

Matthew Faw

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Research Interests

Stochastic Optimization, Online Learning, Multi-Armed Bandits, Optimal Stopping

Education

- 2018–Present **Ph.D. in Electrical & Computer Engineering**, *The University of Texas at Austin*, Austin, TX.
Advisors: Sanjay Shakkottai, Constantine Caramanis.
- 2013–2017 **B.S.E. Electrical & Computer Engineering, B.S. Computer Science, A.B. Math**, *Duke University*, Durham, NC.
Advisors: Nick Buchler, Richard Fair, Benjamin C. Lee

Publications (Google Scholar)

Conference Papers

- COLT 2023 “Beyond Uniform Smoothness: A Stopped Analysis of Adaptive SGD”, **Matthew Faw**[✉], Litu Rout[✉], Constantine Caramanis, and Sanjay Shakkottai, *Proceedings of Thirty Sixth Conference on Learning Theory*
- COLT 2022 “The Power of Adaptivity in SGD: Self-Tuning Step Sizes with Unbounded Gradients and Affine Variance”, **Matthew Faw**[✉], Isidoros Tziotis[✉], Constantine Caramanis, Aryan Mokhtari, Sanjay Shakkottai, and Rachel Ward, *Proceedings of Thirty Fifth Conference on Learning Theory*
- SIGMETRICS 2022 “Learning To Maximize Welfare with a Reusable Resource”, **Matthew Faw**[✉], Orestis Papadigenopoulos[✉], Constantine Caramanis, and Sanjay Shakkottai, *Proceedings of the 2022 ACM SIGMETRICS/IFIP PERFORMANCE Joint International Conference on Measurement and Modeling of Computer Systems*
- SODA 2022 “Single-Sample Prophet Inequalities via Greedy-Ordered Selection”, Constantine Caramanis, Paul Dütting, **Matthew Faw**, Philip Lazos, Stefano Leonardi, Orestis Papadigenopoulos, Emmanouil Pountourakis, and Rebecca Reiffenhäuser (alphabetical order), *Proceedings of the 2022 Annual ACM-SIAM Symposium on Discrete Algorithms*
- NeurIPS 2020 “Mix and Match: An Optimistic Tree-Search Approach for Learning Models from Mixture Distributions”, **Matthew Faw**, Rajat Sen, Karthikeyan Shanmugam, Constantine Caramanis, and Sanjay Shakkottai, *Proceedings of the 34th International Conference on Neural Information Processing Systems*

Journal Papers

- TOCS 2017 “Computational Sprinting: Architecture, Dynamics, and Strategies”, Seyed Majid Zahedi, Songchun Fan, **Matthew Faw**, Elijah Cole, and Benjamin C Lee, *ACM Transactions on Computer Systems*, Volume 34, Issue 4

Working Papers

- “Multi-source Domain Adaptation Under Sparsity Constraints”, **Matthew Faw**, Karthikeyan Shanmugam, Constantine Caramanis, and Sanjay Shakkottai

Awards + Honors

- 2023 Dr. Brooks Carlton Fowler Endowed Presidential Graduate Fellowship in Electrical and Computer Engineering from Cockrell School of Engineering for the 2023-2024 academic year
- 2022 Top 10% reviewer for NeurIPS 2022
- 2022 Highlighted reviewer for ICLR 2022
- 2022 Top 10% reviewer for AISTATS 2022
- 2020 NXP Foundation Fellowship for the 2020-2021 academic year
- 2017 Cum Laude Graduation Honors, Duke University
- 2016 Member, Tau Beta Pi and Eta Kappa Nu Honor Societies, Duke University
- 2014 Gold medal, International Genetically Engineered Machine Competition

Grants

- 2022 \$250 DeepMind student travel grant for COLT 2022
- 2022 \$1575 travel grant for SIGMETRICS 2022
- 2015 \$6000 Research Grant, SMiF Undergraduate User Program

Talks and Poster Presentations

Upcoming Invited Talks

- October 2023 Asilomar 2023, Pacific Grove, CA: "On Learning for Welfare Maximization with a Reusable Resource"

