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Google Scholar

RESEARCH INTERESTS

Data Privacy

Theoretical and applied problems in differential privacy; Statistical inference on privatized data; Theoretical guarantees for synthetic data.

Statistics

Simulation-based inference; Functional data analysis;.

Applied Work

Analysis of physiological signals; Acoustic Analyses; Pitch Estimation.

EDUCATION

Penn State University, University Park PA

August 2016-May 2020

Doctor of Philosophy, Statistics.

Advised by Aleksandra Slavković and Matthew Reimherr.

Brandeis University, Waltham MA

Fall 2014-Spring 2016

Master of Arts, Mathematics.

Clarion University of Pennsylvania, Clarion PA

Fall 2011-Spring 2014

Bachelor of Science, Mathematics.

Minors: Computer Science, Honors.

PROFESSIONAL CAREER

Purdue University, Department of Statistics, West Lafayette IN

August 2020-present

Assistant Professor.

MITRE

June 2021-present

Differential privacy consultant for MITRE and Census Disclosure Avoidance System team.

Harvard University, Center for Research on Computation and Society (CRCS), Cambridge MA

Summer 2018

Visiting Graduate Student.

Penn State University, Department of Statistics, University Park PA

Summer 2017-Spring 2020

Research Assistant.

Teaching Assistant (Spring 2019). STAT 401.

Lafayette College, Department of Mathematics, Easton PA

Summer 2013

REU participant.

HONORS & AWARDS

2nd place Best Poster Award, Statistics and Optimization in Data Science Workshop, Purdue University Summer 2023

Poster presented by Zhanyu Wang.

Outstanding Poster Award, Midwest Machine Learning Symposium

Spring 2023

Poster presented by Zhanyu Wang. 5/141 selected for the award.

Regina and Norman Carroll Research Award for 2022, Purdue Statistics	Spring 2023
Journal of Voice 2022 Best Paper Award Best Paper in the Speech-Language Pathology category	Spring 2023
The Voice Foundation Best Poster Award	Summer 2021
Penn State 2020 Alumni Dissertation Award	Spring 2020
PSU Statistics 50th Anniversary Best Poster Award	Spring 2018
August and Ruth Homeyer Graduate Fellowship, PSU	Fall 2017-Spring 2018
Best Performance on Applied Qualifying Exam, PSU Statistics	Summer 2017
Stephen B. Brumbach Distinguished Graduate Fellowship, PSU	Fall 2016-Spring 2017
GAANN Fellowship	Fall 2014-Summer 2016
MAA Outstanding Student Poster Award	Winter 2014
Clarion University France-Allison Presentation Award	Fall 2013
MAA Outstanding Student Presentation Award	Summer 2013
Board of Governors Academic Tuition Scholarship	Fall 2011-Spring 2014

ON-GOING PROJECTS

Awan, J., Barrientos, A., Ju, N. “Statistical Inference for Unbounded DP.”

Wang, Z., **Awan, J.** “ De-Biased Parametric Bootstrap Inference on Privatized Data.”

Cho, Y. H., Kim, S., **Awan, J.** “Formalizing Semi-Privacy.”

Cho, Y. H., **Awan, J.** “Locally most powerful differentially private tests.”

Tran, T., Dowden, K., **Awan, J.**, Slavkovic, A., Reimherr, M. “binomialDP: An R Package for Differentially Private Inference on Binomial Data.”

Awan, J., Edwards, A., Bartholomew, B., Cady, N., Sillers, A. “Consistent Differentially Private Histograms with Error Quantification.”

SUBMITTED PAPERS

1. **Awan, J.**, Wang, Z. “Simulation-based Finite-sample Inference for Privatized Data.” arXiv:2303.05328. Major revision.
2. **Awan, J.**, Ramasethu, A. “Optimizing Noise for f -Differential Privacy via Anti-Concentration and Stochastic Dominance. arXiv:2308.08343. Submitted.
3. Kang, T., Kim, S., Sohn, J., **Awan, J.** “Differentially Private Topological Data Analysis.” arXiv:2305.03609. Submitted.
4. Ohnishi, Y., **Awan, J.** “Locally Private Causal Inference.” arXiv:2301.01616. Submitted.
5. Wang, Z., Cheng, G., **Awan, J.** “Differentially Private Bootstrap: New Privacy Analysis and Inference Strategies.” arXiv:2210.06140. Submitted.
6. **Awan, J.**, Wang, Y. “Differentially Private Kolmogorov-Smirnov-Type Tests.” arXiv:2208.06236. Submitted.

