Aditya Saraf

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RESEARCH INTERESTS

Matching Markets, Computational Geometry, Complexity Theory, Logic, Parallel and Distributed Algorithms

EDUCATION

UNIVERSITY OF WASHINGTON, Seattle, WA — Expected June 2019

Bachelor of Science in Computer Engineering – Anticipated Spring 2019

- Cumulative GPA: 3.90
- Four-time annual Dean's List recipient
- Phi Beta Kappa (ΦBK) member

RESEARCH EXPERIENCE

MODELING ALTRUISM IN DYNAMIC KIDNEY EXCHANGES — September 2018–current

- We use dynamic matching markets to model kidney exchanges, quantifying the increase in productivity from altruistic donors. We aim to both prove theoretical bounds and propose practical policies.
- Work with John Dickerson, a leading researcher in theoretical and practical kidney exchange policies
- Model the effect of a "kidney voucher" system proposed by the National Kidney Registry to encourage donations
- Create simulations to test other policies that encourage altruism

COMBINATORICS AND ALGORITHMS FOR REAL PROBLEMS (CAAR) — June 2018–current

Research Experience for Undergrads (REU) at the University of Maryland, College Park, MD

- Worked in small groups to tackle open problems at the intersection of theory and practice
- Wrote a paper under Aarthi Sundaram that describes new classifications schemes for monotone graph properties and hidden graph problems (see Significant Papers)
- Analyzed the relative complexity of various classes of hidden graph properties and developed a transfer theorem from graph properties in the hidden setting to constraint satisfaction problems in the standard setting

GRADUATE RESEARCH IN EPISTEMOLOGY — January 2018–current

University of Washington, Seattle, WA

- Explored my diverse academic interests through a graduate course about the philosophy of knowledge
- Wrote a paper under Conor Mayo-Wilson that explores the link between the axioms of logic and norms for how we ought to reason (see Significant Papers)
- Sharpened my technical writing skills and developed a new perspective on academic research

SENIOR CAPSTONE PROJECT – NATURAL LANGUAGE PROCESSING — March 2018–June 2018

University of Washington, Seattle, WA

- Implemented state of the art neural document summarizers from recent literature and developed combinatorial summarizers that used SAT or ILP solvers
- Built a web-based visualizer to easily compare the summaries generated by different models
- Created a poster and a technical report and presented the project to several NLP faculty (see Significant Papers)

TECH POLICY LAB — September 2016–June 2017

Research Lab at the University of Washington, Seattle, WA

- Researched upcoming technologies in the field of autonomous vehicles
- Co-authored "Toys that Listen: A Study of Parents, Children, and Internet-Connected Toys", published in CHI'17
- Researched privacy and security concerns related to the growing Internet of Things
- Researched cell-site simulators, an unregulated technology being employed by law enforcement

TEACHING EXPERIENCE

CSE 311**: FOUNDATIONS OF COMPUTING I,** UW, Instructors: Kevin Zatloukal, Emina Torlak — September–December 2018

The first class in the major, teaching the basics of logic, discrete math, and formal languages.

CSE 421: **INTRODUCTION TO ALGORITHMS,** UW, Instructor: Yin-tat Lee — March–June 2018

An upper division algorithms class taught primarily to juniors/seniors.

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INDUSTRY EXPERIENCE

AMAZON, Seattle, WA June 2017–September 2017

Exports and Expansion Technology – Customer Experience

Software Development Engineer Intern

- Created a full stack application with a web-based frontend server and a RESTful backend service.
- Gained familiarity with Spring MVC, Google Guice and creating RESTful services.
- Had full ownership – discovered (internal) customer requirements; planned and designed the application; developed, tested and deployed the application to production.
- Reduced deployment cycle from 2-4 weeks to instant changes to live.

SIGNIFICANT PROJECTS

OS DEVELOPMENT - XK February 2018

- Added support for multiprocessing, including implementations of `fork`, `wait`, and `exec`
- Implemented memory saving techniques, such as growing the stack on demand and copy-on-write `fork`
- Used a Least Recently Used approximation to page memory in and out from disk

SYNCHRONIZED DOCUMENT EDITING June 2017

- Built a robust, client-server application that allowed multiple users to collaborate on one document in real time
- Implemented Differential Synchronization, a design paradigm that constantly cycles diffs and patches to resolve conflicts and converge to a consistent document
- Gained significant experience working with highly concurrent network applications

PARALLEL CHESS BOTS March 2017

- Implemented the Alpha-Beta algorithm, providing a 37x speedup over general minimax search
- Implemented a parallel Alpha-Beta derivative known as Jamboree, providing a 18x speedup over Alpha-Beta
- Made numerous tweaks and optimizations to make the bot look up to 7 moves ahead
- Tested multiple bots with several experiments to analyze real-world performance in a formal report

SIGNIFICANT PAPERS

1. Emily McReynolds, Sarah Hubbard, Timothy Lau, **Aditya Saraf**, Maya Cakmak, and Franziska Roesner. 2017. *Toys that Listen: A Study of Parents, Children, and Internet-Connected Toys.* In Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI '17). ACM, New York, NY, USA, 5197-5207.
   In this paper, we explore how parents feel about purchasing internet connected toys for their children. We published this time during my time at the Tech Policy Lab.
2. **Aditya Saraf**, Tommy Schneider, Aarthi Sundaram. *Trial and Error for Graph Properties*. Working Draft.
   This work draws connections between hidden constraint satisfaction problems and monotone graph properties, characterizing which graph properties are tractable with access to a particular oracle. The paper came out of my research at Maryland.
3. **Aditya Saraf**. *A Strong Bridge Principle for Logical Normativity*. Working Draft
   This is a paper in epistemology (the philosophy of knowledge) that seeks to answer the question "In what sense does logic provide principles for what we ought to believe?" This paper arose out of a graduate philosophy seminar and is currently being refined for publication.
4. **Aditya Saraf**, Ron Fan. *Evaluation of Neural and Non-Neural Techniques for Extractive Single Document Summarization.* Unpublished.
   This technical report compares state of the art combinatorial and neural summarizers. We are not seeking publication.

Copies of all the papers (including an accompanying poster for 4.) can be found on my website.