CALEB N. ELLINGTON

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PUBLICATIONS & PRESENTATIONS (*first or co-first author)

*Ellington, Caleb, Ben Lengerich, Thomas B.K. Watkins, Jiekun Yang, Hanxi Xiao, Manolis Kellis, Eric P. Xing. "**Contextualized Networks Reveal Heterogeneous Transcriptomic Regulation in Tumors at Sample-Specific Resolution.**" bioRxiv, December 1st, 2023. https://doi.org/10.1101/2023.12.01.569658

- Poster Presentation, Generative AI in Biology NeurIPS Workshop, 2023.
- Platform Talk, Cold Spring Harbor Laboratory – Biological Data Science, 2022.
- Poster Presentation, Machine Learning for Health, 2022.
- Poster Presentation, Graph Learning for Industrial Applications NeurIPS Workshop, 2022.

*Lengerich, Benjamin, Caleb N. Ellington, Andrea Rubbi, Manolis Kellis, and Eric P. Xing. "**Contextualized Machine Learning.**" arXiv, October 17, 2023. https://doi.org/10.48550/arXiv.2310.11340.

*Deuschel, Jannik, Caleb N. Ellington, Benjamin J. Lengerich, Yingtao Luo, Pascal Friederich, and Eric P. Xing. "**Contextualized Policy Recovery: Modeling and Interpreting Medical Decisions with Adaptive Imitation Learning.**" arXiv, October 11, 2023. https://doi.org/10.48550/arXiv.2310.07918.

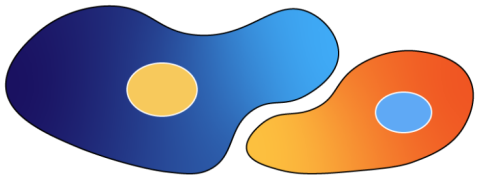
- Poster Presentation, Machine Learning for Health, 2023.

Lengerich, Ben, Caleb Ellington, Bryon Aragam, Eric P. Xing, and Manolis Kellis. "**NOTMAD: Estimating Bayesian Networks with Sample-Specific Structures and Parameters.**" ArXiv:2111.01104 [Cs, Stat], November 1, 2021. http://arxiv.org/abs/2111.01104.

Chen, Xinshi, Haoran Sun, Caleb Ellington, Eric Xing, and Le Song. "**Multi-Task Learning of Order-Consistent Causal Graphs.**" In Advances in Neural Information Processing Systems, 34:11083–95. Curran Associates, Inc., 2021. https://proceedings.neurips.cc/paper/2021/hash/5c3a3b139a11689e0bc55abd95e20e39-Abstract.html.

Lengerich, Benjamin J, Mark E Nunnally, Yin Aphinyanaphongs, Caleb Ellington, and Rich Caruana. "**Automated Interpretable Discovery of Heterogeneous Treatment Effectiveness: A COVID-19 Case Study.**" J. Biomed. Inform., April 30, 2022, 104086. https://doi.org/10.1016/j.jbi.2022.104086.

SOFTWARE



Contextualized
Heterogeneous Modeling Toolbox

I created contextualized.ml, a sklearn-style machine learning toolbox to help informaticians, statisticians, and ML researchers across domains infer models, distributions, and functions with context-specific parameters.
Open-source code: https://github.com/cnellington/Contextualized

POSITIONS

- **Ph.D. Student in Computational Biology** — Sept 2020 - Present
  Statistical Artificial Intelligence and Integrative Genomics (SAILING) Lab, Carnegie Mellon University — Pittsburgh, PA
- **Ph.D. Machine Learning Researcher Intern** — May 2023 - Aug 2023
  Genesis Therapeutics Inc. — San Francisco, CA
- **Research Assistant** — Jan 2019 - June 2020
  Baker Lab, Institute for Protein Design, University of Washington — Seattle, WA
- **Software Engineer Intern** — June 2019 - Aug 2019
  Indeed.com — Austin, TX
- **Research Assistant** — Jan 2017 - Dec 2018
  Klavins Lab, Automated Bio-Fabrication Facility, University of Washington — Seattle, WA

- **Biomedical Engineering Consultant** — Aug 2018 - Sept 2018
  Dhulikhel Hospital / Bioengineering Department, University of Washington — Dhulikhel, Nepal
- **Software Engineer Intern** — June 2018 - Aug 2018
  Amazon.com — Seattle, WA
- **Software Engineer Intern** — June 2017 - Aug 2017
  Inscripta Biotechnology — Boulder, CO

EDUCATION

Carnegie Mellon University — Sept 2020 - Present
Ph.D. Student in Computational Biology — Pittsburgh, PA
Advised by Eric P. Xing
Notable Coursework: Probabilistic Graphical Models 10-708, Machine Learning 10-701, Intermediate Statistics 36-705, Convex Optimization 10-725, Computational Genomics 02-710, Advanced Genetics 03-730, Computational Structural Biology MSCBIO 2211, Cellular Systems Biology MSCBIO 2214, Laboratory Methods 02-760