REFEREED PUBLICATIONS

1. **Awan, J.**, Cai, Z. (2023) “One Step to Efficient Synthetic Data.” *Statistica Sinica*. Accepted.

2. **Awan, J.**, Bernardi, O. (2023) "Tutte Polynomials for Regular Oriented Matroids." *Discrete Mathematics*. Accepted.
3. **Awan, J.**, Vadhan, S. (2023) "Canonical Noise and Private Hypothesis Tests with Applications to Difference of Proportions Testing." *Annals of Statistics*. Volume 51, Number 2, Pages 547-572.
4. **Awan, J.**, Rao, V. (2023) "Privacy-Aware Rejection Sampling." *Journal of Machine Learning Research*. Volume 24, No. 74, Pages 1-32.
5. Awan, S., Shaikh, M., **Awan, J.**, Abdalla, I., Lim, K., Misono, S., (2023) "Smartphone Recordings are Comparable to 'Gold Standard' Recordings for Acoustic Measurements of Voice." *Journal of Voice*. Available online.
6. Feinstein, H., Daşdöğen, Ü., **Awan, J.**, Awan, S., Verdolini Abbott, K. (2023) "Comparative Analysis of Two Methods of Perceptual Voice Assessment." *Journal of Voice*. Available online.
7. **Awan, J.**, Dong, J. (2022) "Log-Concave and Multivariate Canonical Noise Distributions for Differential Privacy." *Advances in Neural Information Processing Systems 36*, 34229-34240.
8. Ju, N., **Awan, J.**, Gong, R., Rao, V. (2022) "Data Augmentation MCMC for Bayesian Inference from Privatized Data." *Advances in Neural Information Processing Systems 36*, 12732-12743.
9. **Awan, J.**, Frechette, C., Li, Y., McMahon, E. (2022) "Demicaps in $AG(4, 3)$ and their Relation to Maximal Cap Partitions." *Graphs and Combinatorics*. Volume 83, No. 193.
10. Li, A., Chen, J., **Awan, J.**, Eddins, D., Awan, S. (2022) "Performance Analysis and Parametric Study of Vortex Whistle." *Proceedings of the ASME 2022 Fluids Engineering Division Summer Meeting. Volume 1: Fluid Applications and Systems (FASTC); Fluid Measurement and Instrumentation (FMITC); Fluid Mechanics (FMTC)*. Toronto, Ontario, Canada. August 3-5, 2022. V001T01A018. ASME.
11. Li, A., **Awan, J.**, Chen, J., Eddins, D., Awan, S. (2022) "Enhancing the Vortex Whistle for Measures of Respiratory Capacity via CFD and CAA." *Journal of Biomechanical Engineering*. Volume 144, Issue 11.
12. Awan, S., **Awan, J.** (2022) "Use of a Vortex Whistle for Measures of Respiratory Capacity." *Journal of Voice*. Volume 36, Issue 5, Pages 630-636. (**Best Paper Award**)
13. **Awan, J.**, Slavković, A. (2021) "Structure and Sensitivity in Differential Privacy: Comparing K -Norm Mechanisms." *Journal of the American Statistical Association*. Volume 116, Number 534, 935-954.
14. **Awan, J.**, Slavković, A. (2020) "Differentially Private Inference for Binomial Data." *Journal of Privacy and Confidentiality*. Volume 10, No. 1.
15. **Awan, J.**, Bernardi, O. (2020) "Tutte Polynomials for Directed Graphs." *Journal of Combinatorial Theory, Series B*. Volume 140, 192-247.
16. Awan, S., **Awan, J.** (2020) "A Two-Stage Cepstral Analysis Procedure for the Classification of Rough Voices." *Journal of Voice*. Volume 34, Issue 1, 9-19.
17. Reimherr, M., **Awan, J.** (2019) "KNG: The K -Norm Gradient Mechanism." *Advances in Neural Information Processing Systems 33*. 10208-10219.
18. Reimherr, M., **Awan, J.** (2019) "Elliptical Perturbations for Differential Privacy." *Advances in Neural Information Processing Systems 33*. 10185-10196.
19. **Awan, J.**, Kenney, A., Reimherr, M., Slavković A. (2019) "Benefits and Pitfalls of the Exponential Mechanism with Applications to Hilbert Spaces and Functional PCA." *Proceedings of the 36th International Conference on Machine Learning*, 97:374-384.
20. **Awan, J.**, Slavković, A. (2018) "Differentially Private Uniformly Most Powerful Tests for Binomial Data." *Advances in Neural Information Processing Systems 32*, 4208-4218.
21. Gaskill, C., **Awan, J.**, Watts, C., Awan, S. (2016) "Acoustic and Perceptual Classification of Within-sample Normal, Intermittently Dysphonic, and Consistently Dysphonic Voice Types." *Journal of Voice*, Volume 31, Issue 2, Pages 218-228.
22. Awan, S., **Awan, J.** (2013) "The Effect of Gender on Measures of Electrolaryngographic Contact Quotient." *Journal of Voice*, Volume 27, Issue 4, 433-440.

