Cait Harrigan, MSc.

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I am a graduate student at the University of Toronto supervised by Quaid Morris and Kieran Campbell. I'm a graduate researcher at the Vector Institute and Doctoral Fellow at the UofT Data Sciences Institute. I use machine learning to understand cancer genomics by modelling the evolutionary constraints that underlie how mutations occur in DNA. I'm passionate about open science, and promoting great mentorship in the sciences.

EDUCATION

PhD in Computer Science, University of Toronto 01/21 - present
Supervised by Quaid Morris and Kieran Campbell

MSc. in Computer Science, University of Toronto 09/19 - 03/21
Supervised by Quaid Morris

BSc. in Computational Biology, University of Toronto 09/15 - 06/19
Awarded with distinction

RESEARCH EXPERIENCE

Visiting Graduate Researcher 03/24 - present
The Francis Crick Institute, London, England
Hosted by Nicholas McGranahan

Visiting Graduate Researcher 06/23 - 09/23
Memorial Sloan Kettering Cancer Center, New York, USA
Hosted by Quaid Morris

Visiting Graduate Researcher 05/21 - 09/21
Memorial Sloan Kettering Cancer Center, New York, USA
Hosted by Quaid Morris

Undergraduate Research Assistant 05/17 - 09/17
SickKids Hospital, Toronto, Canada
Supervised by Michael Wilson and Anna Goldenberg

PEER REVIEWED PUBLICATIONS

* Indicates equal contribution

1. Caitlin Timmons, Quaid Morris, and **Caitlin F. Harrigan**. "Regional mutational signature activities in cancer genomes". En. In: *PLOS Computational Biology* 18.12 (Dec. 2022), p. e1010733.
2. Agata A. Bielska, **Caitlin F. Harrigan**, Yeon Ju Kyung, Quaid Morris, Wilhelm Palm, and Craig B. Thompson. "Activating mTOR mutations are detrimental in nutrient-poor conditions". Eng. In: *Cancer Research* (Jul. 2022).
3. **Caitlin F. Harrigan**, Yulia Rubanova, Quaid Morris, and Alina Selega. "TrackSigFreq : subclonal reconstructions based on mutation signatures and allele frequencies". In: *Pacific Symposium on Biocomputing* 25 (Jan. 2020), pp. 238-249.
4. Yulia Rubanova, Ruian Shi, **Caitlin F. Harrigan**, Roujia Li, Jeff Wintersinger, Nil Sahin, Amit Deshwar, and Quaid Morris. "Reconstructing evolutionary trajectories of mutation signature activities in cancer using TrackSig". In: *Nature Communications* 11.1 (Feb. 2020), pp. 1-12.

OTHER PUBLICATIONS

1. **Caitlin F. Harrigan**, Gabriela Morgenshtern, Anna Goldenberg, and Fanny Chevalier. “Considerations for Visualizing Uncertainty in Clinical Machine Learning Models”. Oct. 2022.
2. Jennifer L. Gorman, Lydia Y. Liu, Jordan P. Hartig, Nikesh Parsotam, Amanda Khoo, Vladimir Ignatchenko, Sarah Asbury, Somi Afiuni, Ricardo Gonzalez, Michael J. Geuenich, **Caitlin F. Harrigan**, Yuju Lee, Jianan Chen, Liang Lim, Qanber Raza, Peggi M. Angel, Kieran Campbell, Stanley K. Liu, Michelle R. Downes, Richard R. Drake, Thomas Kislinger, David King, and Hartland W. Jackson. “Abstract 5561: Whole slide Imaging Mass Cytometry allows the rapid profiling of the immune landscape of histopathologically aggressive prostate tumors”. In: *Cancer Research* 84.6_Supplement (Mar. 2024), p. 5561.
3. Shawn Goyal, Cynthia X. Guo, Adrienne Ranger, Derek K. Tsang, Ojas Singh, **Caitlin F. Harrigan**, Olga Zaslaver, Hannes L. Rost, Herbert Y. Gaisano, Scott A. Yuzwa, Nan Gao, Jeffrey L. Wrana, Dana J. Philpott, Scott D. Gray-Owen, and Stephen E. Girardin. “Bacterial ADP-heptose initiates a revival stem cell program in the intestinal epithelium”. En. Jan. 2024.
4. **Caitlin F. Harrigan**, Gabriella Morgenshtern, Anna Goldenberg, and Fanny Chevalier. “Considerations for Visualizing Uncertainty in Clinical Machine Learning Models”. Realizing AI in Healthcare: Challenges Appearing in the Wild, Workshop at CHI 2021 Online Virtual Conference, May. 2021.

POSTERS

Dirichlet allocation of mutations to model DDR in cancer 04/23
Toronto DNA Damage & Repair Symposium

Dirichlet Allocation of Mutations Captures the Action of DNA Damage and Misrepair Processes 07/22
Intelligent Systems for Molecular Biology

Dirichlet Allocation of Mutations in Cancer Genomes 11/21
Machine Learning in Computational Biology

TrackSigFreq: subclonal reconstructions based on mutation signatures and allele frequencies 12/19
Machine Learning in Computational Biology

FELLOWSHIPS & AWARDS

Mitacs Graduate Research Award 03/24 - present
Mitacs, in partnership with UKRI

NSERC Postgraduate Scholarship - Doctoral 09/22 - present
University of Toronto

DSI Doctoral Student Fellowship Award 09/22 - present
Data Science Institute, University of Toronto