University of Washington — Sept 2016 - Jun 2020
B.Sc. Computer Science — Seattle, WA
B.Sc. Bioengineering (Honors)

AWARDS

- **Computational Biology Department Outstanding Service Award** — Aug 2023
- **GRFP Honorable Mention (NSF)** — Apr 2020
  Project: *Deep Generative Models for Ligand-based Protein Design*
- **Fulbright Semifinalist (Fulbright)** — Apr 2020
  Project: *Freelance Ambulances: Integrating Nepal's private transportation with emergency services*
- **Levinson Emerging Scholar (Washington Research Foundation)** — Sept 2019
  Awarded to highly motivated students demonstrating exceptional communication skills pursuing advanced bioscience careers.
- **Husky 100 Awardee (University of Washington)** — Mar, 2019
  The Husky 100 recognizes 100 students (graduate and undergraduate) from all UW campuses who are making the most of their time at UW.
- **Mary Gates Research Scholar (University of Washington)** — Feb, 2018
  - Project: *Data-Driven Genetic Engineering with Hydra vulgaris*
  - Awarded for strong academic merit, good mentor relationships, intensity of research experience, and long-term impact of the proposed project.

TEACHING & MENTORING

Department Mentor for Machine Learning — Sept 2022 - Dec 2022
Tutored new Ph.D. students on fundamental machine learning and statistics theory

Teaching Assistant, 10-701 Ph.D. Introduction to Machine Learning — Jan 2022 - May 2022
Instructors: Henry Chai, Maria Balkan — Carnegie Mellon University

Teaching Assistant, 02-319 Genetics and Epigenetics of the Brain — Aug 2021 - Dec 2021
Instructors: Andreas Pfenning — Carnegie Mellon University

Current Mentees
- Aaron Alvarez, Mathematics BS Student, MIT

Past Mentees
- Jannik Deuschel, Machine Learning MS Student, KIT
- Ding Bai, Machine Learning Ph.D. Student, MBZUAI
- Tianjun Yao, Machine Learning Ph.D. Student, MBZUAI
- Juwayni Lucman, Artificial Intelligence MS Student, MBZUAI
- Alyssa Lee, Computational Biology BS Student, CMU
- Wesley Lo, Mathematics BS Student, MIT

COMMUNITY INVOLVEMENT

- **Outreach Sub-Chair, Career Mentorship,** Machine Learning for Health (ML4H) November 2023
- **Reviewer,** Generative AI for Biology (GenBio) NeurIPS workshop September 2023
- **Reviewer,** AI for Science (AI4Science) NeurIPS workshop September 2023
- **Reviewer,** Machine Learning for Health (ML4H) September 2023
- **Admissions Committee**, CMU-Pitt Computational Biology Ph.D. Program January 2023
- **Round Table Chair**, ML4H, Injecting Domain Knowledge into DL Models December 2022
- **Reviewer**, Machine Learning for Health (ML4H) September 2022
- **Reviewer**, Time Series for Health (TS4H) NeurIPS workshop September 2022

LEADERSHIP, VOLUNTEERING, & FUNDRAISING

President, CMU-Pitt Computational Biology Graduate Student Association Sept 2023 - Aug 2024
Department Representative, CMU Graduate Student Association Sept 2022 - Aug 2023
Department Senator, CMU-Pitt Computational Biology Graduate Student Association Sept 2021 - Aug 2022
Founding director of the CMU x Pitt CompBio Hackathon Pittsburgh, PA

President, Phi Delta Theta, Washington Alpha Nov 2017 - Nov 2019
Fundraised $49,000 for the Service for Sight Foundation Seattle, WA
Fundraised $1,000 for the Live Like Lou Foundation

Eagle Scout, *Boy Scouts of America* Nov 2015
Construction of the U. Texas Field Laboratory's Research Pier Austin, TX

Run-to-the-Sun 90 Mile Overnight Relay, Beyond Batten Foundation Apr 2015
$500 to the Beyond Batten Foundation Austin, TX

MEDIA (Available on my YouTube, linked at calebellington.com)

- Contextualized Graphical Models Reveal Sample-Specific Transcriptional Networks for 7000 Tumors (CSHL) Nov 2022
- Multi-task Learning of Consistent-Order Causal Graphs (NeurIPS) Dec 2021
- Mixed Feelings: Recognizing, Representing, and Interpolating Human Emotion Dec 2020
- Deep Learning for Contact Prediction in *de novo* Protein Models (UW Research Symposium) May 2020
- Bioscience Python Tutorials 1-4: Protein Sequence Alignment CLI (YouTube) May 2020

SKILLS

Programming: Python (10 yrs), Java (7 yrs), C++ (2 yrs), PyTorch (4 yrs), Tensorflow/Keras (2 yrs), MySQL (2 yrs), React.js (2 yrs), C, Ruby, Django, Git, Superset, AWS, Jira, Linux/Unix, Bash
Languages: Intermediate I Chinese