

Ellis L. Brown, II

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Interests.....

I am primarily interested in artificial intelligence and reinforcement learning. Recently, I am particularly excited about curiosity-based exploration, self-supervised learning, and representation learning. I am also generally interested in drawing inspiration from intelligence in humans and nature. My long-term goal is to develop intelligent agents that can generalize and continually adapt as robustly and efficiently as humans do, allowing them to be safely deployed in the real world.

Education

Carnegie Mellon University Pittsburgh, PA
M.S., Computer Science (expected) Dec. 2022
Coursework: 16-824: Visual Learning & Recognition; 10-703: Deep Reinforcement Learning & Control; 10-715: Advanced Intro Machine Learning; 10-721: Philosophical Foundations of Machine Intelligence; 16-811: Math Fundamentals for Robotics

Stanford University Palo Alto, CA
Non-Degree Graduate Student, Computer Science Jun. 2020
Coursework: CS361: Engineering Design Optimization

Columbia University New York, NY
Non-Degree Graduate Student, Computer Science May 2019
Coursework: EECS E6699: Mathematics of Deep Learning

Vanderbilt University Nashville, TN
B.S., Computer Science; B.A., Mathematics May 2017
Relevant Coursework: CS3250: Algorithms; CS3270: Prog Languages; CS3892: Big Data; CS4260: Artificial Intelligence; MA2175: Multiv Calc; MA2198: Diff Eqns; MA2218: Prob/Math Stats; MA2410: Lin Algebra; MA3320: Error-Correcting Codes; MA3800: Number Theory

Experience

Research.....

Robotics Institute Carnegie Mellon University
Graduate Student Researcher, Advised by Professor [Deepak Pathak](#) 2022–Pres.
● Working on self-supervised learning using internet data.

Department of Electrical Engineering and Computer Science Vanderbilt University
Undergraduate Student Researcher, Advised by Professor [Maithilee Kunda](#) 2016–2018
● Developed a computational cognitive architecture used to model and understand human visual attention in the context of visual search for a spatiotemporal target (MATLAB).
● Contributed to the development of the [Toybox Dataset](#) for small sample learning and hand object scene interaction.

Industry.....

BlackRock AI Labs
● Founding team member and culture carrier. Launched bi-weekly internal reading group. Co-launched the team's [website](#).
● Advised by and worked closely with [Mykel Kochenderfer](#), [Stephen Boyd](#), and [Trevor Hastie](#).

Research Engineer | Palo Alto, CA 2020–2021
● Co-authored and open-sourced two Julia packages for separable optimization problems, presented at JuliaCon 2021. [[blog](#), [talk](#)]
● Formulated the securities lending process as a Markov decision process, allowing for optimization of lending policies. Designed and prototyped a multi-agent lending market simulator; showed that learned policies improve over existing

rule-based policy.

- Created a causal model to forecast the effect of a fee change on inflows for iShares ETFs using GLMNet. Built and deployed a Streamlit webapp to visualize causal predictions that is currently in use by the pricing team.

Machine Learning Engineer | New York, NY

2018–2019

- Developed a logistic model to assign decomposable daily operational “risk” scores to portfolios. Built an ETL pipeline in Spark to extract 3k+ features from various portfolio management systems and output daily predictions. Project presented to CEO.
- Developed a text classifier to identify compliance rules in Investment Management Agreements using OCR and SpaCy.

BlackRock

Software Engineer | New York, NY

2017

- Built an ETL pipeline to ingest daily mutual fund reference data using Apache Storm.

Software Engineering Intern | New York, NY

2016

- Won intern hackathon with a NLP system to extract contract terms from legal documents during new client onboarding.

Teaching

Department of Electrical Engineering and Computer Science

Vanderbilt University

Teaching Assistant, CS 2201: Program Design & Data Structures

Fall 2015

- Held weekly office hours for class of 200+ students. Graded weekly programming assignments and exams.

