Jordan A. Awan
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Google Scholar
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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 **Spring 2023**
Best Paper in the Speech-Language Pathology category

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 Electroglottographic 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 **August 2020**
KNG: The K-norm gradient mechanism

University of Wisconsin-Madison, Department of Statistics, Madison WI **February 2020**
Differentially private inference for binomial data

Lafayette College, Department of Mathematics, Easton PA **February 2020**
Differentially private inference for binomial data

George Mason University, Department of Statistics, Fairfax VA **February 2020**
Differentially private inference for binomial data

Bucknell University, Department of Mathematics, Lewisburg PA **Spring 2020**
Differentially private inference for binomial data

Purdue University, Department of Statistics, West Lafayette IN **Spring 2020**
Differentially private inference for binomial data

2019 Joint Statistical Meetings, Denver CO **Summer 2019**
Benefits and pitfalls of the exponential mechanism

36th International Conference Machine Learning, Long Beach CA **Summer 2019**
Benefits and pitfalls of the exponential mechanism

Simons Institute for the Theory of Computing, Berkeley CA **April 2019**
Differentially private UMP hypothesis tests for Bernouilli data

Computational & Methodological Statistics Meeting in Pisa, Italy **December 2018**
Differentially private UMP hypothesis tests for Bernouilli data

2018 Joint Statistical Meetings, Vancouver Canada **July 2018**
Optimizing finite sample performance under differential privacy

Statistical Society of Canada Annual Meeting, McGill University, Montreal Canada **June 2018**
Optimizing finite sample performance under differential privacy

Mathematical Foundations of Data Privacy, Banff International Research Station (BIRS), Banff Canada **May 2018**
Structure and sensitivity in DP: comparing K-norm mechanisms

Stochastic Modeling and Computational Statistics Seminar at Penn State, University Park PA **February 2018**
Structure and sensitivity in DP: comparing K-korm mechanisms

MIT Combinatorics Seminar, Cambridge MA **April 2016**
Tutte polynomials for directed graphs and oriented matroids

Brandeis Graduate Student Seminar, Waltham MA **April 2016**
Tutte polynomials for directed graphs and oriented matroids

Brandeis Combinatorics Seminar, Waltham MA **January 2016**
Tutte polynomials for directed graphs and oriented matroids

Brandeis Mathematics Graduate Student Seminar, Waltham MA **Fall 2014**
Maximal caps and substructures in $AG(4, 3)$

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 **Fall 2014, Spring 2015**
Multivariate Calculus, Linear Algebra

Brandeis University Department of Mathematics, Tutor **Fall 2014, Spring 2015**
Pre-Calculus, Calculus I & II

Clarion University Department of Academic Enrichment, Tutor **Fall 2011-Spring 2014**
Finite Mathematics, Pre-Calculus, Calculus I & II, Linear Algebra

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/tranntran/binomialDP`

PROFESSIONAL ORGANIZATIONS

Regenstrief Center for Healthcare Engineering, Purdue University **Summer 2022-present**
Associate member

American Statistical Association **Summer 2017-present**

Institute of Mathematical Statistics **Summer 2017-present**