

AMANDA BOWER

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EDUCATION AND EMPLOYMENT

Twitter

April 2021 - Present

Machine learning researcher on the META (machine learning ethics, transparency, and accountability) team

University of Michigan-Ann Arbor (UM-AA)

September 2014 - November 2020

Applied and Interdisciplinary Mathematics MS and PhD

NSF Graduate Fellow

Thesis Advisors: Laura Balzano and Martin Strauss

University of Michigan-Dearborn (UM-D)

September 2009 - April 2013

Bachelor of Science, Mathematics Major

Minors: Applied Statistics and Computer and Information Science

RESEARCH INTERESTS

I especially like working on problems that can have a positive societal impact. My main research area is algorithmic fairness. Recently, I have been interested in building more equitable recommender systems as well as more accurately measuring demographic disparities in machine learning models.

SELECTED PUBLICATIONS AND PREPRINTS

1. **A. Bower**, L. Belli, T. Lazovich, and K. Lum, “**A Case Study of Stochastic Recommendations.**” Preprint.
2. **A. Bower***, K. Lum*, T. Lazovich, K. Yee, and L. Belli, “**Random Isn’t Always Fair: Candidate Set Imbalance and Exposure Inequality in Recommender Systems.**” FAccTRec workshop at Recsys 2022.
3. K. Lum, Y. Zhang, and **A. Bower**, “**Debiasing Bias Measurement.**” FAccT 2022.
4. T. Lazovich, L. Belli, A. Gonzales, **A. Bower**, U. Tantipongpipat, K. Lum, F. Huszar, and R. Chowdhury, “**Measuring disparate outcomes of content recommendation algorithms with distributional inequality metrics.**” Patterns 2022.
5. **A. Bower**, R. Chowdhury, and K. Lum, “**Reporting and Classifying Harms on Social Media.**” Data and Society’s The Social Life of Algorithmic Harms Workshop 2022.
6. **A. Bower**, H. Eftekhari, M. Yurochkin, and Y. Sun, “**Individually Fair Rankings.**” ICLR 2021.
7. **A. Bower** and L. Balzano, “**Preference Modeling with Context-Dependent Salient Features.**” ICML 2020.
8. M. Yurochkin*, **A. Bower***, and Y. Sun, “**Training individually fair ML models with sensitive subspace robustness**”. ICLR 2020. Selected for a Spotlight talk (15%).
9. **A. Bower***, L. Niss*, Y. Sun*, and A. Vargo*, “**Debiasing Representations by Removing Unwanted Variation Due to Protected Attributes.**” FAT-ML workshop at ICML 2018.
10. **A. Bower**, L. Jain, L. Balzano, “**The Landscape of Nonconvex Quadratic Feasibility.**” ICASSP 2018. Selected for oral presentation (14%).

11. **A. Bower***, S. Kitchen*, L. Niss*, M. Strauss*, A. Vargo*, and S. Venkatasubramanian*. “**Fair Pipelines.**” FAT-ML workshop at KDD 2017.

* = Equal Contribution

WORK AND TEACHING EXPERIENCE

Twitter

Machine Learning Researcher

April 2021 - Present

Remote

- Work on Twitter’s Responsible ML team to find applied solutions in an emerging problem space
- Led project to identify a responsible ML problem in a major recommender system and A/B tested a proposed machine learning solution which is currently being shipped to production since it led to a 1.3
- Researched and prototyped metrics now implemented in an internal tool to measure algorithmic bias used throughout Twitter, e.g. to evaluate production recommendation, ranking, and content moderation models
- Produced taxonomy of algorithmic harms used as the basis of model governance initiatives as well as a framework to avoid ethical vulnerabilities arising from model predictions
- Led research on responsible recommendation and algorithmic harms resulting in three first author publications/preprints another two publications in responsible machine learning with other team members

University of Michigan SPADA Lab

Research Mentor

May - August 2020

Ann Arbor, MI

- I co-mentored three undergraduates and a masters student on two algorithmic fairness projects as part of a summer research program that L. Balzano ran in the SPADA lab. One project studied the long term dynamics of fair ranking systems, and the other explored bias in judge sentencing decisions on the state level and risk assessment tools.