Publications

Journal

- 2018 Ellis Brown, Soobeen Park, Noel Warford, Adriane Seiffert, Kazuhiko Kawamura, Joe Lappin, and Maithilee Kunda. An Architecture for Spatiotemporal Template-Based Search. Advances in Cognitive Systems, Volume 6, 101-118. [\[paper\]](#)

Conference

- 2018 Ellis Brown, Soobeen Park, Noel Warford, Adriane Seiffert, Kazuhiko Kawamura, Joe Lappin, and Maithilee Kunda. SpatioTemporal Template-based Search: An Architecture for Spatiotemporal Template-Based Search. Sixth Annual Conference on Advances in Cognitive Systems, Stanford, CA. [\[paper\]](#)

Reports

- 2020 Ellis Brown. Securities Lending Policy Optimization. Department of Computer Science, Stanford University, Palo Alto, CA. [\[paper\]](#), [video](#)
- 2019 Ellis Brown*, Melanie Manko*, Ethan Matlin*. Modeling Uncertainty in Bayesian Neural Networks with Dropout. Department of Electrical Engineering and Computer Science, Columbia University, New York, NY. (*equal contribution) [\[paper\]](#), [slides](#)

Talks

- 2021 Linearly Constrained Separable Optimization (oral), JuliaCon 2021 JuMP-dev track. [\[talk\]](#)
- 2019 Modeling Uncertainty in Bayesian Neural Networks with Dropout: the effect of weight prior and network architecture selection (poster), American Indian Science and Engineering Society National Conference 2019, Madison, WI. [\[poster\]](#)
- 2018 SpatioTemporal Template-based Search: An Architecture for Spatiotemporal Template-Based Search (oral), Sixth Annual Conference on Advances in Cognitive Systems, Stanford, CA. [\[slides\]](#)
- 2017 Computational Cognitive Systems to Model Information Saliency (oral), American Indian Science and Engineering Society National Conference 2017, Denver, CO. [\[slides\]](#), [link](#)

Open-Source Projects

[JuliaFirstOrder](#)/{ [PiecewiseQuadratics.jl](#), [SeparableOptimization.jl](#) } 2021
Co-authored two Julia packages for solving the problem of minimizing a sum of piecewise-quadratic functions subject to affine equality constraints by applying the Alternating Direction Method of Multipliers (ADMM).

[amdegroot/ssd.pytorch](#) ★ 4.5k 🍷 1.7k 2017
Co-authored the de facto PyTorch implementation of the [Single Shot MultiBox Detector](#), a real-time object detection framework using a single network, shortly after PyTorch's alpha release.

[ellisbrown/name2gender](#) 2017
Implemented Naive Bayes & Char-RNN (PyTorch) approaches to inferring gender from character sequences in multinational first names. Wrote a [blog post](#) that was published by Towards Data Science.

Awards and Honors

- Scholar, Lighting the Pathways to Faculty Careers for Natives in STEM, AISES 2021
- Scholar, Computer Science Research Mentorship Program, Google Research 2021
- Intel Growing the Legacy Graduate Scholarship 2021
- 3rd Place, Graduate Student Research Competition, AISES National Conference 2019
- 1st Place, BlackRock Intern Hackathon 2016
- Osage Nation Higher Education Scholarship 2013–2017
- (2x) Academic All-American, USA Water Polo 2012, 2013

Extracurricular Activities

American Indian Science & Engineering Society (AISES)

Volunteer 2019–2021

- Mentored a Native undergraduate student studying CS through the 2020–2021 Full Circle Mentorship Program.
- Reviewed scholarships for the 2020 AISES Undergraduate Scholarship.
- Judged posters for Undergraduate Student Research Competition at the 2019 National Conference.

Code/Interactive

Mentor 2018

- Provided assistance with weekly lessons and advice to an underprivileged high school student interested in CS.

Vanderbilt Admissions

Tour Guide 2014–2016

- Led weekly campus tours to groups of 10-50+ prospective students.

Kappa Sigma Fraternity (Kappa Chapter)

Social Chairman 2014–2016

- Managed \$90k annual social budget; served on Executive Council.

Water Polo

Captain & President, Vanderbilt club team (2014 SEC Champions) 2014–2016

- Led tri-weekly practices, coordinated travel to tournaments, interfaced with university administration.

Trainee, USA Olympic Development Program 2010–2013

- Trained in the National Team Pipeline program. Competed in Junior Olympics.