Carlos J. Soto

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EMPLOYMENT EXPERIENCE

Assistant Professor September 2023 - Present
University of Massachusetts Amherst

Bruce Lindsay Visiting Assistant Research Professor August 2020 - August 2023
Pennsylvania State University

Research position exploring both the theoretical and methodological connections between differential privacy and the geometry of the space in which the data live. Implemented differentially private models on manifolds and evaluated their performance as compared to state of the art techniques. This position also has a teaching component of six credits (two courses) per academic year.

Under the supervision of Matthew Reimherr and Aleksandra Slavković.

EDUCATION

PhD Biostatistics Fall 2017 – July 2020
Florida State University *Tallahassee, Florida*

- Cumulative GPA: 4.0
- Dissertation "Structural Data Analysis in Bioinformatics: With a Focus on Chromosomes and Proteins"
- Advised by Anuj Srivastava

MS Biostatistics Fall 2015 – Fall 2017
Florida State University *Tallahassee, Florida*

- Cumulative GPA: 4.0

MS Mathematics Fall 2013 – Spring 2015
University of Wisconsin–Milwaukee *Milwaukee, Wisconsin*

- Cumulative GPA: 3.618

BA Mathematics Fall 2007 – Spring 2011
Ripon College *Ripon, Wisconsin*

- Cumulative GPA: 3.42, Graduated Cum Laude

PUBLICATIONS

1. Carlos Soto, Karthik Bharath, Matthew Reimherr, and Aleksandra Slavkovic. Shape and structure preserving differential privacy. *Advances in Neural Information Processing Systems*, 2022
2. Carlos Soto, Audrey Dalgarno, Darshan Bryner, Fred Huffer, Nicola Neretti, and Anuj Srivastava. Tadbay: A bayesian topologically associated domain caller. In *2022 IEEE International Conference on Bioinformatics and Biomedicine (BIBM)*, 2022
3. Carlos Soto, Darshan Bryner, Nicola Neretti, and Anuj Srivastava. Toward a three-dimensional chromosome shape alphabet. *Journal of Computational Biology*, pages 601–618, 2021
4. Carlos J Soto, Peiyao A Zhao, Kyle N Klein, David M Gilbert, and Anuj Srivastava. Statistical comparisons of chromosomal shape populations. In *2021 IEEE 18th International Symposium on Biomedical Imaging (ISBI)*, pages 788–791. IEEE, 2021

5. Matthew Reimherr, Karthik Bharath, and Carlos Soto. Differential privacy over riemannian manifolds. *Advances in Neural Information Processing Systems*, 34, 2021

6. Carlos Soto, Audrey Dalgarno, Darshan Bryner, Benjamin McLaughlin, Nicola Neretti, and Anuj Srivastava. Representation of chromosome conformations using a shape alphabet across modeling methods. In *2021 IEEE International Conference on Bioinformatics and Biomedicine (BIBM)*, pages 151–156, 2021

7. Jose Cordova, Carlos Soto, Mostafa Gilanifar, Yuxun Zhou, Anuj Srivastava, and Reza Arghandeh. Shape preserving incremental learning for power systems fault detection. *IEEE control systems letters*, 3(1):85–90, 2018

Forthcoming

1. Carlos Soto, Matthew Reimherr, Aleksandra Slavkovic, Mark Shriver. Differentially Private Human Faces via Radial Curve Representation. *International Conference on Learning Representations*, 2025

In Progress

1. Carlos J Soto and Aditya Kulkarni. "Private Geodesic Regression"

2. Carlos J Soto. "Differential Privacy over Lie Groups."

3. Carlos J Soto " Shape in Shape out Regression."

INVITED TALKS AND PRESENTATIONS

* **CFE-CMStatistics** Dec 14-16, 2024
Gaussian Differential Privacy for Human Faces London, UK
* **NESS** May 23-24, 2024
Representation of Chromosome Conformations Using a Shape Alphabet Across Modeling Storrs, CT
* **IMS Internation Conference of Statistics and Data Science (ICSDS)** Dec, 2023
Shape Preserving Differential Privacy Lisbon, Portugal
* **Joint Statistical Meetings (JSM)** Aug, 2023
Differential Privacy Over Riemannian Manifolds Toronto, Canada
* **National Agricultural Statistics Service (USDA NASS)** July, 2023
Differential Privacy Over Riemannian Manifolds Virtual
‡ **NeurIPS (Neural Information Processing Systems)** Dec 2022
Shape And Structure Preserving Differential Privacy New Orleans, LA
* **The 35th New England Statistics Symposium** May 22-25, 2022
Geometry-driven Statistics: Differential Privacy on Manifolds Storrs (UConn), CT, USA
Workshop on Differential Privacy and Statistical Data Analysis July 25-29, 2022
Intrinsic Differential Privacy Fields Institute (Toronto), ON, CAN
Computational and Methodological Statistics Dec 18-20, 2021
Recent advances in differential privacy: Differential privacy over Riemannian manifolds London, UK
Stochastic Modeling and Computational Statistics (SMAC) Apr 21, 2023
Shape and Structure preserving Differential Privacy University Park, PA
* **Symposium on Data Science and Statistics (SDSS)** Jun 7-10,2022
Differential Privacy on Manifolds Pittsburgh, PA
Joint Statistical Meetings(JSM) Aug 8, 2022
Shape and Structure Preserving Differential Privacy on Manifolds Washington D.C.
* **IEEE-BIBM(International Conference on Bioinformatics and Biomedicine)** Dec 9-12,2021

