

Sorathan (Tum) Chaturapruek

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Education

- Stanford University**, Stanford, CA, USA 2019 (expected)
Ph.D. Candidate in Computer Science
Advisors: Ramesh Johari, John Mitchell
GPA: 3.97/4.00
- Stanford University**, Stanford, CA, USA 2019
MS in Computer Science
GPA: 3.97/4.00
- Harvey Mudd College**, Claremont, CA, USA 2014
B.Sc. (with highest distinction) in Mathematics and in Computer Science (double major)
Departmental Honors in Computer Science
Departmental Honors in Mathematics
GPA: 3.92/4.00 (Math: 4.00/4.00, CS: 3.86/4.00)

Working Papers

- [1] From Choice to Consideration: A New Way to Understand Undergraduate Decision Making in US Higher Education
- [2] Encouraging Academic Exploration: A Value-Relevance Intervention in Undergraduate Course Selection
- [3] Gender, Grades, and Pathways: Evidence from Three Public Universities
- [4] Bootstrapping Sequential Recommendation Systems from Passive Data

Conference Papers

- [5] **S. Chaturapruek**, T.S. Dee, R. Johari, R.F. Kizilcec, & M.L. Stevens. How a Data-Driven Course Planning Tool Affects College Students' GPA: Evidence from Two Field Experiments. *Proceedings of the Fifth ACM Conference on Learning at Scale (L@S)*, 2018.
Press: This paper is featured in [Stanford News](#) and [Inside Higher Ed](#).
Best paper award.
- [6] M.L. Stevens, M.H. Harrison, M.E. Thompson, A. Lifschitz, & **S. Chaturapruek**. Choices, Identities, Paths: Understanding College Students' Academic Decisions. In *Annual Meeting of the American Sociological Association (ASA)*, 2018. [\(link\)](#)
- [7] S. Zhao, **S. Chaturapruek**, S. Ermon, & A. Sabharwal. Towards Closing the Gap Between Short and Long XORs for Model Counting. *AAAI Conference on Artificial Intelligence*, 2016.

- [8] M.E. Vachovsky*, G. Wu*, **S. Chaturapruek***, O. Russakovsky*, R. Sommer, & L. Fei-Fei. SAILORS: Towards More Gender Diversity in CS through an Artificial Intelligence Summer Program for High School Girls. *Proceedings of the 47th ACM Special Interest Group on Computer Science Education (SIGCSE)*, 2016
Press: [SAILORS](#) is featured in [Wired](#).
 * = equal contribution
- [9] **S. Chaturapruek**, J.C. Duchi, & C. Ré. Asynchronous Stochastic Convex Optimization. *Advances in Neural Information Processing Systems (NeurIPS)*, 2015.

Journal Articles

- [10] (2 journal article submissions in progress)
- [11] M. Bolla, B. Bullins, **S. Chaturapruek**, S. Chen, & K. Friedl. Spectral properties of modularity matrices. *Linear Algebra and its Applications* (2014).
- [12] **S. Chaturapruek**, J. Breslau, D. Yazdi, T. Kolokolnikov, & S.G. McCalla. Crime Modeling with Lévy Flights, *SIAM Journal on Applied Mathematics* **73**, 1703-1720 (2013). [DOI: 10.1137/120895408](#).
Press: This paper is featured in [SIAM Nugget](#), [ScienceDaily](#), [\(e\) Science News](#), [Pacific Standard](#), and [Mathematical Association of America \(MAA\)](#).