Queen Elizabeth II Graduate Scholarship in Science & Technology 07/22
(respectfully declined)

Ontario Graduate Scholarship 09/21 - 09/22
Department of Computer Science, University of Toronto

ACM SIGHPC Computational & Data Science Fellowship 07/20 - 07/22
Special Interest Group on High Performance Computing of the Association for Computing Machinery

JXTX foundation Genome Informatics Scholarship 08/21
James P. Taylor Foundation for Open Science

General Motors Women in Science and Mathematics Award 09/20
University of Toronto

ACADEMIC TALKS

Mutational Signatures for DNA Damage and Misrepair 05/23
BIRS: Mathematical Methods in Cancer Biology, Evolution and Therapy
Invited talk

DAMUTA: Dirichlet allocation of mutations as a function of both damage and DNA repair 11/21
Cold Spring Harbour Laboratory Meeting: Genome Informatics
Selected Talk

TrackSigFreq: subclonal reconstructions based on mutation signatures and allele frequencies 01/20
Pacific Symposium on Biocomputing
Selected Talk, Poster

GUEST LECTURES

Exploring & Explaining Data in the Wild 03/23
AI & Data Science Post-Graduate Program, Loyalist College
Invited by Prof. Peter Papadakos as an anual guest lecturer in 2023 & 2024

Data Collection & Analysis 02/22
PRISM research & mentorship program, University of Toronto
Invited by Prof. Sadia Sharmin

Environmental & Life Sciences Workshop Series 01/20
STEMHub Foundation
Invited workshop series

R for bioinformatics 01/20
Global Society for Genetics and Genome Biology
Invited workshop

OTHER TALKS

Machine Learning for Cancer Genomics 03/24
Artificial Intelligence in Healthcare Society Case Competition, York University
Invited keynote

Finding the 'I' in science 10/22
ACM Canadian Celebration of Women in Computing
Selected Workshop

Undergraduate research opportunities: how to find them and make them work for you 02/20
UofT Bioinformatics and Computational Biology Student Union
Invited by the BCBSU

How to hack your degree 05/19
Computer Science Student Union, University of Toronto
Invited by the CSSU

SERVICE

Peer review: PLOS Computational Biology, Genome Biology, iScience, Genome Medicine
Conference program committee: Machine Learning in Computational Biology (2019), Pacific Symposium on Biocomputing (2020)

RESEARCH MENTORSHIP

Kiki Zhang 06/23 - 08/23

Combined BS/MSE Student; Biomedical Engineering. Research internship via Computational Biology Student Program at MSKCC.

Topic: Mutational signatures in the context of branching evolution

Fedir Zhydok 09/22 - 12/22

BS Student; Computer Science. Course project in Artificial Intelligence in Medicine "global classroom" program at University of Toronto.

Topic: Identifying metastatic tumours from mutational signatures

Caitlin Timmons 05/21 - 08/22

BA Student; Statistical and Datasciences, Biology. Research internship via Computational Biology Student Program at MSKCC. Went on to a Research Technician position at Dana-Farber Cancer Institute.

Topic: Modelling spatial distribution of mutational signatures in cancer genomes.

Haritha Lakshmanan 05/20 - 11/20

Highschool Student. Independent study at MSKCC. Went on to a combined BA/MD at Brooklyn College.

Topic: Automatic discovery of mutations predictive of survival in breast cancer patients

PROGAM ADMINISTRATION

Program Organizer 09/21 - present

UofT Graduate Application Assistance Program, Toronto

Project Manager 10/20 - 05/21

STEMHub Foundation, Toronto, Canada

Founder and treasurer 05/18 - 05/19

Bioinformatics and Computational Biology Student Union, University of Toronto

Event chair 03/18

Bioinformatics and Computational Biology Hackathon, University of Toronto

Communications and Marketing Executive 09/16 - 05/17

UofT Women in Computer Science (WiCS), University of Toronto

TEACHING ASSISTANT POSITIONS

Unless otherwise noted, school is University of Toronto

JSC370: Data Science II 01/23 - 05/23

JSC270: Data Science I 01/23 - 05/23

STA313: Data Visualization 09/22 - 12/22

PRISM: Preparation for Research through Immersion, Skills, and Mentorship 01/22 - 05/22

JSC370: Data Science II 01/22 - 05/22

CSC197: Privacy in the Age of Big Data Collection 09/21 - 12/21

STA4273: Minimizing Expectations 01/21 - 05/21

CSC197: Privacy in the Age of Big Data Collection 09/20 - 12/20

JSC270: Data Science I 01/20 - 05/20

CSC373: Algorithm Design, Analysis & Complexity 09/19 - 12/19

MENTORSHIP

As part of my ongoing commitment to supporting students at all levels and background in engaging with computational biology, I make an effort to be available to provide guidance and resources to students, with a particular focus on creating an inclusive environment that fosters diverse perspectives and experiences. In addition to being a mentor through the organized programs listed here, I set aside ~2h/month for by-request 30 minute meetings.

Computer Science Alumni Mentorship Program	01/23 - 05/23
Statistical Science Alumni Mentorship Program	10/21 - 05/22
ProjectX machine learning research competition	09/20 - 02/21
Her Code Camp, Toronto Ontario	08/20 - 08/21
Department of Statistics Mentorship Program	10/18 - 05/19
SPROUT Peer Mentorship Program	09/16 - 05/19
New College E-Mentorship Program	09/16 - 05/19

Last updated: Apr 2024