Matthew Faw

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Research Interests

Online learning and bandit problems, optimization, adaptive data analysis, transfer learning.

Education

2018–Present **Ph.D. in ECE**, *University of Texas at Austin*, Austin, TX.
Advisors: Sanjay Shakkottai, Constantine Caramanis.

2013–2017 **B.S.E. ECE, B.S. Computer Science, A.B. Math**, *Duke University*, Durham, NC.

Awards + Honors

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

2015 $6000 Research Grant, SMiF Undergraduate User Program

2014 Gold medal, International Genetically Engineered Machine Competition

Publications + Preprints

Matthew Faw, Rajat Sen, Karthikeyan Shanmugam, Constantine Caramanis, and Sanjay Shakkottai. Mix and match: An optimistic tree-search approach for learning models from mixture distributions. *arXiv preprint arXiv:1907.10154*, 2019.

Seyed Majid Zahedi, Songchun Fan, Matthew Faw, Elijah Cole, and Benjamin C Lee. Computational sprinting: Architecture, dynamics, and strategies. *ACM Transactions on Computer Systems (TOCS)*, 34(4):12, 2017.

Research Experience

Feb-Oct 2019 **New Algorithms and Models for Covariate Shift**, *Advisors: Sanjay Shakkottai, Constantine Caramanis*, UT Austin.
Proposed new framework for analyzing and designing algorithms for the covariate shift problem. Derived novel SGD concentration results and smoothness conditions to provide simple regret guarantees for an optimistic tree-search algorithm. Conducted experiments on several real-world datasets to demonstrate the practical usefulness of the theory. (Paper currently under submission).

Jan-Dec 2016 **Datacenter Architecture**, *Advisor: Dr. Benjamin Lee*, Duke University.
Proposed, designed, and simulated a randomized Round Robin strategy for system-level computational sprinting using core allocation and DVFS sprinting strategies on a several Spark applications, and performed TCO analysis to assess economic viability of the sprinting strategy. Published results in ACM TOCS. Worked to extend results to collocating latency-sensitive and insensitive workloads.

Jan-Dec 2015 **Microfluidics**, *Advisor: Dr. Richard Fair*, Duke University.
Designed and fabricated digital microfludic devices capable of manipulating magnetic beads within droplet. Designed and conducted lab procedure to attach magnetic beads to E.coli cells, and demonstrated the feasibility of on-chip manipulation of cells for cell manipulation and concentration control.

May-Nov 2014 **Synthetic Biology**, *Advisor: Dr. Nick Buchler*, Duke University.
Conducted molecular titration experiments which demonstrated the potential of CRISPR-based technologies to design E.coli cells capable of performing logical operations. Designed 3D-printed lab equipment to lower the financial barriers to biology research.

Industry Experience

June 2017-July 2018 **Software Engineer**, *Verato*, McLean, VA.
Built a CI platform on Kubernetes with one other developer which allowed per-branch deployment of containerized versions of the entire software stack, capable of supporting hundreds of simultaneous builds. Designed software to maintain and update 300-million entry Mongo database and Solr search engine.

May-August 2016 **Software Engineering Intern, Stateflow Semantics**, *MathWorks*, Natick, MA.
Designed and implemented a proof-of-concept architectural change to the team's current code generation process with another intern that allowed product extensibility and optimizations that were previously infeasible.

Teaching Experience

Aug 2018-May 2019 **EE 460J, Data Science Lab TA**, *University of Texas at Austin*.
Held 3-hour lab sessions involving a 30-minute lectures and homework help, and graded homeworks and exams.

Jan-May 2017 **CS 308, Software Design and Implementation TA**, *Duke University*.
Mentored 3 undergraduate CS students to help them learn software design best practices, advised their design and implementation of 3 software projects, and performed code reviews of their projects.

Aug-Dec 2015 **ECE 280, Signals & Systems TA**, *Duke University*.
Held office hours and graded assignments for 70 undergraduate students.

Jan-May 2015 **Synthetic Biology House Course Co-Designer/Instructor**, *Duke University*.
With one other undergraduate student, designed and taught the first-offered Duke course on synthetic biology to 10 undergraduate students.

Technical Skills

Programming: Java, Python (PyTorch, Sklearn), C/C++, JavaScript

Infrastructure: Kubernetes, AWS, Google Cloud, Mongo, Solr

References

Sanjay Shakkottai, Professor, UT Austin, sanjay.shakkottai@utexas.edu

Constantine Caramanis, Professor, UT Austin, constantine@utexas.edu

Benjamin Lee, Professor, Duke University, benjamin.c.lee@duke.edu