BLAKE MASON

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EDUCATION

University of Wisconsin, Madison
Ph.D. Electrical and Computer Engineering, December 2020
Advisor: Dr. Robert Nowak
GPA: 3.875 / 4.00

University of Southern California
B.S. Electrical Engineering, May 2015
GPA: 3.90 / 4.00

Relevant coursework: Advanced Machine Learning, Large Scale Machine Learning and Optimization, Linear Systems, Nonlinear Optimization, Information Theory, Digital Signal Processing

SELECTED RESEARCH & INDUSTRY EXPERIENCE

University of Wisconsin — Madison | Dept. of Electrical & Computer Engineering

- **Nearest Neighbors With Noisy Data** 1/19 - Present

Led a project developing an active, multi-armed bandit approach to learn nearest neighbor graphs for recommendation and network detection with noisy data.

- Applied bandit techniques and methods for nearest neighbor detection to develop an efficient algorithm
- Demonstrated novel theory guaranteeing sample complexity and success of algorithm
- Compared algorithm against state of the art techniques for recommendation in experiment using user data

- **Metric Learning with Human Data** 8/15 – Present

Worked under professors in Machine Learning and Educational Psychology through UW Madison's interdisciplinary research program, LUCID, Led a project adapting metric learning techniques to assess individual learning differences in STEM education.

- Applied and compared low dimensional metric learning algorithms to rank visual features present in the molecules by correlation with students' judgments, and access concept knowledge
- Developed novel theory demonstrating the sample complexity, optimality, and convergence rates of low dimensional metric learning algorithms
- Conducted large scale perceptual similarity experiment in chemistry classroom, asking students to judge the similarity between molecules

- **Fast Ordinal Triplet Embedding (FORTE)** 8/16 – 8/17

Co-wrote an open-source library of ordinal embedding algorithms in Cython and Python, providing fast implementations of many classical and modern algorithms.

- Analyzed algorithmic performance and quality of results
- Applied FORTE to improve existing data analysis tools used by collaborators

Amazon | Seattle, WA | Applied Scientist Intern 6/18 – 8/18

Designed and implemented novel recommendation systems for Amazon Music business in MXNet. Developed novel algorithm for extreme classification. Built prototype of product and demonstrated to senior managers.

- Applied MXNet and Gluon to reduce training time by 35% and decrease codebase by 60%
- Improved new artist discovery for customers
- Increased diversity of recommended music

The Aerospace Corporation | El Segundo, CA | Engineering Intern 5/14 – 5/15

Designed and built a testing environment to measure thermo-acoustic transduction in carbon-nanotube transistors. Successfully captured the world's first audio recording of a single molecule, the smallest known loudspeaker.

- Wrote LabView code to automate testing and data-analysis
- Published first author paper and presented at a conference

University of Southern California | Dept. of Electrical Engineering

- **Fast Robust Tensor Estimation for Diffusion Tensor Imaging** 5/14 – 5/15

Designed and implemented algorithms to detect, and correct for errors in diffusion tensor imaging,

- Developed heuristic methods for error detection leveraging correlated noise
- Designed simulated whole slice DTI measurements for algorithm validation

SKILLS & INTERESTS

Programming: Python (NumPy, Dask, Multiprocessing, Cython, SciPy, pandas, MXNet/Gluon), MATLAB, Pyspark, LaTex
Machine Learning: Active Learning & Bandits, Ordinal Embedding, Metric Learning, Recommender Systems
Interests: Active learning, human data, sparsity, similarity embeddings, running, choir, writing poetry, folk music

LEADERSHIP & CAMPUS INVOLVEMENT

GODDESSES Seminar | Founder, Organizer 9/17 – 9/18

Founded and lead a graduate student only Optimization and Machine Learning speaker series where students can practice scientific communication skills and get feedback on research ideas.

- Coordinate presenters to ensure a variety of topics and viewpoints are shared
- Assist younger students in forming topics and presenting them effectively

LUCID | Communications Board 8/16 – 9/18

- Graduate training program at UW Madison which focuses on interdisciplinary research
- Connect LUCID students to resources for developing cross-disciplinary communications skills
- Assist LUCID faculty in understanding the needs of the students in the program

Moneythink | Co-President, Mentor Captain 8/12 – 5/15

Led the USC chapter of the Chicago-based non-profit *Moneythink*; we trained students to teach financial literacy in local high schools, focussing on personal finance and college.

- Taught weekly course to underserved high school students in financial literacy
- Coordinated the teaching of over 400 students in urban Los Angeles

AWARDS & HONORS

Innovative Signal Analysis Fellowship
UW Madison – Wisconsin Distinguished Graduate Fellow
2015 NSF GRFP Honorable Mention
2017 NSF GRFP Honorable Mention
2016 EDM Conference Best Paper Honorable Mention
USC Presidential Scholar and Provost Fellow

PUBLICATIONS

Mason, B., Tripathy, A., & Nowak, R. (2019). Learning Nearest Neighbor Graphs from Noisy Distance Samples. In *Advances in neural information processing systems (NeurIPS)*.

Mason, B., Rau, M. A., & Nowak, R. (2019). Cognitive Task Analysis for Implicit Knowledge About Visual Representations With Similarity Learning Methods. *Cognitive Science*, *43*(9), e12744.

Sen, A., Patel, P., Rau, M, **Mason, B.**, Nowak, R., Rogers, T., and Zhu, X. "Machine Beats Human at Sequencing Visuals for Perceptual-Fluency Practice." *International Educational Data Mining Society* (2018).

Sen, A., Patel, P., Rau, M.A., **Mason, B.**, Nowak, R., Rogers, T.T. and Zhu, J.. "For Teaching Perceptual Fluency, Machines Beat Human Experts." CogSci. 2018

Nobles, J., Hamoudi, A, Nowak, R., Landau, E., Baron, A., Brittingham, J., **Mason, B**. "Place-Based Variation in Early Pregnancy Loss: Evidence from Population Data." Reproductive Sciences. Vol. 25.

Mason, B., Jain, L., & Nowak, R. (2017). Learning low-dimensional metrics. In *Advances in neural information processing systems (NeurIPS)* (pp. 4139-4147).

Rau, M., **Mason, B**., and Nowak, R. D. How to model implicit knowledge? Similarity learning. methods to assess perceptions of visual representations. In *Proceedings of the 9th International Conference on Educational Data Mining*, 2016. (**best paper nominee**)

Mason, B., Rau, M., Jain, L., and Nowak, R., "Modeling Perceptional Fluency with Visual Representations". (2016). *33rd International Conference on Machine Learning - Workshop Publication*.

Mason, B.; Chang, S. W.; Chen, J.; Cronin, S. B.; & Bushmaker, A. W. (2015). Thermoacoustic Transduction in Individual Suspended Carbon Nanotubes. ACS nano.