Cecilia Ferrando

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Research interests: Differential Privacy, Private Machine Learning, Statistical Machine Learning.

Education

University of Massachusetts Amherst — *Amherst, MA*

PhD in Computer Science, Manning College of Information and Computer Sciences — *Aug. 2019 - Oct. 2025 (exp.)*

- Apple Scholars in AI/ML nominated candidate (2022)
- Dean's Outstanding Leadership Award (2021)
- CS Fellow (merit scholarship for Computer Science students, 2019-2020)
- Cadence Women in Technology Scholar (2019-2020)
- PhD Appplicant Support Program, Co-Chair (2020-)

Carnegie Mellon University — *Pittsburgh, PA*

MS in Computational Design, focus on Machine Learning — *Aug. 2016 - May 2018*

- Fulbright Scholar

Polytechnic University of Turin and Collegio Carlo Alberto — *Turin, Italy*

Honors BS+MS Double Degree, Majors: Economics and Statistics, Architecture — *Sep. 2010 - Jul. 2016*

- Collegio Carlo Alberto "Allievi" Scholar
- Alta Scuola Politecnica Scholar
- Won EU-funded scholarship to study abroad in Paris, France (2014-2015)

Research Experience

Meta — *New York, NY (remote)*

Research Engineer Intern, Stats & Privacy R&D team. Host: James Honaker, PhD — *May 2022 - Aug. 2022*

- Researched novel statistically valid differentially-private inference methods for two company-specific problems
- Provided the engineering team with a ready-to-use implementation of my algorithms that the company can now adopt on multiple private inference pipelines

Google Research — *New York, NY (remote)*

Research Intern. Host: Alex Kulesza, PhD — *May 2021 - Aug. 2021*

- Conducted research on novel differentially-private inference methods and supporting theory
- Independently designed and ran extensive experiments to validate new methods
- Presented our work at an internal research seminar
- Formalized results into a conference workshop paper (accepted at PriML at NeurIPS 2021)

University of Massachusetts Amherst — *Amherst, MA*

Research Assistant to prof. Daniel Sheldon, Probabilistic Machine Learning — *Aug. 2019 -*

- Developing new methods and algorithms for noise-aware differentially private inference and uncertainty estimation
- Published research papers on differentially private inference
- Implemented and published code to execute experiments validating my methods, including output visualization
- Current research includes query-based synthetic data for ML, non-parametric bootstrap for differentially private inference

Carnegie Mellon University — *Pittsburgh, PA*

Research Assistant to prof. Daniel Cardoso Llach, Spatial Machine Learning — *May 2017 - Apr. 2018*

- Published research on applications of machine learning for spatial analysis of architectural plans
- Presented Master's thesis work at Spatial Cognition 2018, winning Best Poster Presentation award
- Developed novel graph learning techniques to mathematically encode the spatial hierarchies of architectural plans
- Trained statistical models to classify architectural plans based on their graph embedding
- Contributed to curating an exhibition on the origins of computer-aided design (CAD)

Other Experience

Cadence Design Systems *Pittsburgh, PA*

Machine Learning Software Engineer *Jun. 2018 - May 2019*

- Independently led applied research on generative adversarial networks using capsule networks, implementing algorithms from scratch
- Improved the performance of a classification algorithm by 11% by integrating capsule networks in the computer vision pipeline
- Communicated results with audiences of different expertise and background
- Invited to present my methods and results at Cadence Machine Learning Summit 2019, attendees included company's top scientific and executive leadership

Procore Technologies *Carpinteria, CA*

Quantitative Research Intern *May 2017 - Jul. 2017*

- Developed data analytic app for uncertainty estimation of statistics derived from user data. The company has adopted my app for routine use in their survey data analysis pipeline
- Communicated quantitative results with technical and non-technical audiences
- Collaborated with UX, Engineering and Finance teams

Research Papers

Upcoming:

C. Ferrando, D. Sheldon, *Private Regression via Data-Dependent Sufficient Statistic Perturbation*, under review

Published:

C. Ferrando, S. Wang, D. Sheldon, *Parametric Bootstrap for Differentially Private Confidence Intervals*, AISTATS 2022

C. Ferrando, J. Gillenwater, A. Kulesza, *Combining Public and Private Data*, PriML Workshop at NeurIPS 2021

C. Ferrando, N. Dalmasso, J. Mai, D. Cardoso Llach, *Architectural Distant Reading – Using Machine Learning to Identify Typological Traits Across Multiple Buildings*, CUMINCAD 2019

Posters and Presentations

C. Ferrando, D. Sheldon, *Parametric bootstrap for correcting clamping and truncation bias in differential privacy*, Women in Machine Learning Workshop, NeurIPS 2020

