# Ellis L. Brown, II

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## Education

**Carnegie Mellon University** — **Pittsburgh, PA**
*M.S., Computer Science; Advised by Professors Deepak Pathak and Alexei Efros* — *(expected) May 2023*

**Stanford University** — **Palo Alto, CA**
*Non-Degree Graduate Student, Computer Science* — *Jun. 2020*

**Columbia University** — **New York, NY**
*Non-Degree Graduate Student, Computer Science* — *May 2019*

**Vanderbilt University** — **Nashville, TN**
*B.S., Computer Science; B.A., Mathematics; Advised by Professor Maithilee Kunda* — *May 2017*

## Publications

2022 A. Li*, **E. Brown***, A. Efros, D. Pathak. *Internet Curiosity: Directed Unsupervised Learning on Uncurated Internet Data. ECCV 2022 Workshop, "Self Supervised Learning: What is Next?"*

2018 **E. Brown**, S. Park, N. Warford, A. Seiffert, K. Kawamura, J. Lappin, and M. Kunda. An Architecture for Spatiotemporal Template-Based Search. *Advances in Cognitive Systems, Volume 6*, 101-118.

2018 **E. Brown**, S. Park, N. Warford, A. Seiffert, K. Kawamura, J. Lappin, and M. Kunda. SpatioTemporal Template-based Search: An Architecture for Spatiotemporal Template-Based Search. *Sixth Annual Conference on Advances in Cognitive Systems*, Stanford, CA. (Oral Presentation)

*equal contribution

## Awards and Honors

- *Scholar*, Lighting the Pathways to Faculty Careers for Natives in STEM, AISES — *2021–Pres.*
- Intel Growing the Legacy Graduate Scholarship — *2021; 2022*
- *Scholar*, Computer Science Research Mentorship Program, Google Research — *2021*
- *3rd Place*, Graduate Student Research Competition, AISES National Conference — *2019*
- Osage Nation Higher Education Scholarship — *2013–2017; 2021–Pres.*
- (2x) *Academic All-American*, USA Water Polo — *2012, 2013*

## Experience

### Robotics Institute, Carnegie Mellon University

*Graduate Student Researcher,* Advised by Professors Deepak Pathak and Alexei Efros — *2022–Pres.*

- Researching self-supervised learning, curiosity-driven exploration, and generalization.
- Lead contributor to securing a $30m cross-institutional DARPA Machine Common Sense grant for CMU, UC Berkeley, MIT, and UMich—team "MESS" (Model-building, Exploratory, Social-learning Systems).

### BlackRock AI Labs

Advised by Professors Mykel Kochenderfer, Stephen Boyd, and Trevor Hastie.
Founding team member and culture carrier. Launched bi-weekly reading group. Co-launched external website.

*Research Engineer* | Palo Alto, CA — *2020–2021*

- Formulated the securities lending process as a Markov decision process; designed and wrote a multi-agent lending market simulator for the learning and evaluation of policies; showed that learned policies outperform the rule-based policy used by the lending desk.
- Open-sourced two Julia packages for separable optimization problems. Presented at JuliaCon 2021. [blog, talk]

*Machine Learning Engineer* | New York, NY — *2018–2019*

- Proposed a model of portfolio "operational risk"—decomposable into an interpretable set of factors. Built a Spark ETL pipeline that extracts 3k+ features from various portfolio management systems and outputs daily predictions for all portfolios in the firm.
- Designed a system to identify and parse compliance rules in legal documents automatically; previously performed by 30+ FTEs.

**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.

**Department of Computer Science, Vanderbilt University**

*Undergraduate Student Researcher,* Advised by Professor Maithilee Kunda *2016–2018*

- Developed a computational cognitive architecture of human attention during spatiotemporal visual search.
- Contributed to the development of the Toybox Dataset for small sample learning and hand-object interaction.

### Open-Source

JuliaFirstOrder/{ **PiecewiseQuadratics.jl**, **SeparableOptimization.jl** } *2021*

- Co-authored Julia packages for solving the problem of minimizing a sum of piecewise-quadratic functions subject to affine equality constraints via a derivative of the Alternating Direction Method of Multipliers (ADMM). Formed the JuliaFirstOrder organization.

amdegroot/**ssd.pytorch** ★ 4.7k ⑂ 1.7k *2017*

- Co-authored the canonical PyTorch implementation of the Single Shot MultiBox Detector, a real-time object detection framework using a single network, 3 months after PyTorch's alpha release.

### Teaching

**Department of 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 progamming assignments and exams.

## 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 Salience (oral), *American Indian Science and Engineering Society National Conference 2017*, Denver, CO. [slides, link]

## Graduate Coursework

- CMU: Deep Reinforcement Learning for Robotics, Visual Learning & Recognition, Deep Reinforcement Learning & Control, Advanced Intro Machine Learning, Philosophical Foundations of Machine Intelligence, Math Fundamentals for Robotics, Distributed Systems, Intro to Computer Systems
- Stanford: Engineering Design Optimization
- Columbia: Mathematics of Deep Learning

### Reports

2022 Alvin Shek, **Ellis Brown**, Nilay Pande, David Noursi. Self-Supervised Representation Learning via Curiosity-Driven Exploration. Robotics Institute, Carnegie Mellon University, Pittsburgh, PA. [report]

2021 **Ellis Brown**, Aaron M. Roth. Scaling Interpretable Reinforcement Learning via Decision Trees to Minecraft. Robotics Institute, Carnegie Mellon University, Pittsburgh, PA. [report]

2020 **Ellis Brown**. Securities Lending Policy Optimization. Computer Science Department, Stanford University, Palo Alto, CA. [report, 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. [report, slides]

*equal contribution

## Extracurricular Activities

**American Indian Science & Engineering Society (AISES)**
*Volunteer* *2019–2021*
- Mentored an undergraduate AISES 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*
- Advised and tutored (weekly) an underprivileged high schooler interested in CS; helped prepare college applications.

**Vanderbilt Admissions**
*Tour Guide* *2014–2016*
- Led weekly campus tours to groups of 10-50+ prospective students and families.

**Kappa Sigma Fraternity** (Kappa Chapter)
*Social Chairman* *2014–2016*
- Managed $90k annual budget; planned & executed dozens of large-scale events; served on Executive Council.

**Water Polo**
*Captain & President*, Vanderbilt Club Team (2014 SEC Champions) *2014–2016*
- Coordinated and led a team of 20+ players through a 10 week season with 2+ travel tournaments.

*Trainee*, USA Olympic Development Program *2010–2013*
- Trained in the United States National Team Pipeline program. Competed in Junior Olympics.