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:*** *Massive-Scale 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*

Experience

Undergraduate Researcher • Berkeley Laboratory for Information Systems and Sciences ***01/2019 - Present***

- Demonstrated a 25% faster runtime than state-of-the-art matrix multiplication straggler tolerance schemes on AWS Lambda by implementing a locally recoverable product code in Python, leading to asymptotically optimal decoding costs.
- Published experimental results and theoretical guarantees of coding-based approach at IEEE ICDCS 2020, linked below.

Signal Processing and Laser Systems Intern • Lawrence Livermore National Laboratory ***05/2019 - 08/2019***

- Reduced mean squared error of laser signal acquisition algorithm by 5x and saved $2 million over previously proposed method by using fiducial signal to approximate impulse response measurements, eliminating the need to take multiple impulse shots.
- Developed and shipped new software tool to calibrate raw data from all 48 of the National Ignition Facility's 3ω laser diagnostics by implementing provably optimal parametric fits in Matlab, providing a way to track diagnostic tool health for future experiments.

Signal Processing and Laser Systems Intern • Lawrence Livermore National Laboratory ***05/2018 - 08/2018***

- Quantified previously unknown error bars in laser diagnostic measurements by implementing Monte Carlo-based error propagation in Matlab, leading to ~3% less error after adding masking and normalization techniques to the deconvolution algorithm.
- Presented work at SPIE Photonics West 2019 in San Francisco, with a publication in the conference proceedings, linked below.

Teaching

Teaching Assistant (GSI) for EECS 120: Signals and Systems • UC Berkeley EECS Department ***08/2018 - Present***

20-hour-per-week Head GSI in spring 2019, fall 2019, and spring 2020 semesters. 8-hour-per-week GSI in fall 2018 semester.

- Won the 2019-2020 EECS Distinguished GSI Award, the EECS Department's most prestigious award for GSIs, as well as the campus Outstanding GSI Award for 2019-2020, given annually to the top 10% of UC Berkeley GSIs in each department.
- Marshaled an 8-person staff and took charge of a 130-student class as Head GSI, coordinating all logistics with the professor.
- Initiated and spearheaded project to create six new applications-driven Jupyter Notebook virtual labs in the spring 2019 semester.
- Fine-tuned the original six labs using student feedback, and led the spring 2020 staff to create four more for a full set of 10.
- Paper on the labs accepted to the 2020 International Conference on Higher Education Advances. Links to PDF, lab files are below.
- Taught weekly sections to 30 students on signal processing, linear time-invariant system theory, and their engineering applications.
- Demonstrated consistent improvement in teaching ability, as proven by end of semester feedback: received an average rating of 4.3/5 in fall 2018, 4.6/5 in spring 2019 and 4.8/5 in fall 2019 all on anonymous student surveys with 80+% response rates.

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, Jupyter Notebook), Soccer Fullback

Familiar: Java, MATLAB, C, Unix/Linux, LaTeX, HTML, Git, GitHub, Markdown

Achievements

2019-2020 EECS Distinguished GSI Award, UC Berkeley EECS Department ***04/2020***

2019-2020 Outstanding GSI Award, UC Berkeley ***04/2020***

Eagle Scout, Boy Scouts of America ***10/2012***