NON-REFEREED PUBLICATIONS

1. **Awan, J.**, Gong, R. (2023). “Statistical Inference and Differential Privacy.” *CRC Handbook on Privacy*. Accepted.
2. **Awan, J.**, Reimherr, M., Slavković, A. (2020). “Formal Privacy for Modern Nonparametric Statistics.” *CHANCE* 33, No. 4. 43-49.
3. Awan, S., **Awan, J.**, Watts, C., S. Gaskill, C. (2018). “Response to Aichinger and Kubin Re: Letter to the Editor “Acoustic and Perceptual Classification of Within-Sample Normal, Intermittently Dysphonic, and Consistently Dysphonic Voice Types.”” *Journal of Voice*. Issue 32, No. 3, 383-384.

GRANTS

NIH R01: Vital Capacity & Airflow Measurement for Voice Evaluation: A Vortex Whistle System, MPI **2023-2028**

One of 4 MPIs, along with Dr. Shaheen Awan, Dr. Jun Chen, and Dr. Amanda Gillespie. \$3,129,418 for 5 years.

NSF: Simulation-based Inference for Differential Privacy, PI **2022-2025**

Principal investigator, along with Co-PI Dr. Roberto Molinari. \$450,000 for 3 years.

RESEARCH PRESENTATIONS

Joint Statistical Meetings, Toronto Canada **August 2023**

Simulation-based Inference for Privatized Data

Air Force Institute of Technology, Department of Mathematics and Statistics, Wright-Patterson Air Force Base, OH **January 2023**

Bayesian Inference on Privatized Data

Auburn University, Statistics and Data Science Seminar, Online **September 2022**

Bayesian Inference from Privatized Data

Statistical Learning and Differential Privacy, Bath U.K. (online) **September 2022**

Data Augmentation MCMC for Bayesian Inference from Privatized Data

Joint Statistical Meetings, Washington D.C. **August 2022**

Posterior Inference on Privatized Data via Data Augmentation MCMC

Workshop on the Analysis of Census Noisy Measurement Files and Differential Privacy, Rutgers University **April 2022**

Posterior Inference on Privatized Data via Data Augmentation MCMC

Computational & Methodological Statistics Meeting, Online **December 2021**

Canonical noise distributions and private hypothesis tests

Privacy in Machine Learning, Virtual NeurIPS Workshop **December 2021**

Canonical noise distributions and private hypothesis tests

Privacy in Machine Learning, Virtual NeurIPS Workshop **December 2021**

Privacy-aware rejection sampling

Privacy Preserving Machine Learning, Virtual ACM CCS Workshop **November 2021**

Canonical noise and private hypothesis tests

Michigan State University, Department of Statistics, Online **November 2021**

Canonical noise and private hypothesis tests

Invited Panel: Virtual Symposium on Data Privacy, ASA Nevada Chapter **September 2021**

