

Christine Herlihy

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EDUCATION

University of Maryland, College Park

College Park, MD

Ph.D. in Computer Science

2019–present

- *Coursework*: Algorithms in ML: Guarantees and Analyses, Applied Mechanism Design, Computational Linguistics I & II, Common-sense Reasoning and Natural Language Understanding, Program Analysis
- *Advised by*: Dr. John Dickerson | *Research interests*: sequential and combinatorial decision-making under uncertainty; algorithmic fairness; graph-based knowledge representation and reasoning; healthcare.

Georgia Institute of Technology

Atlanta, GA

M.S. in Computer Science | Concentration: Machine Learning

2017–2018

- *Coursework*: Machine Learning, Artificial Intelligence, Reinforcement Learning, ML for Trading, HPC, Big Data Analytics for Healthcare, Data Analytics using Deep Learning, Info. Security, Computability and Algorithms

Georgetown University

Washington, DC

B.A. in Government; minor in Spanish

2007–2011

- Received academic honors during every semester of attendance; studied abroad in Santiago, Chile.

EXPERIENCE

Amazon Robotics

Remote

Summer Research Scientist

05/2021 - 08/2021

- Graph-based deep reinforcement learning algorithm development.

Georgia Tech Research Institute

Atlanta, GA

Research Scientist II, High-Performance Computing & Data Analytics Branch

01/2017 - 08/2019

- Technical task lead and core contributor for a range of research projects and proposals, including: patient-level predictive modeling; computational phenotyping; application of unsupervised learning and NLP techniques on unstructured text to develop machine phenotypes and detect spatially/temporally co-occurring machine failures; development of models to predict geopolitical conflict and detect fake news.

Econometrica, Inc.

Bethesda, MD

Research Associate II, Health Data Analytics

08/2015 - 01/2017

- Patient and population-level predictive modeling; healthcare policy evaluation using Python, R, and Stata.
- Primary project was an impact evaluation contract that involved using various econometric methodologies, a genetic matching algorithm, and survey design schemes to detect and determine changes in quality of care, medical outcomes, Medicare costs, and unintended consequences associated with emerging bundled payment and gainsharing mechanisms in health care systems.

Frontier Strategy Group

Washington, DC

Macroeconomic Research Analyst, Latin America

08/2012 - 08/2014

- Conducted econometric research and built forecast models using Python and R to advise C-suite executives at over 200 multinationals on resource allocation and risk management in LATAM.

TECHNICAL SKILLS

- **Proficient:** Python, R, Julia, SQL, \LaTeX | **Familiar:** Java, C++, Scala, Spark, bash, Coq, Unity, MPI
- **Libraries & tools:** scikit-learn, pandas, numpy, OpenAI Gym, PyTorch, TensorFlow, spaCy/scispacy, nltk, gensim, textacy, AllenNLP, NetworkX, Neo4j, git, Postgres, Categorical Query Language (CQL), FHIR, OMOP, Tableau
- **Languages:** English (Native), Spanish (Fluent), Portuguese (Intermediate), Farsi (Beginner)

PREPRINTS

- [1] **C. Herlihy**, A. Prins, A. Srinivasan, and J. Dickerson, *Planning to Fairly Allocate: Probabilistic Fairness in the Restless Bandit Setting*, Under review, 2021. arXiv: 2106.07677 [cs.LG].

CONFERENCE PAPERS

- [1] **C. Herlihy** and R. Rudinger, “MedNLI Is Not Immune: Natural Language Inference Artifacts in the Clinical Domain”, in *Proceedings of the 59th Annual Meeting of the Association for Computational Linguistics and the 11th International Joint Conference on Natural Language Processing (Volume 2: Short Papers)*, Online: Association for Computational Linguistics, Aug. 2021, pp. 1020–1027. [Online]. Available: <https://aclanthology.org/2021.acl-short.129>.
- [2] M. Halter, **C. Herlihy**, and J. P. Fairbanks, “A Compositional Framework for Scientific Model Augmentation”, in *Proceedings Applied Category Theory 2019, ACT 2019, University of Oxford, UK, 15-19 July 2019*, J. Baez and B. Coecke, Eds., ser. EPTCS, vol. 323, 2019, pp. 172–182. [Online]. Available: <https://doi.org/10.4204/EPTCS.323.12>.