Talks

- July 2023 COLT 2023, Bangalore, India: "Beyond Uniform Smoothness: A Stopped Analysis of Adaptive SGD"
- April 2023 IFML Workshop, University of Washington: "Beyond Uniform Smoothness: A Stopped Analysis of Adaptive SGD"
- July 2022 COLT 2022, London, UK: "The Power of Adaptivity in SGD: Self-Tuning Step Sizes with Unbounded Gradients and Affine Variance"
- June 2022 SIGMETRICS 2022, IIT Bombay, Mumbai, IN: "Learning To Maximize Welfare with a Reusable Resource"
- April 2022 Machine Learning Lab Research Symposium, UT Austin: "The Power of Adaptivity in SGD: Self-Tuning Step Sizes with Unbounded Gradients and Affine Variance"
- January 2022 SODA 2022, Virtual: "Single Sample Prophet Inequalities via Greedy-Ordered Selection"

Poster Presentations

- October 2022 Joint IFML/Data-Driven Decision Processes Workshop, Simons Institute, UC Berkeley, "The Power of Adaptivity in SGD: Self-Tuning Step Sizes with Unbounded Gradients and Affine Variance"
- December 2020 NeurIPS 2020, Virtual, "Mix and Match: An Optimistic Tree-Search Approach for Learning Models from Mixture Distributions"
- November 2019 Texas Wireless Summit, UT Austin, "Mix and Match: An Optimistic Tree-Search Approach for Learning Models from Mixture Distributions"

Conference Reviewing

- 2023 NeurIPS, ALT

2022 AISTATS (Top 10% reviewer), ICLR (Highlighted reviewer), NeurIPS (Top 10% reviewer)
2021 AISTATS, ICML, NeurIPS

Industry Experience

June **Software Engineer**, *Verato*, McLean, VA.
2017-July Co-designed and built a custom continuous integration system using Kubernetes, capable of testing
2018 hundreds of simultaneous builds of the software stack. Designed software to maintain 300M entry Mongo database and Solr search engine.
May-August **Software Engineering Intern**, *Stateflow Semantics*, *MathWorks*, Natick, MA.
2016 Co-designed and implemented a proof-of-concept architectural change to the team's code generation process that allowed product extensibility and optimizations that were previously infeasible.

Undergraduate Research Experience

Jan-Dec 2016 **Datacenter Architecture**, *Advisor: Dr. Benjamin Lee*, Duke University.
Evaluated performance and economic viability of several strategies for system-level computational sprinting for Spark applications. Worked on extensions for co-locating batch and latency-critical workloads.
Jan-Dec 2015 **Microfluidics**, *Advisor: Dr. Richard Fair*, Duke University.
Designed and fabricated digital microfluidic devices capable of manipulating E.coli using magnetic beads within droplet to conduct small-scale biology experiments.
May-Nov **Synthetic Biology**, *Advisor: Dr. Nick Buchler*, Duke University.
2014 Conducted molecular titration experiments to evaluate several CRISPR-based techniques for creating an ultrasensitive response in gene expression. Designed 3D-printed lab equipment to lower financial barriers to biology research.

Teaching Experience

Fall 2018, **EE 460J, Data Science Lab TA**, *UT Austin*.
Spring 2019 Led lab sessions, and graded homeworks and exams
Spring 2017 **CS 308, Software Design and Implementation TA**, *Duke University*.
Personally mentored 3 undergraduate CS students, conducted code reviews, advised and evaluated design and implementation of 3 software projects.
Fall 2015 **ECE 280, Signals & Systems TA**, *Duke University*.
Held office hours and graded assignments for 70 undergraduate students.
Spring 2015 **Synthetic Biology House Course Co-Designer/Instructor**, *Duke University*.
Co-designed and taught the first-offered Duke course on synthetic biology to 10 undergraduates.

Graduate Coursework

Fall 2020 Advanced Probability, Combinatorial Optimization, Sublinear Algorithms
Spring 2020 Markov Chains & Mixing Times, Theoretical Statistics
Fall 2019 Online Learning, Combinatorics & Graph Theory
Spring 2019 Analysis & Design of Communication Networks, Large Scale Optimization II
Fall 2018 Probability & Stochastic Processes, Large Scale Optimization I

Technical Skills

Programming Java, Python (PyTorch, Sklearn), C/C++, JavaScript
Infrastructure Kubernetes, AWS, Google Cloud, Mongo, Solr

References available upon request