Kithmini Herath

kithmini_herath@berkeley.edu · Website · LinkedIn · GitHub

Summary

I'm interested in developing representation learning methods to map macromolecular organization in the cell that will serve as a foundation for analyzing macromolecular function and interactions.

Computational Biology | In-situ Cryo-EM | Representation Learning | Computer Vision

Education

University of California, Berkeley — California, USA
Ph.D. Student, Computational Biology (Advisor: Prof. Bronwyn Lucas) — *2023 - Present*
Current GPA - 3.9/4.0

University of Moratuwa — Moratuwa, Sri Lanka
B.Sc.(Hons.) Electronic and Telecommunication Engineering — *2017 - 2022*
GPA - 4.01/4.20 (First Class)

Research Experience

Jun 2024 – Aug 2024 | **Machine Learning Intern** at **Biohub**, CA, USA
Mentor: Dr. Bridget Carragher
Research in developing deep learning methods for detecting macromolecules in-situ with 2D Cryo-EM images:
- Explore deep learning methods informed by 2D template matching for macromolecule detection with the goal of increasing the sensitivity of detections.
- Explore a multi-modal representation learning method for macromolecule detection for improved performance.

Jul 2022 – Jun 2023 | **Post Baccalaureate Fellow** at **Harvard University**, MA, USA
Advisors: Dr. Dushan Wadduwage, Dr. Sergey Ovchinnikov
- Research in computational imaging at the Wadduwage Lab - Developing an all optical phase retrieval microscope using a learnable Fourier filter.
- Research in computational biology at the So Lab - Designing differentiable algorithms for non-sequential protein structure alignment.

Oct 2020 – Mar 2021 | **Visiting Researcher (Student)** at **University of Sydney**, Australia
Advisor: Prof. Anusha Withana
- Conducted signal processing, data analysis of Mechanomyography (MMG) signals and developed a realtime gesture prediction model for a personalized MMG sensor wearable.
- Designed circuits and programmed firmware for simultaneous haptic stimulation of electrodes in tactile interfaces.

Apr 2020 – May 2022 | **Undergraduate Researcher** at **University of Moratuwa**, Sri Lanka
- Implemented a differentiable optical-electronic framework for phase imaging.
- Conducted feature extraction of simultaneously recorded PCG and ECG signals and developed a machine learning algorithm to classify abnormal and normal heart sounds.

Publications

[1] U. Haputhanthri, **K. Herath** R. Hettiarachchi, H. Kariyawasam, A. Ahmad, B. S. Ahluwalia, G. Acharya, C. U. S. Edussooriya and D. Wadduwage, "Towards Ultrafast Quantitative Phase Imaging via Differentiable Microscopy". *Biomedical Optics Express*, 2024, Vol. 15, pp. 1798-1812, doi: 10.1364/BOE.504954

[2] H. Arguello, J. Bacca, H. Kariyawasam, E. Vargas, M. Marquez, R. Hettiarachchi, H. Garcia, **K. Herath**, U. Haputhanthri, B. S. Ahluwalia, P. So, D. N. Wadduwage, C. U. S. Edussooriya, "Deep Optical Coding Design in Computational Imaging". *IEEE Signal Processing Magazine Special Issue on Physics-Driven Machine Learning for Computational Imaging*, vol. 40, no. 2, 2023, pp. 75-88, doi: 10.1109/MSP.2022.3200173

[3] S. S. Lin, N. M. Gamage, **K. Herath** and A. Withana "MyoSpring: 3D Printing Mechanomyographic Sensors for Subtle Finger Gesture Recognition," *International Conference on Tangible Embedded and Embodied Interaction (TEI)*, 2022, Article 15, pp.1-13, doi: 10.1145/3490149.3501321

[4] R. Hettiarachchi, U. Haputhanthri, **K. Herath**, H. Kariyawasam, S. Munasinghe, K. Wickramasinghe, D. Samarasinghe, A. C. De Silva and C. U. S. Edussooriya, "A Novel Transfer Learning Based Approach for Screening Pre-existing Heart Diseases using Synchronized ECG Signals and Heart Sounds," *IEEE International Symposium on Circuits and Systems (ISCAS)*, 2021, pp. 1-5, doi: 10.1109/ISCAS51556.2021.9401093.

Preprints:

[1] **K. Herath** , H. Kariyawasam*, R. Hettiarachchi*, U. Haputhanthri*, R. N. Ahmad, A. Ahmad, B. S. Ahluwalia, C. U. S. Edussooriya and D. Wadduwage, "Differentiable Microscopy Designs an All Optical Phase Retrieval Microscope"[link] [Under review at IEEE Transactions on Computational Imaging]

Conference Talks/ Poster Presentations

[1] "Locating macromolecules within Cryo-EM images of crowded cell environments with deep representation learning", Poster presentation at,

- The Bay Area Cryo-EM Meeting - University of California San Francisco, CA, USA. - Oct, 2025
- The Machine Learning Applied to Macromolecular Structure and Function Meeting - Keystone, CO, USA. - Mar, 2025

[2] "All-optical phase retrieval microscope designed using differentiable microscopy", SPIE Photonic West Computational Optical Imaging and Artificial Intelligence in Biomedical Sciences Conference - San Francisco, USA. - Feb, 2024 [link]

[3] "Sparse optical neural architectures for quantitative phase imaging", SPIE Photonic West Quantitative Phase Imaging X Conference - San Francisco, USA. - Feb, 2024 [link]

[4] "Presented work on Realtime Configuration of Intelligent Reflecting Surfaces", Signal Processing Cup 2021 Finals at IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) - Jun, 2021 [Virtual]

[5] "Presented work on INTELLISCOPE: A Low-Cost AI-Powered Stethoscope for Cardiovascular Disease Management in Resource-Constrained Environments", IEEE International Symposium on Circuits and Systems (ISCAS) - COVID-19 Special SDC - Oct, 2020 [Virtual]

Honors, Awards, and Competitions

Winner - IEEE Signal Processing Cup organized by ICASSP	2021
First Runner Up - CASS COVID-19 Special Student Design Competition organized by IEEE CAS	2020
Asia Pacific Region Iron Award - InnovateFPGA organized by Intel and Terasic	2019
Visakha Vidyalaya Susan George Pulimood Educational Trust Scholarship - For the best all round performance in academic & extra-curricular activities in high school	2017

Volunteer Experience/ Leadership

Member - Center for Computational Biology retreat organization committee	2025
Webmaster - IEEE Signal Processing Society Sri Lanka Chapter	2023
Secretary - IEEE Signal Processing Society Student Branch Chapter, University of Moratuwa	2020/2021
Volunteer - Rotaract Club and Electronic Club, University of Moratuwa	2017/2020

Relevant Coursework

STAT201A : Introduction to Probability at an Advanced Level, STAT201B : Introduction to Statistics at an Advanced Level, MCELLBI210 : Advanced Biochemistry and Molecular Biology: Macromolecular Reactions and the Cell, COMPSCI282A : Designing, Visualizing and Understanding Deep Neural Networks

Skills

Programming:	C, Python, MATLAB
Technical Skills:	PyTorch, Tensorflow, Multi-GPU/ Multi-node Training (DDP), Git
Other Skills:	Collaboration, Leadership, Communication, Time Management