons between features with few star ratings.

PUBLICATIONS

· A Awadelkarim, "Algorithms, statistical models, and their applications to real-world networks and choice systems", PhD Thesis (Stanford 2023).

· A Awadelkarim and J Ugander, "Modeling top-k partial orders", *Manuscript.*

· A Awadelkarim, A Seshadri, I Ashlagi, I Lo, and J Ugander, "Rank-heterogeneous preference models for school choice", 29th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (KDD '23).

· A Awadelkarim and J Ugander, "Prioritized restreaming algorithms for balanced graph partitioning", Proceedings of the 26th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (KDD '20).

· A Awadelkarim, "Finite-element implementation and verification of complex fluid models based on evolving natural configurations, motivated by studies of blood", MS Thesis (PSU 2017).

PRESENTATIONS

· "Rank-heterogeneous preference models for school choice", Talk and poster, ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (KDD), Long Beach, CA, August 2023, Promotional video.

· "Improved preference modeling for school choice", Poster, International Conference for Computational Social Science (IC2S2), Chicago, IL, July 2022.

· "Designing defaults for school choice", Talk and poster, NeurIPS Workshop for Human Machine Decision-Making (WHMD), Virtual, November 2021, Recorded talk.

· "Prioritized restreaming algorithms for balanced graph partitioning", Talk and poster, ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (KDD), Virtual, August 2020, Slides.

· "Prioritized restreaming algorithms for balanced graph partitioning", Talk, SIAM Network Science, Virtual, July 2020.

· "Prioritized restreaming algorithms for balanced graph partitioning", Talk, Stanford Women in Math Mentoring (SWIMM) Seminar, Stanford, CA, May 2020.

· "Training a playlist curator based on user taste", Poster, Stanford Machine Learning Symposium, Stanford, CA, December 2018, Poster.

AWARDS

National Science Foundation, Graduate Research Fellowship	Fall 2017 - Summer 2020
PSU Engineering Science & Mechanics, Outstanding Thesis Award	Spring 2016
PSU Leonhard Center, Public Speaking & Presentation Contest Winner	Winter 2015

ACTIVITIES

Member, San Francisco Women's Ultimate team, Fury	Jun 2018 - present
Facilitator, Ultimate Impact African-American Affinity Group	Oct 2020 - Apr 2021
Coach, Stanford Women's Ultimate team, Superfly	Sept 2019 - Dec 2020
Mentor, Stanford Women in Math Mentoring (SWIMM)	Oct 2019 - Jun 2020