

# Cecilia Ferrando

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## Education

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### University of Massachusetts Amherst

Amherst, MA

PHD IN COMPUTER SCIENCE

Aug. 2019 - May 2024 (exp.)

- CICS Fellow (merit scholarship for Computer Science students, 2019-2020)
- Cadence Women in Technology Scholar (2019-2020)
- PhD Applicant 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

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### Google LLC

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

### University of Massachusetts Amherst

Amherst, MA

RESEARCH ASSISTANT TO PROF. DANIEL SHELDON, PROBABILISTIC MACHINE LEARNING

Aug. 2019 -

- Published research on uncertainty quantification in differential privacy
- Performed extensive literature reviews
- Implemented code for differentially-private inference and uncertainty estimation, as well as output visualization
- Developing new methods and algorithms for reasoning about differential privacy noise in various inference problems
- Adapting bootstrap methods bias reduction in differentially-private inference problems
- Analyzing disparate impact of the bias induced by privacy mechanisms, for example on deep neural networks
- Exploring advantages and limitations of differentially-private synthetic dataset generation methods
- Responsible for organizing weekly meetings for eight PhD and Master's students in prof. Sheldon's lab

### 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
- Implemented graph learning techniques and visibility graphs to study spatial hierarchies
- Developed novel method to mathematically encode the spatial “footprint” of architectural plans
- Trained statistical models to correctly classify architectural plans based on their graph embedding
- Contributed to curating an exhibition on the origins of computer-aided design (CAD)

## Other Experience

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### Cadence Design Systems

Pittsburgh, PA

MACHINE LEARNING SOFTWARE ENGINEER

Jun. 2018 - May 2019

- Conducted applied research on generative adversarial networks, capsule networks, graph matching, implementing algorithms from scratch
- Improved the performance of a company-specific classification algorithm by 11% by integrating capsule networks in existing algorithm
- 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

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

**C. Ferrando**, S. Wang, D. Sheldon, *Parametric Bootstrap for Differentially Private Confidence Intervals*, under review, 2021

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

## Posters and Presentations

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**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

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

## Honors & Awards

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### SCHOLARSHIPS AND FELLOWSHIPS

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|-----------|---|
| 2020      | <b>Cadence Women in Technology Scholarship</b> , Cadence Design Systems                               |
| 2019      | <b>CS Fellowship</b> , CICS, University of Massachusetts Amherst                                      |
| 2016-2018 | <b>Fulbright Scholarship (\$40,000)</b> , US Department of State                                      |
| 2010-2016 | <b>Collegio Carlo Alberto “Allievi” Scholarship (\$17,000)</b> , Collegio Carlo Alberto, Turin, Italy |
| 2010-2016 | <b>Alta Scuola Politecnica</b> , top 1% students, Polytechnic University of Turin, Italy              |
| 2014-2015 | <b>Erasmus+ Scholarship</b> , European Union  |

## AWARDS

- 2021 **Dean's Outstanding Anti-Racism Leadership Award**, 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
- 2019 **NeurIPS 2019 travel award**, CS Women, CICS, University of Massachusetts Amherst
- 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

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### 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 WINTER RESEARCH PROGRAM

Jan. 2021

- Mentoring three undergraduate students conducting applied research on uncertainty quantification in differential privacy

### University of Massachusetts Amherst

Amherst, MA

GRADUATE MENTOR, CICS UNDERGRADUATE SUMMER RESEARCH PROGRAM

Jun. 2020 - Aug. 2020

- Mentored two undergraduate students conducting applied research connected to differential privacy
- Provided weekly 1-1 guidance and feedback tailored on each student

## Service & Leadership

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- 2020- **PhD Applicant Support Program (PASP)**, CICS, University of Massachusetts Amherst, Co-Chair. A new mentorship program for prospective PhD students, with a focus on supporting underrepresented candidates. Received Dean's Outstanding Anti-Racism Leadership Award.
- 2020- **Voices of Data Science**, Co-Chair. Leading the committee organizing the inaugural Voices of Data Science 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**, CICS, University of Massachusetts Amherst. Contributed to PhD candidate visit day.
- 2018 **Greater Pittsburgh Community Food Bank**, volunteered with the Cadence Global Giving program.

## Skills

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