Gary Cheng

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Education

Ph.D. Electrical Engineering, Stanford University

September 2019 - Present GPA 4.0

Advised by Professor John Duchi, researching topics in optimization and statistics for machine learning. Supported by a 3-year *Professor Michael J. Flynn Stanford Graduate Fellowship.* Generally interested in developing theoretically justified optimization methods which are useful in practical applications. Currently working on creating and analyzing algorithms for Federated Learning. Also learning and exploring ideas in Differential Privacy.

B.A. Computer Science, University of California, Berkeley

Highest Distinction (Summa Cum Laude) GPA 4.0

August 2015 - May 2019

Advised by Professors Laurent El Ghaoui, Jean Walrand, and Kannan Ramchandran. Coursework in machine learning, optimization, statistics, probability, algorithms, signal processing, analysis, abstract algebra, linear algebra, etc.

Publications

Karan Chadha*, **Gary Cheng***, and John Duchi. "Accelerated, Optimal, and Parallel: Some Results on Model-Based Stochastic Optimization" *preprint*. https://arxiv.org/abs/2101.02696

Hilal Asi*, Karan Chadha*, **Gary Cheng***, and John Duchi. "Minibatch Stochastic Approximate Proximal Point Methods" **Spotlight Presentation** at *NeurIPS 2020*. https://papers.nips.cc/paper/2020/hash/fa2246fa0fdf0d3e270c86767b77ba1b-Abstract.html

Gary Cheng, Armin Askari, Kannan Ramchandran, and Laurent El Ghaoui. "Greedy Frank-Wolfe Algorithm for Exemplar Selection." Poster at *BayLearn 2018*. https://arxiv.org/abs/1811.02702

Gary Cheng, Kabir Chandrasekher, and Jean Walrand. "Static and Dynamic Appointment Scheduling with Stochastic Gradient Descent." In *American Control Conference 2019*. https://ieeexplore.ieee.org/document/8814666

* denotes equal contribution; authors were alphabetically ordered

Experience

Research Assistant, Stanford Statistical Machine Learning Group

June 2020 - Present

Advised by Professor John Duchi, working on developing algorithms for scalable machine learning. Our previous work on aProx methods was a spotlight presentation at NeurIPS 2020 and has been submitted to SIAM Journal on Optimization. Currently working on personalized Federated Learning (FL). Using ideas from overparameterized linear models, random matrix theory, and meta-learning to characterize the personalization properties of popular FL

algorithms. Designing experiments in PyTorch to see which FL personalization algorithms work best in practice.

Research Assistant, Stanford Information Systems Laboratory

September 2019 - Present

Working with Professor David Tse studying problems related to adaptive sampling and multi-armed bandits. Researching the problem of estimating smooth function outputs given uncertainty in the inputs. Currently preparing a conference submission.

Research Assistant, UC Berkeley BAIR Lab

January 2018 - May 2019

Developed an early stopping Frank-Wolfe Algorithm for the purpose of dataset summarization. Proved algorithm has a linear convergence rate. Designed, coded, and simulated all numerical experiments in Python. Advised by Professors Laurent El Ghaoui and Kannan Ramchandran. First author paper on arXiv and presented poster at BayLearn 2018.

Research Assistant, UC Berkeley BLISS Lab

August 2016 - May 2019

Developed a novel dynamic appointment scheme and used stochastic gradient descent to find optimal appointment schedules with applications in hospital scheduling. Designed, coded, and simulated all numerical experiments in Python. Advised by Professor Jean Walrand. Outstanding Presentation Award at GCURS 2017 and first author paper presented at American Control Conference 2019.

Software Development Intern, Amazon.com

May 2017 - August 2017

Full stack developer on the Forecasting team in Supply Chain Optimization. Implemented graph algorithms to give insight into the longest running components of forecasting calculations. Created new Java APIs and integrated them into a Ruby on Rails front-end.

Teaching

Teaching Assistant, University of California, Berkeley

EE 126, Probability and Random Processes. Spring 2018 & Spring 2019.
CS 170, Algorithms. Fall 2017.
CS 61B, Data Structures and Algorithms. Spring 2017.

Awards

Prof. Michael J. Flynn Stanford Graduate Research Fellowship. Spring 2019, Awarded by Stanford.

NSF Graduate Research Fellowship Honorable Mention. Spring 2019, Awarded by NSF.

UC Berkeley Campus Outstanding GSI Award. Spring 2019, Awarded by UC Berkeley.

GCURS 2017 Outstanding Presentation Award. Fall 2017, Awarded by Rice University.

Cal Alumni Association Leadership Award. Fall 2015, Awarded by UC Berkeley.

Languages

Proficient in: Python, NumPy, Java
Familiar with: PyTorch, TensorFlow