C. Ferrando, *A Machine Learning Framework for Spatial Analysis*, Best Poster Presentation award, Spatial Cognition 2018

Selected Projects

Spring 2021	**2020 National Institute of Standards and Technology Differential Privacy Temporal Map Challenge, team won $43,000 prize**, with Ryan McKenna, Joie Wu, Arisa Tajima, Brett Mullins, and Siddhant Pradhan
Fall 2019	**Adaptive robust regression for heteroskedastic data**, UMass Amherst CS689 Machine Learning, final project with Kenta Takatsu
Spring 2017	**HP-Intel NASA Design Challenge "Life in Space"**, 1st prize winning team project
Fall 2016	**The Harmonograph**, Carnegie Mellon 15-112 Fundamentals of CS and Programming, final project, 2nd prize over 400+ projects

Honors & Awards

Scholarships and Fellowships

2022	**GHC Scholarship**, Anita Borg, Grace Hopper Celebration
2020	**Cadence Women in Technology Scholarship**, Cadence Design Systems
2019	**CS Fellowship**, CICS, University of Massachusetts Amherst
2016-2018	**Fulbright Scholarship ($40,000)**, US Department of State
2010-2016	**Collegio Carlo Alberto "Allievi" Scholarship ($17,000)**, Collegio Carlo Alberto, Turin, Italy
2013-2015	**Alta Scuola Politecnica**, top 1% students, Polytechnic University of Turin, Italy
2014-2015	**Erasmus+ Scholarship**, European Union

Awards

2021	**Dean's Outstanding Leadership Award**, for piloting the PhD Applicant Support Program, CICS, University of Massachusetts Amherst
2021	**2020 NIST Differential Privacy Temporal Map Challenge ($43,000)**, with the Minutemen team
2020	**NeurIPS 2020 registration award**, Women in Machine Learning
2020	**GHC 2020 registration award**, CICS, University of Massachusetts Amherst
2020	**ICML and ICLR 2020 registration award**, Women in Machine Learning
2019	**NeurIPS 2019 travel and registration award**, NeurIPS Conference
2017	**First Prize**, HP-Intel "Life in Space" Design Challenge, CMU team
2017	**Second Prize**, Carnegie Mellon 15-112 best CS projects over more than 400
2009	**Albo delle Eccellenze**, top high-school students in Italy, Italian Ministry of Education

Conference presentations

2018	**Spatial Cognition 2018 Best Poster Award**, Spatial Cognition 2018, Tuebingen, Germany

Teaching & Mentorship

University of Massachusetts Amherst *Amherst, MA*

Graduate thesis mentor to undergraduate student Adi Geva *Feb. 2022 - May 2022*

- Mentored Adi as she worked on her thesis project on bootstrap methods for differentially private confidence intervals. Adi won the UMass Manning CICS 2022 Outstanding Undergraduate Achievement Award

University of Massachusetts Amherst *Amherst, MA*

Graduate mentor, CICS EMBER program *Feb. 2021 - May 2021*

- Mentoring undergraduate students from underrepresented groups conducting applied research on uncertainty quantification in differential privacy

University of Massachusetts Amherst *Amherst, MA*

Graduate mentor, CICS Undergraduate Research program *Jun. 2020 - Jan. 2021*

- Mentoring five undergraduate students conducting applied research on uncertainty quantification in differential privacy
- Provided weekly 1-1 guidance and feedback tailored on each student

Service & Leadership

2022-	**JMLR**, Reviewer
2020-2022	**PhD Applicant Support Program (PASP)**, UMass Amherst CICS, Co-Chair. A mentorship program supporting underrepresented prospective PhD students. Received Dean's Outstanding Anti-Racism Leadership Award.
2020-2021	**Voices of Data Science**, Co-Chair. Leading the committee organizing the inaugural Voices of Data Science at UMass Amherst conference. The 2021 edition highlighted work by women (cis and trans) and non-binary data scientists.
2020	**UMass Graduate CS Women group**, Social Co-Chair. Organized networking events for CS women graduate students and faculty.
2020	**New Student Committee**, UMass Amherst CICS. Contributed to PhD candidate visit day.

Skills

Programming	Python (NumPy, SciPy, Pandas, PyTorch, TensorFlow, jupyter, matplotlib), C++, Matlab, git, LaTeX
Design	Adobe Photoshop, InDesign, Illustrator, Lightroom, PremierePro. Autodesk AutoCAD, 3DSMax. Rhino, Grasshopper
Languages	Italian (native), English (advanced), French (advanced)