Other Papers and Manuscripts

- [13] **S. Chaturapruek**, M.S. Bernstein, S. Cina, R. Johari, A. Paepcke, & M.L. Stevens. Carta: Studying College Pathways at Scale. White Paper, 2016. [\(link\)](#)
- [14] A. Balakrishnan, **S. Chaturapruek**, F. Fan, H. Ishfaq, & L.A. Roitman. On initializations in multi-modal neural networks to predict transcription factor binding. *ResearchGate*, 2016. [\(link\)](#)
- [15] J. C. Duchi, **S. Chaturapruek**, & C. Ré. Asynchronous Stochastic Convex Optimization. *arXiv*, 2015. [\(link\)](#)
- [16] T. Ashmore, **S. Chaturapruek**, C. Druhan, B. Eichelberger, M. Erlinger, & E. Schofield. Harvey Mudd College (HMC) Online. *Harvey Mudd College (HMC) Clinic Program Reports*, 2014. [\(link\)](#)
- [17] **S. Chaturapruek**. A Mathematical Framework for Unmanned Aerial Vehicle Obstacle Avoidance. *Harvey Mudd College (HMC) Senior Theses*, 2014.
- [18] T. Ashmore, **S. Chaturapruek**, Z. Dodds, C. Druhan, B. Eichelberger, M. Erlinger, & E. Schofield. 2014. MyCS: building a middle-years CS curriculum (abstract only). In *Proceedings of the 45th ACM technical symposium on Computer science education (SIGCSE '14)*. ACM, New York, NY, USA, 714-715. [DOI: 10.1145/2538862.2544313](#).
- [19] **S. Chaturapruek**. On Sequences of Bicentric Quadrilaterals. *Mahidol Wittayanusorn School Research Report*. Thailand, 2009.
- [20] **S. Chaturapruek**. T-Score. *My Maths Magazine*. Volume 2 No.4. (Mathucation Section). ISSN1686-6630, Thailand, 43-45, 2006.

Patents

- [21] **S. Chaturapruek**, K.A. Edmonds, & G. Theocharous. Recommending Sequences of Content with Bootstrapped Reinforcement Learning (pending, P7486-US/ADBS.286448).
- [22] **S. Chaturapruek** & G. Theocharous. Bootstrapping recommendation systems from passive data (pending, P7488-US/ADBS.282228).

Honors, Awards, and Fellowships

- 2018 **Best Paper Award**, ACM Conference on Learning at Scale
- 2016-17 **Selected as an Accel Innovation Scholar**, Stanford University
- 2016 **The Vice Provost for Teaching and Learning (VPTL) 2016 Grant**, Stanford University
- 2016 **Dean's Office's Support**, Stanford University (in recognition of Carta's University-wide impact)
- 2014-15 **Graduate Fellowship from the Leland T. Edwards Fellowship Fund**, Stanford University
- 2014 **RIF Hutchings Prize for Outstanding Performance in the Putnam Mathematical Competition**, Harvey Mudd College
- 2014 **Two Departmental Honors (in Computer Science and in Mathematics)**, Harvey Mudd College
- 2013-14 **The 2013 Giovanni Borrelli Fellowship**, Harvey Mudd College (awarded annually to one Harvey Mudd student)
- 2012 **Top 15 in the Putnam Mathematical Competition** (ranked 14th nationally out of 4,277 students in the 2012 William Lowell Putnam Mathematical Competition. N1 Category – next from Putnam Fellows)
- 2012-3 **The 2012 Giovanni Borrelli Fellowship Honorable Mention**, Harvey Mudd College Mathematics Department (a recognition of a high-quality research proposal and an exemplary class work at Harvey Mudd)
- 2012 **The Courtney S. Coleman Prize in Mathematics**, Harvey Mudd College
- 2011 **The James Prize in Mathematics**, Harvey Mudd College
- 2011 **Commendation Letter: Superior Academic Performance**, Harvey Mudd College
- 2010 **Ranked 16th nationally in the Virginia Tech Regional Math Exam** (1st among Harvey Mudd students)
- 2010 **Henry N. Square Computer Science & Mathematics Awards**, Kent School
- 2009- **The Royal Thai Government Scholarship**, Thailand
- 2010 **Individual First Place**, General Electric's Connecticut Contest in Computer Science
- 2008 **Bronze Medal**, the XX Asian Pacific Mathematics Olympiad 2008 (APMO)
- 2006 **Gold Medal**, Singapore Mathematics Olympiad (SMO) (Senior Section)
- 2006 **Gold Medal**, Thailand Mathematical Olympiad (TMO)