Representation of Chromosome Conformations Using a Shape Alphabet Across Modeling Methods Virtual
Joint Math Meetings (JMM) April 6, 2022
Differential Privacy Over Riemannian Manifolds Virtual
IEEE-ISBI (International Symposium of Biomedial Imaging) April 13-16, 2021
Statistical Comparisons of Chromosomal Shape Populations Virtual
‡ **NeurIPS (Neural Information Processing Systems)** Dec 2021
Differential Privacy Over Manifolds Virtual
Stochastic Modeling and Computational Statistics (SMAC) Dec 3, 2021
Differential Privacy Over Riemannian Manifolds University Park, PA
Joint Statistical Meetings(JSM) August 5, 2020
Statistical Comparison of Chromosomal Shape Populations Virtual
**Invited* † *Upcoming* ‡ *Poster*

TEACHING EXPERIENCE

Instructor Spring 2024
University of Massachusetts Amherst *Amherst, MA*
Full instructor for STAT 535: Statistical Computing. Introductory statistical computing in R.

Instructor Fall 2023
University of Massachusetts Amherst *Amherst, MA*
Full instructor for STAT 515: Introduction to Statistics. The first of a sequence; covers probability theory.

Instructor Spring 2021, Fall 2021, Fall 2022
Pennsylvania State University *University Park, PA*
Full instructor for STAT 380: Data Science Through Statistical Reasoning and Computation, responsible the entire course except grading.

Instructor Fall 2016 – Spring 2020
Florida State University *Tallahassee, Florida*
Full instructor for STA 2171: Statistics for Biology, responsible for lecturing and creating all coursework including worksheets and exams.

Teaching Assistant Fall 2015 – Spring 2016
Florida State University *Tallahassee, Florida*
Teaching Assistant for CGS 2518: Spreadsheets for Business, responsible for assisting students with assignments as well as grading assignments and exams.

Instructor Fall 2013 – Spring 2015
University of Wisconsin–Milwaukee *Milwaukee, Wisconsin*
Full instructor for MATH 098, MATH 108, and MATH 105, responsible for lecturing and creating all coursework including worksheets and exams.

Math and Statistics Tutor and Assistant Fall 2009 – Spring 2011
Ripon College *Ripon, Wisconsin*
Assisted fellow undergraduate students in math and statistics courses including multivariate calculus, linear algebra, and introductory statistics.

SERVICE

- Reviewer for *International Conference on Learning Representations* (ICLR), *Annals of Applied Statistics*, *Institute of Electrical and Electronics Engineers/Association for Computing Machinery* (*IEEE/ACM*), *Institute of Electrical and Electronics Engineers/International Symposium on Biomedical Imaging* (*IEEE/ISBI*), *Computational and Structural Biotechnology Journal*, *Neural Information Processing Systems (NeurIPS)*, *Internation Conference on Machine Learning (ICML)*,

Jounral of the American Stasitical Associate (JASA), and *Journal on Uncertainty Quantification (JUQ)*.

- Member of the Professional Development Committee of the ASA JEDI (American Statistical Association - Justice Equity Diversity and Inclusion).
- Member of the Penn State Statistics Department Climate and Diversity Committee 2021-2023.
- Organizer of Penn State's Statistics Department Differential Privacy group Fall 2021.
- ASA Student Chapter President - Florida State University 2018.

MEMBERSHIPS

- American Statistical Association (ASA)
- Institute of Mathematical Statistics (IMS)
- Institute of Electrical and Electronics Engineers (IEEE)
- Mathematical Association of America (MAA)
- New England Statistical Society (NESS)

SKILLS

Proficient MATLAB, R, LaTeX
Familiar Python, C++, SAS, and SQL
Languages English (fluent), Spanish (fluent)

AWARDS

- IMS ICSDS 2024 Junior Researcher Travel Support