Carol Xuan Long

Science & Engineering Complex, 150 Western Ave. Allston, MA, 02134
carol_long@g.harvard.edu

Education

Harvard University — **Cambridge, MA**
Ph.D. in Applied Mathematics, School of Engineering and Applied Sciences (SEAS) — *Sept. 2021 – Present*
Advisor: Flavio du Pin Calmon

New York University — **New York, NY**
B.A. in Mathematics and Computer Science, Courant Institute of Mathematical Sciences — *Sept. 2018 – May 2021*
GPA: 4.0/4.0, Summa Cum Laude, Phi Beta Kappa Honor Society, Graduated in 3 years

Research Interests

Areas: Information Theory, Statistical Learning Theory

Topics: Algorithmic Fairness

Publications

C. X. Long, H. Hsu*, W. Alghamdi*, and F. P. Calmon, "Arbitrariness Lies Beyond the Fairness-Accuracy Frontier," in *Advances in Neural Information Processing Systems* (***NeurIPS***), 2023. *Equal contribution.

L. M. Paes*, **C. X. Long***, B. Ustun, and F. P. Calmon, "On the Epistemic Limits of Personalized Prediction," in *Advances in Neural Information Processing Systems* (***NeurIPS***), 2022. *Equal contribution.

Awards, Honors, and Scholarships

Harvard University Kao Fellowship — *2022*
(for exceptional graduate students at Harvard SEAS)

North America School of Information Theory (*NASIT*) Travel Award — *2022*

Courant Institute Mathematics Award for Academic Achievement — *2021*
(presented to graduating seniors for excellence in mathematics)

NYU Alumni Award — *2021*
(presented to a graduating senior for scholarship and general attainments in Science)

NYU Women in Science Fellowship — *2020-2021*
(∼ 10 students/year)

Courant Institute Summer Undergrad Research Experience Fellowship — *2020*
(∼ 15 students/year)

NYU Dean's Honors List — *2018-2021*
(every academic year)

Singapore Ministry of Education Senior-Middle 1 Scholarship — *2013-2017*
(∼ 200 Chinese students/year, full scholarship to attend high school in Singapore)

Professional and Research Experiences

Meta Platforms (formerly Facebook) — **Menlo Park, CA**
Software Engineering Intern, Ads ML Infra Team — *May 2021 – Aug. 2021*
– Design a mechanism that improves stability and reliability of the feature pipeline for the Ads ranking ML system
– Implement the design using C++ to optimize the algorithm and ensure efficiency during real-time delivery

Undergraduate Summer Research — **New York, NY**
NYU Courant SURE Fellowship, PI: Yunan Yang — *Jul. 2020 – Oct. 2020*

– Modify the K-Means algorithm to enhance its ability to capture geometry in data by replacing Euclidean centroid with Wasserstein barycenter

– Benchmark algorithms for computing Wasserstein distance by investigating regularized and sliced Wasserstein distance against the traditional Kantorovich formulation

– Apply the augmented algorithm on the 99 Shapes Dataset and demonstrate significant visual improvement

Undergraduate Research Assistant **New York, NY**
NYU Department of Psychology, PI: Elena Sizikova *Sep 2019 – May 2020*

– Investigate the existence of human vision's physiological phenomena in CRNN, a deep neural network, to shed light on the root cause of Dyslexia

– Exposed CRNN's limitations in modeling noise adaptation and crowding in human vision, as well as its low efficiency, as measured by the signal-to-noise ratio of the images

– Generate images similar to human perception by applying Gaussian-noise techniques with Numpy and Matplotlib

– Explore a new method to model reaction time in dyslexia by measuring FLOPs (Floating Point Operations per Second) in networks

Undergraduate Research Volunteer **New York, NY**
NYU Langone Health *Oct 2019 – Feb 2020*

– Classify attack/non-attack behavior of a mouse using its brain activity data by training a long short-term memory model (LSTM) on High Performance Computing cluster

– Investigate the problem of leveraging the machine learning model to automate the process of labeling mice activity videos

Teaching Experiences

ES 250: Information Theory – Graduate Level Course *Fall 2022*
Engineering and Applied Sciences — Harvard University
Teaching Assistant
Hold weekly office hours to address students' concerns and questions. Guide 10+ students on their final projects.

NYU Courant Undergrad Tutor *2020-2021*
Cover classes including Discrete Math, Linear Algebra, and Calculus I, II,III.

Professional Service and Activities

Conference Reviewer
- Neural Information Processing Systems (NeurIPS), 2022, 2023
- International Conference on Machine Learning (ICML), 2023
- ACM Conference on Fairness, Accountability, and Transparency (FAccT), 2023

Conference and Workshop Attendence
- International Conference on Machine Learning (ICML), 2022
- North America School of Information Theory (NASIT), including a poster presentation, 2022

Skills and Interests

Technical Skills:
- Programming Languages: Python, C/C++, MATLAB
- Software and Packages: Jupyter Notebook, Matplotlib, Numpy, Pandas, Scikit-Learn
- Other: terminal, git

Languages: Cantonese, English, Mandarin

Interests: Dancing, Long-distance running (half-marathon), Music (classical, piano, pop), Travel