

Ellis L. Brown, II

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Interests

I am primarily interested in machine learning and reinforcement learning. Recently, I am particularly excited about exploration, model-based/unsupervised/meta learning, and learning useful representations. 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

M.S., Computer Science

Coursework: 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

Pittsburgh, PA

(expected) Dec. 2022

Stanford University

Non-Degree Graduate Student, Computer Science

Coursework: CS361: Engineering Design Optimization

Palo Alto, CA

Jun. 2020

Columbia University

Non-Degree Graduate Student, Computer Science

Coursework: EECS E6699: Mathematics of Deep Learning

New York, NY

May 2019

Vanderbilt University

B.S., Computer Science; B.A., Mathematics

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

Nashville, TN

May 2017

Experience

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.

Research

Artificial Intelligence and Visual Analogical Systems Lab

Vanderbilt University

Research Assistant, Professor [Maithilee Kunda](#)'s group

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.

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

Working (titles and authors may change)

- 2021 Aaron M. Roth, **Ellis Brown**. *Interpretable Reinforcement Learning in Complex Environments via Decision-Tree Policies*.

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.

Participant, USA Olympic Development Program 2010–2013

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