Emily Ruth Diana

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Research Interests

Ethical algorithm design, fairness and privacy in machine learning, financial applications of data science, statistical learning, bias mitigation under distribution shift, proxy attributes, tool development

Academic Appointment

Sept 2023 -   Toyota Technological Institute at Chicago
Research Assistant Professor

Work Experience

Jun 2021 -
April 2022   Amazon Web Services (Remote)
Applied Scientist Intern

Supervisors: Michele Donini and Bilal Zafar
Research Topic: Bias Mitigation Benchmarking for Amazon SageMaker Clarify (Working Paper)
Language: Python

Jun 2020 -
May 2021   Amazon Web Services (Remote)
Applied Scientist Intern

Supervisors: Michael Kearns, Krishnaram Kenthapadi, Aaron Roth
Research Topics: Minimax Group Fairness, Multiaccurate Proxies for Downstream Fairness.

Mar 2018 -
Aug 2018   Center on Poverty and Inequality, Stanford University, Stanford, CA
Research Assistant

Supervisors: David Grusky and Adrian Raftery
Research Topic: Developing methodologies to analyze trends in contemporary social mobility based on contingency tables of longitudinally-linked Census data.

Aug 2015-
Sep 2017   Lawrence Livermore National Laboratory, Livermore, CA
Scientific Software Developer

Parallelized and integrated a domain decomposer, Recursive Inertial Bisection, into the mesh generation step of ALE3D, a multi-physics "Arbitrary Lagrangian-Eulerian 3D" numerical simulation code. Primary developer for LLNL's ParticlePack code. Member of team integrating a GPU portability abstraction into ALE3D's advection package. Presented research internally on implications of strided memory access patterns on GPU-accelerated computing.

Education

2018-2023 Ph.D. in Statistics and Data Science - The Wharton School, University of Pennsylvania
Advisors: Michael Kearns and Aaron Roth
Committee: Michael Kearns, Aaron Roth, Shane Jensen, Edgar Dobriban
Thesis: *Approaches Addressing Algorithmic Bias and Disclosiveness*

2017-2018 M.S. in Statistics - Stanford University

2011-2015 B.A. in Applied Mathematics, cum laude - Yale College
Thesis: *Maintaining Bipartite Structure with a Modified Louvain Algorithm*
Supervisor: Daniel Spielman

Selected Awards

The Wharton School's J. Parker Memorial Bursk Prize for Excellence in Research (2022)

Michigan Institute for Data Science Future Leader (2022)

MIT EECS Rising Star (2021)

Brown Best Student Paper Award (2021)

Wellcome Data Re-Use Prize: Malaria (£15000, 2019)

Weapons Simulation and Computing Code Development Silver Star Award (2017)

Manuscripts in Submission

1. Siqi Deng, **Emily Diana**, Michael Kearns, and Aaron Roth. Balanced filtering via non-disclosive proxies, 2023.

2. Alexander Williams Tolbert and **Emily Diana**. Correcting underrepresentation and intersectional bias for fair classification, 2023.

Peer-Reviewed Publications

1. **Emily Diana**, Wesley Gill, Michael Kearns, Krishnaram Kenthapadi, Aaron Roth, and Saeed Sharifi-Malvajerdi. Multiaccurate proxies for downstream fairness. In *2022 ACM Conference on Fairness, Accountability, and Transparency*, FAccT '22, page 1207–1239, New York, NY, USA, 2022. Association for Computing Machinery.

2. **Emily Diana**, Wesley Gill, Ira Globus-Harris, Michael Kearns, Aaron Roth, and Saeed Sharifi-Malvajerdi. Lexicographically Fair Learning: Algorithms and Generalization. In *2nd Symposium on Foundations of Responsible Computing (FORC 2021)*, volume 192 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 6:1–6:23, Dagstuhl, Germany, 2021. Schloss Dagstuhl – Leibniz-Zentrum für Informatik.

3. **Emily Diana**, Wesley Gill, Michael Kearns, Krishnaram Kenthapadi, and Aaron Roth. Minimax group fairness: Algorithms and experiments. In *Proceedings of the 2021 AAAI/ACM Conference on AI, Ethics, and Society*, AIES '21, page 66–76, New York, NY, USA, 2021. Association for Computing Machinery.

4. **Emily Diana**, Travis Dick, Hadi Elzayn, Michael Kearns, Aaron Roth, Zachary Schutzman, Saeed Sharifi-Malvajerdi, and Juba Ziani. Algorithms and learning for fair portfolio design. In *Proceedings of the 22nd ACM Conference on Economics and Computation*, EC '21, page 371–389, New York, NY, USA, 2021. Association for Computing Machinery.