PUBLICATIONS

- [1] A. Moreland, **C. Herlihy**, M. Tynan, G. Sunshine, R. McCord, C. Hilton, J. Poovey, A. Werner, C. Jones, E. Fulmer, A. Gundlapalli, H. Strosnider, A. Potvien, M. García, S. Honeycutt, and G. Baldwin, “Timing of State and Territorial COVID-19 Stay-at-Home Orders and Changes in Population Movement - United States, March 1-May 31, 2020”, *Morbidity and Mortality Weekly Report*, vol. 69, no. 35, Sep. 2020.
- [2] D. Ruiz, D. Stout, and **C. Herlihy**, “Use of Genetic Matching in Program Evaluation: The Case of RAD”, *Cityscape*, vol. 19, no. 2, pp. 337–350, 2017, ISSN: 1936007X. [Online]. Available: <http://www.jstor.org/stable/26328344>.

SELECT PROJECTS

- Resource-Constrained Cohort Selection Using Multi-Arm Bandits | UMD (Python & Julia, 2020 - Present)
Developing algorithms to incorporate equity constraints in the RMAB setting, and cope with vanishing arms in tiered MABs.
- A Category-Theoretic Approach to Computational Phenotyping | UMD & NIST (Python & Julia, 2019 - Present)
Developing NLP and category-theoretic techniques to parse, represent, and compose clinical trial eligibility criteria.
- Task-Informed Document Retrieval on the CORD-19 Dataset Using Topic Modeling | UMD (Python, 2020)
NMF and Jensen-Shannon divergence-based approach to unsupervised, COVID-19 task-informed document retrieval.
- A Compositional Approach to Representing and Manipulating Scientific Models | GTRI (Julia, 2018-2019)
Developed program analysis and category-theoretic techniques for epi model extraction and composition from text and code.
- ClarityNLP: An open-source NLP framework for clinical phenotyping | GTRI & Celgene (Python, 2018-2019)
Developed supervised and unsupervised methods for clinical text mining, feature engineering, and cohort identification.

- NLP Pipeline to Detect Cascading and Co-occurring Machine Failures | GTRI (Python & Neo4j, 2018-2019)
Statistical analysis and topic modeling of work order notes; constructed KG to identify spatial/temporal failure patterns.
- Verifiable, Patient-Directed Provider-to-Provider EHR Record Sharing | GTRI (Python & Ethereum, 2018)
Developed escrow smart contract prototype to facilitate patient-directed record sharing among providers and stakeholders.
- Chest X-ray Disease Diagnosis with Deep Convolutional Neural Networks | Georgia Tech (PyTorch, 2018)
Used CNNs to detect and localize the 14 thoracic pathologies present in the NIH Chest X-ray dataset.
- Predicting Sepsis Onset in ICU Patients | GTRI (Python & R, 2017)
Worked with clinical team to develop patient-level predictive models for sepsis and population-level triage models.

TEACHING

- **Co-Instructor** at Georgia Tech Professional Education Fall 2018
Machine Learning Short Course
- **Teaching Assistant** at Johns Hopkins University Spring 2017
Algorithms and Data Structures
- **Teaching Assistant** at University of Maryland, College Park 2014 - 2015
Political Theory; International Relations
- **Volunteer Teacher** at Latino Student Fund 2012-2014
English as a Second Language (ESL) for Adult Learners

EXTRACURRICULAR ACTIVITIES

- Iribe Initiative for Inclusion & Diversity in Computing: Student Advisory Board Member 2019–Current
Bias, Education, Incident Reporting, and Professional Development committee member

SCHOLARSHIPS AND AWARDS

- **Grace Hopper Conference Scholarship Recipient** | University of Maryland, College Park 2021
- **Professional Research Experience Program (PREP) Researcher** | NIST 2019–2021
- **Dean's Fellowship (CS)** | University of Maryland, College Park 2019–2020
- **HIVE \$25K Research Grant Winner** | Georgia Tech Research Institute 2017
- **FIA-Deutsch \$25K Seed Grant Fellow** | University of Maryland, College Park 2014–2015
- **Dean's Fellowship (GVPT)** | University of Maryland, College Park 2014–2015
- **Merit-based scholarship recipient; academic honors** | Georgetown University 2007–2011
- **Gilman International Scholarship Recipient** | United States Department of State 2010