Dominic Carrano

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Education

University of California, Berkeley

M.S. in Electrical Engineering and Computer Science ***08/2020 - 05/2021***
Advisor: Prof. Kannan Ramchandran • **Focus Area:** Distributed Machine Learning

B.S. in Electrical Engineering and Computer Science ***08/2016 - 05/2020***
Major GPA: 3.85/4 • **Cumulative GPA:** 3.80/4 • **Top 20% of Graduating Class**

Experience

Distributed Machine Learning Researcher • UC Berkeley BASiCS Lab ***01/2019 - Present***

- Developed the *local product code*, a novel erasure coding technique to combat stragglers in distributed matrix multiplication, which beat all other state-of-the-art methods' runtimes by 25+% by using the minimum possible number of matrix block read operations.
- Implemented the method in Python (code available on GitHub) and deployed it on AWS Lambda to perform matrix factorization.
- Proved that the number of matrix blocks read by the decoding algorithm is asymptotically optimal, and that the probability of reading more than a given number of blocks decays super-exponentially.
- Published the results and theoretical guarantees at the 2020 IEEE International Conference on Distributed Computing Systems (~19% acceptance rate), and was nominated as a Best Paper Finalist out of over 300 submissions.

Hardware Test Automation Intern • Apple, Inc. ***06/2020 - 08/2020***

- Developed a Python API for object detection and RGB-D camera streaming that leveraged computer vision, machine learning, and signal processing techniques to determine 3D object coordinates precise to within ±2 mm for robotic automation testing.
- Packaged and shipped the API on the company internal PyPI server, giving 20+ users across 7+ hardware testing teams an automated replacement for their time-intensive manual depth calibration procedures.
- Presented project to the VP of Product Integrity, and was one of only 6 of 45 Product Integrity interns invited to do so.

Teaching

Head TA for EECS 127: Optimization Models in Engineering • UC Berkeley ***08/2020 - Present***

- Managed a 16-person teaching team and a 300-student course as head TA in fall 2020 semester, running weekly staff meetings.
- Taught weekly 30-student sections on linear algebra, vector calculus, convex optimization, and gradient descent algorithms.

Head TA and TA for EECS 120: Signals and Systems • UC Berkeley ***08/2018 - 05/2020***

- Managed an 8-person teaching team and a 130-student course as head TA in spring 2019, fall 2019, and spring 2020 semesters.
- Taught weekly 30-student sections on signal processing, linear time-invariant system theory, and several of their applications.
- Initiated and spearheaded project to create six new applications-driven Jupyter Notebook virtual labs in the spring 2019 semester.
- Proactively solicited student feedback to fine-tune the labs, and led the spring 2020 team to create four more for a full set of 10.
- Received an average end-of-semester TA rating of 4.29/5 (fall '18), 4.59/5 (spring '19), 4.77/5 (fall '19), and 4.70/5 (spring '20), all on anonymous student surveys with 80% or higher response rates, proving consistent teaching effectiveness.

Publications

V. Gupta*, **D. Carrano***, Y. Yang, V. Shankar, T. Courtade, K. Ramchandran. *Serverless Straggler Mitigation using Local Error-Correcting Codes*. IEEE International Conference on Distributed Computing Systems, Singapore, 2020. [**pdf**] [**code**]

D. Carrano, I. Chugunov, J. Lee, B. Ayazifar. *Self-Contained Jupyter Notebook Labs Promote Scalable Signal Processing Education*. International Conference on Higher Education Advances, Valencia, Spain, 2020. [**pdf**] [**labs**]

D. Carrano, R. Muir. *Deconvolution uncertainty for power sensors at the National Ignition Facility*. SPIE High Power Lasers for Fusion Research, San Francisco, California, 2019. [**pdf**]

Skills and Tools

Proficient: Python (+NumPy, SciPy, Matplotlib, PyPI), MATLAB, Jupyter Notebook, Intel RealSense, Soccer Fullback

Familiar: C, Java, R, AWS Lambda, Unix/Linux Terminal, Mac OS, LaTeX, HTML, Git, GitHub, Markdown, Digital Oscilloscopes

Achievements

2019-2020 EECS Distinguished TA Award, UC Berkeley EECS Department ***04/2020***
2019-2020 Outstanding TA Award, UC Berkeley ***04/2020***
Eagle Scout, Boy Scouts of America ***10/2012***