5. **Emily Diana**, Hadi Elzayn, Michael Kearns, Aaron Roth, Saeed Sharifi-Malvajerdi, and Juba Ziani. Differentially private call auctions and market impact. In *Proceedings of the 21st ACM Conference on Economics and Computation*, EC '20, page 541–583, New York, NY, USA, 2020. Association for Computing Machinery.

6. **Emily Diana**, Michael Kearns, Seth Neel, and Aaron Roth. Optimal, truthful, and private securities lending. In *Proceedings of the First ACM International Conference on AI in Finance*, ICAIF '20, New York, NY, USA, 2020. Association for Computing Machinery.

Contributed Articles

1. **Emily Diana**, Mingzi Niu, and Georgy Noarov. Sigecom winter meeting 2022 highlights. *ACM SIGecom Exchanges*, 20(1):3–23, July 2022.

2. Charles R. Noble, Andrew T. Anderson, Nathan R. Barton, Jamie A. Bramwell, Arlie Capps, Michael H. Chang, Jin J. Chou, David M. Dawson, **Emily Diana**, Timothy A. Dunn, Douglas R. Faux, Aaron C. Fisher, Patrick T. Greene, Ines Heinz, Yuliya Kanarska, Saad A. Khairallah, Benjamin T. Liu, Jon D. Margraf, Albert L. Nichols, Robert N. Nourgaliev, Michael A. Puso, James F. Reus, Peter B. Robinson, Alek I. Shestakov, Jerome M. Solberg, Daniel Taller, Paul H. Tsuji, Christopher A. White, and Jeremy L. White. Ale3d: An arbitrary lagrangian-eulerian multi-physics code. Technical Report https://www.osti.gov/biblio/1361589LLNL-TR-732040, Lawrence Livermore National Lab. (LLNL), Livermore, CA (United States), May 2017.

Talks and Presentations

1. *YinzOR 2023 at Carnegie Mellon University.* "Balanced Filtering via Non-Disclosive Proxies." 2023. (Upcoming Talk).

2. *The Wharton School of the University of Pennsylvania.* "Approaches Addressing Algorithmic Bias and Disclosiveness." 2023. (Thesis Defense)

3. *University of Illinois Urbana-Champaign.* "Addressing Algorithmic Bias and Dislosiveness: Minimax Group Fairness and Multiaccurate Proxies." 2023. (Seminar)

4. *University of Chicago.* "Addressing Algorithmic Bias and Dislosiveness: Minimax Group Fairness and Multiaccurate Proxies." 2023. (Seminar)

5. *Baruch College.* "Addressing Algorithmic Bias and Dislosiveness: Multiaccurate Proxies for Downstream Fairness." 2023. (Seminar)

6. *University of Washington.* "Addressing Algorithmic Bias and Dislosiveness: Minimax Group Fairness and Multiaccurate Proxies." 2023. (Seminar)

7. *University of Virginia.* "Addressing Algorithmic Bias and Dislosiveness: Minimax Group Fairness and Multiaccurate Proxies." 2023. (Seminar)

8. *University of Florida.* "Addressing Algorithmic Bias and Dislosiveness: Minimax Group Fairness and Multiaccurate Proxies." 2023. (Seminar)

9. *University of California, Irvine.* "Addressing Algorithmic Bias and Dislosiveness: Minimax Group Fairness and Multiaccurate Proxies for Redacted Features." 2022. (Seminar)

10. *Gies College.* "Addressing Algorithmic Bias and Dislosiveness: Minimax Group Fairness and Multiaccurate Proxies for Redacted Features." 2022. (Seminar)

11. *University of Michigan.* "Addressing Algorithmic Bias and Dislosiveness: Minimax Group Fairness and Multiaccurate Proxies for Redacted Features." 2022. (Seminar)

12. *University of South Carolina.* "Addressing Algorithmic Bias and Dislosiveness: Minimax Group Fairness and Multiaccurate Proxies for Redacted Features." 2022. (Seminar)

13. *Foster School of Business.* "Addressing Algorithmic Bias and Dislosiveness: Multiaccurate Proxies for Downstream Fairness." 2022. (Seminar)

14. *Tippie College of Business.* "Addressing Algorithmic Bias and Dislosiveness: Multiaccurate Proxies for Downstream Fairness." 2022. (Seminar)

15. *Michigan AI Symposium.* "Balanced Filtering via Non-Disclosive Proxies." 2022. (Lightning Talk)