Canonical noise distributions and private hypothesis tests

2021 Joint Statistical Meetings, Online **August 2021**

Approximate co-sufficient sampling with applications to goodness of fit tests and synthetic data

2020 Joint Statistical Meetings, Online KNG: The K -norm gradient mechanism	August 2020
University of Wisconsin-Madison, Department of Statistics, Madison WI Differentially private inference for binomial data	February 2020
Lafayette College, Department of Mathematics, Easton PA Differentially private inference for binomial data	February 2020
George Mason University, Department of Statistics, Fairfax VA Differentially private inference for binomial data	February 2020
Bucknell University, Department of Mathematics, Lewisburg PA Differentially private inference for binomial data	Spring 2020
Purdue University, Department of Statistics, West Lafayette IN Differentially private inference for binomial data	Spring 2020
2019 Joint Statistical Meetings, Denver CO Benefits and pitfalls of the exponential mechanism	Summer 2019
36th International Conference Machine Learning, Long Beach CA Benefits and pitfalls of the exponential mechanism	Summer 2019
Simons Institute for the Theory of Computing, Berkeley CA Differentially private UMP hypothesis tests for Bernoulli data	April 2019
Computational & Methodological Statistics Meeting in Pisa, Italy Differentially private UMP hypothesis tests for Bernoulli data	December 2018
2018 Joint Statistical Meetings, Vancouver Canada Optimizing finite sample performance under differential privacy	July 2018
Statistical Society of Canada Annual Meeting, McGill University, Montreal Canada Optimizing finite sample performance under differential privacy	June 2018
Mathematical Foundations of Data Privacy, Banff International Research Station (BIRS), Banff Canada Structure and sensitivity in DP: comparing K -norm mechanisms	May 2018
Stochastic Modeling and Computational Statistics Seminar at Penn State, University Park PA Structure and sensitivity in DP: comparing K -norm mechanisms	February 2018
MIT Combinatorics Seminar, Cambridge MA Tutte polynomials for directed graphs and oriented matroids	April 2016
Brandeis Graduate Student Seminar, Waltham MA Tutte polynomials for directed graphs and oriented matroids	April 2016
Brandeis Combinatorics Seminar, Waltham MA Tutte polynomials for directed graphs and oriented matroids	January 2016
Brandeis Mathematics Graduate Student Seminar, Waltham MA Maximal caps and substructures in $AG(4, 3)$	Fall 2014
Pi Mu Epsilon Conference, Youngstown OH	Spring 2014

Maximal caps and substructures in $AG(4, 3)$

Joint Math Meetings, Baltimore MD

Winter 2014

Maximal caps and substructures in $AG(4, 3)$

Clarion University Honors Presentations, Clarion PA

Fall 2013

Results on demicaps in $AG(4, 3)$

Mathfest Conference, Hartford CT

Summer 2013

Maximal caps and substructures in $AG(4, 3)$

POSTERS

**Thirty-Sixth Conference on Neural Information Processing Systems, New Orleans, LA (online)
November 2022**

Log-Concave and Multivariate Canonical Noise Distributions for Differential Privacy

**Thirty-Sixth Conference on Neural Information Processing Systems, New Orleans, LA (online)
November 2022**

Data Augmentation MCMC for Bayesian Inference from Privatized Data

Joint Statistical Meetings, Washington D.C.

August 2022

Post-processing large-scale differentially private data with known constraints

Joint Statistical Meetings, Washington D.C.