Netflix

Machine Learning Researcher, Intern

May - August 2019

Los Angeles, CA

- I audited algorithms for bias with the Content Demand Modeling team. My responsibilities included giving presentations on my work and writing an internal memo for how to think about algorithmic bias at Netflix.

University of Michigan

Graduate Student Instructor for graduate level machine learning

September - December 2018

Ann Arbor, MI

- For a graduate level machine learning course taught by C. Scott and S. Sekeh, I held office hours, organized and taught a python tutorial, graded exams, and answered questions on an online forum.

University of Michigan Math and Science Scholars

Course Assistant

July - August 2017, 2018

Ann Arbor, MI

- I was a course assistant and mentor to talented high school students for a math and art course taught by Martin Strauss.

UCLA/IPAM Research in Industrial Projects for Students

Undergraduate Researcher

June - August 2013

Los Angeles, CA

- I was a project manager of a research project whose goal was to improve the search algorithm used by the USC Shoah Foundation for indexed video testimonies of survivors of the Holocaust and other genocides. My advisor was Zicong Zhou.

Williams College SMALL Research Experience for Undergraduates

Undergraduate Researcher

June - August 2012

Williamstown, MA

- I did research in number theory and probability. My advisor was Steven J. Miller.

University of Michigan-Dearborn

Mentor and grader

September 2011 - April 2012

Dearborn, MI

- I mentored for advanced calculus I and graded for number theory.

TALKS AND OTHER SPEAKING ENGAGEMENTS

- **Advertising Research Foundation podcast: Contending with Algorithmic Bias pt 2**
 - Along with Kalinda Ukanwa, an Assistant Professor of Marketing at USC’s Marshall School of Business, we discuss algorithmic bias especially in the context of advertising.
- **Advertising Research Foundation panel: Contending with Algorithmic Bias pt 1**
 - One of five panelists discussing algorithmic bias especially in the context of advertising.
- **Random Isn’t Always Fair: Candidate Set Imbalance and Exposure Inequality in Recommender Systems**
 1. Talk FAccTRec workshop at RecSys
- **Debiasing Bias Measurement**
 1. Talk at FAccT 2022.
- **Individually Fair Ranking**
 1. Talk at ICLR 2021.
- **Preference Modeling with Context-Dependent Salient Features**
 1. Talk at ICML 2020.
 2. Poster and lightening talk at Heidelberg Laureate Forum, 2020.
 3. Poster at Women in Machine Learning workshop at NeurIPS, 2019.
- **Training individually fair ML models with sensitive subspace robustness**
 1. Spotlight talk (15% of accepted papers) at ICLR 2020.
 2. Talk at the Institute for Advanced Study domain adaptation reading group, 2020.
- **Debiasing Representations By Removing Unwanted Variation Due To Protected Attributes**
 1. Poster (presented by L. Niss) at FAT-ML workshop at ICML in Stockholm, Sweden, 2018.
 2. Poster at the University of Michigan MIDAS Annual Data for Public Good Symposium, 2019.
 3. Poster at the University of Michigan Women in Big Data at Michigan Symposium, 2018.
- **The Landscape of Non-Convex Quadratic Feasibility**
 1. Talk (oral acceptance rate 14%) at IEEE ICASSP in Calgary, Alberta, Canada, 2018.
 2. Talk at the University of Michigan Applied and Interdisciplinary Math Student Seminar, 2018.
 3. Poster at the University of Michigan Student Symposium for Interdisciplinary Statistical Sciences, 2018.
 4. Poster at University of Michigan MCubed Symposium, 2018.
- **Fair Pipelines**