16. *IPAM Summer School on Algorithmic Fairness 2022.* "Multiaccurate Proxies for Downstream Fairness." 2022. (Poster)

17. *ACM FAccT Conference 2022.* "Multiaccurate Proxies for Downstream Fairness." 2022. (Short Talk, Long Talk, Poster)

18. *Lawrence Livermore National Laboratory Applied Statistics Group Seminar.* "Approaches Assessing Automated Bias: Minimax Fairness and Bias-Aware Proxies for Redacted Features." 2022. (Invited Seminar)

19. *3rd Symposium on Foundations of Responsible Computing (FORC 2022).* "Multiaccurate Proxies for Downstream Fairness." 2022. (Talk)

20. *Wharton Statistics PhD Student Seminar Day.* "Bias Mitigation Benchmarking." 2022. (Short Talk)

21. *MIDAS Future Leaders Summit.* "Multiaccurate Proxies for Downstream Fairness." 2022. (Lightning Talk)

22. *Rutgers Conference on Advances in Bayesian and Frequentist Statistics.* "Multiaccurate Proxies for Downstream Fairness." 2022. (Poster)

23. *EECS Rising Stars 2021.* "Multiaccurate Proxies for Downstream Fairness." 2021. (Poster)

24. *AMLC 2021 Workshop on Trustworthy AI.* "Multiaccurate Proxies for Downstream Fairness." 2021. (Talk)

25. *Lawrence D. Brown Distinguished Lecture and Student Workshop.* "Multiaccurate Proxies for Downstream Fairness." 2021. (Talk)

26. *2nd Symposium on Foundations of Responsible Computing (FORC 2021).* "Lexicographically Fair Learning: Algorithms and Generalization." 2021. (Long Talk)

27. *AAAI/ACM Conference on Artificial Intelligence, Ethics and Society.* "Minimax Group Fairness: Algorithms and Experiments." 2021. (Short Talk, Long Talk, Poster)

28. *ALT Mentorship Workshop.* "Minimax and Lexicographically Fair Learning: Algorithms, Experiments, and Generalization." 2021. (Talk Dissection)

29. *AMLC Workshop on Fairness and Bias in AI.* "Convergent Algorithms for (Relaxed) Minimax Fairness." 2020. (Talk)

30. *6th Annual Bloomberg-Columbia Machine Learning in Finance.* "Optimal, Truthful, and Private Securities Lending." 2020. (Invited Talk)

31. *Joint Statistical Meetings, Philadelphia, PA.* "Is Anemia Prevalence a Good Proxy for Malaria Prevalence for Children? A Community-Level Perspective via Matched Logistic Regression." 2020. (Talk)

32. *NeuRIPS Workshop on Robust AI in Financial Services: Data, Fairness, Explainability, Trustworthiness, and Privacy, Vancouver, CA.* "Optimal, Truthful, and Private Securities Lending." 2019. (Spotlight Talk)

33. *Grace Hopper Celebration of Women in Computing, Houston, TX.* "Domain Decomposition with Recursive Inertial Bisection." 2016. (Poster)

Teaching Assistantships

The Wharton School, University of Pennsylvania

CIS 399: Science of Data Ethics (Spring 2020, Undergraduate)

STAT 613: Regression Analysis for Business (Fall 2019, Graduate)

STAT 102: Introduction to Business Statistics (Spring 2019, Undergraduate)

Stanford University

CS 161: Design and Analysis of Algorithms (Winter 2018-2019, Undergraduate)

CS 106A: Programming Methodologies (Fall 2018, Undergraduate)

Service and Leadership

4th Workshop on Adversarial Robustness In the Real World (AROW) at ICCV External Reviewer (2023)

Pattern Recognition Letters Reviewer (2023)

TheWebConf External Reviewer (2023)

FAccT Program Committee Member (2022, 2023)

UpML Workshop at ICML Program Committee Member (2022)

SEAS Center on Safe, Explainable, and Trustworthy AI-enabled Systems Member (2022)

Invited Contributor: Exchanges Cover of the SIGecom Winter Meeting on Algorithmic Fairness (2022)

AMLC Workshop on Trustworthy AI External Reviewer (2021)

FORC External Reviewer (2021)

Wharton Doctoral Program Student Representative (2021)

Wharton Doctoral Program Peer Mentor (2020-present)

Stanford Women in Mathematics Mentoring (2017)

LLNL Division Representative for Girls Who Code (2016-2017)

Other

Two Patents Filed (2021)

University of Pennsylvania Center for Teaching and Learning Teaching Certification (2022)

References

Available upon request