August 2022

Differentially private bootstrap

Privacy in Machine Learning, Virtual NeurIPS Workshop

December 2021

Canonical noise distributions and private hypothesis tests

Privacy in Machine Learning, Virtual NeurIPS Workshop

December 2021

Privacy-aware rejection sampling

Privacy Preserving Machine Learning, Virtual ACM CCS Workshop

November 2021

Canonical noise and private hypothesis tests

Privacy Preserving Machine Learning, Virtual ACM CCS Workshop

November 2021

Privacy-aware rejection sampling

Voice Foundation 2021, Online

June 2021

Use of a vortex whistle for measures of respiratory capacity

**Thirty-Third Conference on Neural Information Processing Systems,
Vancouver Canada**

December 2019

Elliptical perturbations for differential privacy

**Thirty-Third Conference on Neural Information Processing Systems,
Vancouver Canada**

December 2019

K -Norm gradient mechanism for private empirical risk minimization

36th International Conference on Machine Learning, Long Beach CA

Summer 2019

Benefits and pitfalls of the exponential mechanism

**Thirty-second Conference on Neural Information Processing Systems,
Montreal Canada**

December 2018

Differentially private uniformly most powerful tests for binomial data

**Theory and Practice of Differential Privacy in 25th ACM Conference on
Computer and Communications Security, Toronto Canada**

October 2018

Differentially private uniformly most powerful tests for binomial data

50th Anniversary Conference at Penn State Department of Statistics, University Park PA	May 2018
Optimizing finite sample performance under differential privacy	
Rao Prize Conference at Penn State, University Park PA	May 2017
Maximum likelihood estimation with differential privacy	
Joint Math Meetings, Baltimore MD	Winter 2014
REU results on maximal caps and substructures in $AG(4, 3)$	

OTHER PRESENTATIONS

Open DP Community Workshop	Summer 2020
Lightning talk on Binomial inference under differential privacy	
Penn State Statistics Graduate Student Association Workshop	Fall 2018
Introduction to differential privacy	
Center for Research on Computation and Society, Harvard University	Summer 2018
Introduction to differential privacy	
Penn State Statistics Graduate Student Association Workshop	Fall 2017
Introduction to differential privacy	
Penn State DS 300: Privacy and Security for Data Sciences	Fall 2017
Introduction to differential privacy	
Brandeis Mathematics Graduate Student Seminar	Fall 2015
A proof of the 5 color theorem	
Brandeis Combinatorics Seminar	Spring 2015
Topics in matroid representability	
Brandeis Mathematics Graduate Student Seminar	Spring 2015
Topics regarding the Tutte polynomial	
Pi Mu Epsilon Conference, Youngstown OH	Spring 2013
A solution for the 2013 COMAP MCM problem A	
Clarion University High School Mathematics Competition	Fall 2012
Mental math algorithms with proofs and examples	
Cumberland Valley Math Modeling Challenge at Shippensburg University	Fall 2011
A model to predict the economic impacts of different voting systems	

TEACHING EXPERIENCE

Purdue University Department of Statistics, Instructor	Fall 2020, Fall 2021
STAT 417: Statistical Theory Fall 2020 (online), Fall 2022	
STAT 519: Probability Theory, Fall 2021, Spring 2023	
STAT 598: Differential Privacy, Fall 2022	
STAT 692: Research Seminar, Fall 2021, Spring 2022	
Pennsylvania State University Department of Statistics, Instructor	Spring 2019
Introduction to Probability and Statistics with R for Engineers	
Brandeis University Department of Mathematics, Instructor	Fall 2015, Spring 2016

Integral Calculus

Brandeis University Department of Mathematics, Grader
Multivariate Calculus, Linear Algebra

Fall 2014, Spring 2015

Brandeis University Department of Mathematics, Tutor
Pre-Calculus, Calculus I & II

Fall 2014, Spring 2015

Clarion University Department of Academic Enrichment, Tutor
Finite Mathematics, Pre-Calculus, Calculus I & II, Linear Algebra

Fall 2011-Spring 2014

SOFTWARE DEVELOPMENT

binomialDP R Package

Summer 2020

Implementation of UMP tests and UMA confidence intervals for Binomial test statistics under differential privacy. In collaboration with Tran Tran and Dr. Aleksandra Slavković. <https://github.com/trantran/binomialDP>

PROFESSIONAL ORGANIZATIONS

Regenstrief Center for Healthcare Engineering, Purdue University
Associate member

Summer 2022-present

American Statistical Association

Summer 2017-present

Institute of Mathematical Statistics

Summer 2017-present