1. Poster at the FAT-ML workshop at KDD in Halifax, Nova Scotia, Canada, 2017.

HONORS AND AWARDS

- **At Your Service Award**, 2021. An award within my Twitter org given to “someone who has shown a deep obsession for addressing customer needs and wants with deep customer empathy.” \$200.
- **National Science Foundation Graduate Research Fellowship**, 2015-2020. Fellowship awarded by the National Science Foundation that financially covers 3 years of graduate school. Approximately \$130,000.
- **Rackham Merit Fellowship**, 2014-2019. Fellowship awarded by UM-AA to first year graduate students to financially cover 4 semesters and a summer throughout the first five years of graduate school. Approximately \$45,000.
- **Kimball Midwest Scholarship**, 2017 and 2018. \$1,000.
- **Carroll V. Newsom Scholarship**, 2014. Given by the Department of Mathematics at UM-AA. Approximately \$6,000.
- **Chancellor’s Medallion**, 2013. Given by UM-D to nine graduating students selected by faculty based on academic record, quality of character, vitality, intellect, and integrity.
- **Chancellor’s Scholarship**, 2009-2013. Full tuition given by UM-D. Approximately \$45,000.
- **Undergraduate Honors Scholar Award for Outstanding Achievement in Mathematics**, 2013, Given by the Department of Mathematics and Statistics at UM-D.
- **Henry Ford Health System Scholarship**, 2009 and 2012.
- **Susan Nokes Alumni Scholarship**, 2009. Given by Melvindale High School.
- **Linda Bunte Memorial Scholarship**, 2009. Given by Melvindale High School.

PROFESSIONAL SERVICE

FAccT Session Chair 2022

AI Stats Reviewer 2021

Association for Women in Math Task Force 2020

Panel Co-organizer

- I co-organized a panel on ethics in math and algorithmic fairness for the 2021 Joint Math Meetings.

NeurIPS Reviewer 2019, 2020 (top 10% reviewer award), 2021

Women in Machine Learning Reviewer 2019

Midwest Machine Learning Symposium June 2017

Poster Contest Organizer

Chicago, IL

- I co-designed, administered, and implemented code for a graduate student poster contest using rank aggregation algorithms with L. Jain and L. Balzano.

WORKSHOPS, PROGRAMS, AND SUMMER SCHOOLS

Institute for Advanced Study

Visting PhD Student

February - March 2020

Princeton, NJ

- Visited my advisor L. Balzano who was participating in the special year on optimization, statistics, and theoretical machine learning at the Institute for Advanced Study during her sabbatical.

Heidelberg Laureate Forum

Participant

September 2019

Heidelberg, Germany

- Met “the recipients of the most prestigious awards in mathematics and computer science, the Abel Prize, ACM A.M. Turing Award, ACM Prize in Computing, Fields Medal and Nevanlinna Prize” as one of “200 selected young researchers from all over the world.”

Fundamentals of Data Analysis

Participant

July 2018

Madison, WI

- Summer school on randomized linear algebra; high-dimensional statistics; interactive machine learning; probability on graphs; continuous optimization; deep learning.

Summer School High Dimensional Representations

Participant

July 2018

Berkely, CA

- Mathematical Sciences Research Institute summer school on compressed sensing and other fundamental machine learning topics

Workshop on Fair Interactive Learning and Fair Representations

Participant

March 2018

Philadelphia, PA

- Computing Community Consortium workshop about algorithmic fairness in the context of interactive algorithms

Workshop on Trustworthy Algorithmic Decision-Making

Participant

December 2017

Arlington, VA

- The goal of the workshop was “to develop ideas . . . to make progress toward understanding, developing, and evaluating trustworthy algorithmic decision-making”

Princeton Research Training Group Summer School in Financial Math

Participant

June 2013

Princeton, NJ

- Summer school on modern and developing topics in financial math such as systemic risk and high-frequency trading.

Women and Mathematics: 21st Century Geometry

Participant

May 2012

Princeton, NJ

- Lecture series on 21st century geometry and mentoring program at the Institute for Advanced Study and Princeton University.

TECHNICAL SKILLS

- Python
- L^AT_EX
- SQL