

Caleb Hallinan

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EDUCATION

PhD in Biomedical Engineering

Johns Hopkins University, Baltimore, MD

August 2023 – Present

Bachelor of Arts in Statistics and Biology

University of Virginia, Charlottesville, VA

August 2017 – May 2021

RESEARCH EXPERIENCE

Research Assistant II

Boston Children's Hospital & Harvard Medical School

Advisor: Kwonmoo Lee, PhD

September 2021 – June 2023

- Developed a feature selection algorithm to discover novel subtypes in gene, protein, and image data
- Investigated live cell images from breast cancer stem cells using machine learning and image analysis techniques
- Employed deep-learning algorithms for cell segmentation and feature extraction
- Managed Linux servers, order materials, and present recent research papers to fellow lab mates

Undergraduate Research Assistant

Focused Ultrasound Foundation & University of Virginia

Advisors: Frederic Padilla, PhD & Tianxi Li, PhD

May 2020 – August 2021

- Performed statistical analysis on flow cytometry data to deduce the effect of focused ultrasound on mice tumors
- Transformed, analyzed, and visualized brain tumor data to distinguish normal brain matter from tumor tissue
- Developed R and Python files to read in data and implement machine learning techniques
- Transferred R-version of the package 'randnet' to Python

TEACHING EXPERIENCES

Teaching Assistant, Computational Analysis of Heterogeneity in Cellular Images Nano Course

Harvard Medical School Curriculum Fellows Program, Harvard Medical School

January 2023

- Guided 20 participants in understanding basic algorithms of segmentation, edge detection, and tracking of cells
- Worked with participants in a hands-on experience of analyzing live-cell image datasets

Teaching Assistant, Regression Analysis

Statistics Department, University of Virginia

January 2020 – May 2021

- Oversaw 80 students while aiding in their understanding of regression in a SAS, project-based course
- Held office hours, graded assignments, and answered specific questions during class

Teaching Assistant, Introduction to Chemistry Lab

Chemistry Department, University of Virginia

September 2019 – December 2019

- Supervised 24 students in weekly labs, designed presentations, graded assignments, and held office hours

PUBLICATIONS

Journal Papers:

J2. J. Jang, Y. Kim, B. Westgate, Y. Zong, **C. Hallinan**, A. Akalin, and K. Lee. "Screening Adequacy of Unstained Fine Needle Aspiration Samples Using a Deep Learning-based Classifier." *Scientific Reports*, 2023.

J1. J. Jang, **C. Hallinan**, and K. Lee. "Protocol for live cell image segmentation to profile cellular morphodynamics using MARS-Net." *STAR Protocols*, 2022.

Papers Under Review:

P1. A. Abul-Basher*, C. Hallinan*, and K. Lee. "Heterogeneity-Preserving Feature Selection for Subtype Discovery."

*Equal Contributors

INVITED TALKS AND PRESENTATIONS

Poster Presentations:

P2. "Phenotyping of Heterogenous Live Cell Motility and Morphology," Dr. M. Judah Folkman Research Day, Boston Children's Hospital & Harvard Medical School, Boston, MA, 2023.

P1. "Deep-Hetero: A Deep Metric Learning with UMAP-based Clustering Approach for Identifying Heterogeneity in Cells," Dr. M. Judah Folkman Research Day, Boston Children's Hospital & Harvard Medical School, Boston, MA, 2022.

Oral Presentations:

O3. "Deconvolution of Cellular Heterogeneity for Sub-Type Discovery by Analyzing Feature Variation," Vascular Biology Program Work in Progress, Boston Children's Hospital & Harvard Medical School, Boston, MA, 2022.

O2. "Machine Learning Approaches Applied to the Prediction of Covid-19 Spread and Cell Motility Phenotyping," Vascular Biology Program Work in Progress, Boston Children's Hospital & Harvard Medical School, Boston, MA, 2022.

O1. "Ultrasound Microbubble Tumor Analysis," Focused Ultrasound Foundation Summer Intern Presentations, Focused Ultrasound Foundation, Charlottesville, VA, 2021.

VOLUNTEERING AND OUTREACH

Statistics Alumni Panel & Biostatistics Symposium

October 2022

Statistics Department, University of Virginia

- Talked about experiences at UVA Statistics Department to 250+ college students
- Engaged with audience regarding questions post graduating and current research work

Lee Lab Diversity Outreach Video

March 2022

Boston Children's Hospital & Harvard Medical School

- Created a five-minute introduction of the Lee Lab using videos, images, and an AI generated voice
- Reached out to students from a diverse background in local high schools

Volunteer Leader

March 2018 – May 2021

Young Life, University of Virginia

- Lead a collaborative, volunteer leadership team providing guidance to students at The Covenant School
- Coordinated and executed events by creating a safe and encouraging environment for more than 100 students

HONORS AND AWARDS

- Graduated with Distinction – Highest Honors Possible
- Dean's List – 4/5 Possible Semesters

May 2021

January 2018 – December 2019

SKILLS

- Proficient in: Python, R, R Markdown, TensorFlow, Shell Script, SAS, Word, Excel, ImageJ and PowerPoint
- Experience with: SQL, Git, MATLAB, Mathematica, LaTeX, HTML, CSS, and C
- Machine Learning, Deep Learning, AI, Statistical Analysis, Data Science, Cell Biology, Omics Analysis

REFERENCES

References available upon request.