Nathan Tung

Curriculum Vitae

29 Creighton St, Providence, RI 02906
ntung88.github.io/work | 314-873-2327 | nathan_tung@brown.edu

EDUCATION

Ph.D. in Statistics — **Stanford University, Fall 2022 – Spring 2027**
Sc.M. in Applied Mathematics — **Brown University, Fall 2020 – Spring 2022**
Sc.B. (Honors) in Applied Mathematics and Computer Science — **Brown University, Fall 2018 – Spring 2022**

Graduate-Level Courses: Probability Theory I and II, Real Function Theory I and II, Topics in Modern Learning Theory, Advanced Probabilistic Methods in Computer Science, Partial Differential Equations I

RESEARCH EXPERIENCE

Honors Thesis — **Brown University**
Researcher – Professors Eli Upfal and Basilis Gidas — **October 2021 – Present**
(Full proposal on GitHub site) Investigating concentration of functions of random variables around median as opposed to the usual expectation and in what scenarios such bounds may be useful. Of particular interest are bounds arising from Talagrand's isoperimetric-type inequality and applications to machine learning and Rademacher complexity.

BigData Group — **Brown University**
Research Assistant – Professors Ani Eloyan and Eli Upfal — **January – November 2021**
Developed theory, wrote R code, and ran experiments for a novel statistical algorithm to detect strongly connected brain regions using graphical random walks and multiple hypothesis testing. Considered many tradeoffs and validation methods while designing the algorithm. Much of my work during the summer involved addressing complex program bugs that forced me to engage with the theory of a Bayesian Gaussian graphical model for FC estimation, understanding the choices of priors for all parameters to derive optimal ranges for our use. I plan to collaborate with a Brown PhD student on extending connectivity estimation from the population to the individual level.

Intelligent Robot Lab — **Brown University**
Research Assistant – Professor George Konidaris — **February 2020 – February 2021**
Worked on learning robust movements via chaining of dynamical movement primitives (DMPs), which use fixed-point attractor landscapes to model the actuations of motors to execute small movements. Soft actor-critic, off-policy maximum-entropy deep RL with a stochastic actor, was used to sequence these movements. Implemented a form of DMPs that use sensory feedback to adjust to perturbations by integrating feedback into a traditional DMP codebase. Also ran experiments using soft actor-critic on simulated tasks with OpenAI gym.

Donald Danforth Plant Science Center — **St. Louis, MO**
Research Assistant – Dr. James Umen — **June 2017 – February 2018**
Designed and carried out experiments to mutagenize and study developmental mutants of the multicellular green algae *Volvox carteri*. In the process I found an undocumented mutant and worked to image development of various mutants. Wrote a research report of findings for use in future work.

TEACHING EXPERIENCE

Artificial Intelligence – CSCI 1410 — **Brown University**
Undergraduate Teaching Assistant — **September – December 2020**
Took charge of and improved the Hidden Markov Model assignment, held hours to help students' with concepts and coding, and graded assignments.

Varsity Tutors — **Virtual**
Tutor — **December 2018 – May 2020**

Tutored high school students in math and early college students in computer science on a weekly basis. Topics ranged from geometry to software engineering and algorithms.

INDUSTRY EXPERIENCE

moodplex.com **Virtual**
Software Engineering Intern **May – August 2020**
One of two developers building a social media platform with posts pulled from Hackernews, Twitter, Reddit, and Youtube. Personally wrote backend, implementing an ELO algorithm for post rankings, a SQL database and management methods in Golang, and JavaScript behind the website.

HLK Agency **St. Louis, MO**
Data Engineering Intern **June – August 2019**
Worked on an agile data platform giving each client a secure & isolated data lake and big-data workspace. Performed AI analysis on data in Jupyter Notebooks including a Naïve Bayes classifier and worked with Kubernetes, Rancher, Kafka, and Spark to create API's and data sync systems that are running the company's data lake today.

PROJECTS AND AWARDS

Fulbright U.S. Student Research Grant Winner **March 2022**
Won a nine-month grant to conduct research full-time in the mathematics department at École Normale Supérieure in Paris-Saclay, France. Unable to accept due to conflict with graduate study.

American Statistical Association Student Paper Competition **January 2022**
One of four runner-ups in the competition, awarded for work in Neuro-Hotnet. $500 cash prize and will present at the Joint Statistical Meetings in Washington D.C. in August.

Citadel and Correlation One East Coast Regional Data Open **September 2020**
Placed 1st overall and won $20k for a novel diversity index for movies including poster representation, Bechdel test results, and cast composition that strongly correlates with IMDb ratings. Scraped for movie posters, extracted demographics with computer vision, and ran statistical analyses between datasets. Invited to international Data Open Championship in 2021.

Tron Bot **October 2019**
Created an artificial intelligence to play Tron/lightbike in Python using minimax algorithm, alpha-beta pruning, and a heuristic to analyze game states and make decisions. Placed in top 10 of 150-student AI class.

NeuroStud **April 2019**
Worked in a team to hack an EEG headset to feed data to an Arduino which was then analyzed and integrated with a Java webapp. Monitors attention level while studying to generate a review session of screenshots when attention lapsed.

Paranoid Passenger **December 2018**
Won flights and hotel stay from JetBlue at Yale's Hackathon for paranoidpassenger.com, a web app to provide optimized flight options based on turbulence, security checkpoint wait-time, airport rating, and travel distance data scraped from the TSA, Homeland Security, NOAA, and Google. Wrote backend in Python and PHP and scraped for TSA data.

PREPRINTS AND UNDER REVIEW

1. Nathan Tung, Eli Upfal, Jerome Sanes, and Ani Eloyan. "Neuro-Hotnet: A Graph Theoretic Approach for Brain FC Estimation". In: *arXiv:2111.08118* (2021). Submitted for publication.

SKILLS

Natural Languages	**Native:** English **Proficient:** Spanish **Basic:** Chinese, French
Programming Languages	**Fluent:** R, Python, Matlab, Golang, HTML, CSS **Familiar:** Java, C, JS, Swift, SQL