Research and Work Experience

- 2018 **Robinhood**, Menlo Park, CA, USA
Data Science Intern. Mentor: Norases Vesdapunt.
- I analyzed data and ran experiments to help with business decisions, ranging from improving new users' experience, evaluating customer support initiatives, helping the American Depository Receipts launch, to evaluating infrastructure improvements.
 - I analyzed sequential user actions and Robinhood's actions to predict trading behavior and pathways to low churning.
- 2017 **Adobe Research**, San Jose, CA, USA
Data Science Research Intern. Mentors: Georgios Theodorou and Ramesh Johari
- 1 working paper, 2 patent submissions in progress
 - In the Adobe helpx tutorial recommendation system, we propose to sequentially recommend tutorials to visit next based on the sequential history of user tutorial visits.
 - I have developed a new algorithm that bootstraps from a large amount of passive data (data in which the recommender agent did not act) in order to allow us to learn to optimize our objective more quickly when deploying the system in the real world.
- 2015-19 **Stanford University**, Stanford, CA, USA
Lead Researcher and Software Engineer of the Carta team
- We know a lot what happens before college and after college. This project is to understand what happens in between.
 - Currently, I am leading the team of 18 people that designs and builds Carta (cartalab.stanford.edu), a web application that helps Stanford students explore and plan courses at Stanford
 - Carta has been used by more than 10,000 unique Stanford students since its launch in August 2016 (more than 95% of undergraduates), with over 4,000 weekly users during course enrollment periods.
- 2014-15 **Stanford University**, Stanford, CA, USA
First-Year Rotation Ph.D. Student in Computer Science
- First rotation: John Duchi. Asynchronous Stochastic Optimization. See conference publication [1].
 - Second rotation: Percy Liang. Learning with Relaxed Supervision. [\(link\)](#)
 - Third rotation: Chris Ré. Asynchronous Stochastic Optimization. See conference publication [1].

- 2014 **Yelp, Inc.**, San Francisco, CA, USA
Software Engineering Intern, Search Data Team
- Built Bizmatch service v2, an algorithm to match partial business information (e.g., name, address, GPS location, suggested business id) from 3rd party data sources with businesses in the Yelp databases.
 - Fixed many false negatives, false positives, mismatches, and also improved bizmatch speed, precision
 - Developed front-end tools (mostly with AngularJs) to allow humans to quickly see matching business candidates during labeling and to debug bizmatch
- 2013-14 **Harvey Mudd College**, Claremont, CA, USA
Student Researcher, Senior Thesis in Mathematics
- Worked with Professor Weiqing Gu
 - Researched Unmanned Aerial Vehicles using Lie groups, Lie algebra, and machine learning techniques. Investigated quadrotor landing and control problems.
 - Demonstrated an obstacle avoidance algorithm using way-point settings that take the geometry of the obstacle and its Minkowski sum into account
- 2013-14 **Harvey Mudd College**, Claremont, CA, USA
Student Researcher and Developer, Clinic Program in Computer Science
- Developed and improved the existing Middle-years Computer Science (MyCS) curriculum for middle and high school teachers to emphasize development of a computational identity, described as a student's self-definition regarding his or her computational thinking skills.
 - Deployed a web instance on Amazon EC2 and a local server for MyCS Massive Open Online Course.
 - In the spring semester, working on "How Stuff Moves", a physics course aimed at Harvey Mudd students and high school students to learn calculus-based physics.
- 2012-14 **Harvey Mudd College**, Claremont, CA, USA
Mathematics Tutor, Academic Excellence in Mathematics. Learning Programs
- Held campus-wide tutoring sessions for students taking courses in linear algebra, differential equations, probability & statistics, and discrete mathematics.
 - Presented tutoring strategies in staff development meetings
- 2013 **Yelp, Inc.**, San Francisco, CA, USA
Software Engineering Intern, Search Data Team
- Designed and implemented an end-to-end workflow for business match service, which matches partial business information to businesses in the Yelp database.
 - Wrote scripts to parse results from Elastic Search and used AngularJS to write an admin page for debugging searching results
 - Evaluated matching results using domain-specific evaluation metrics for different use cases and presented the result to the rest of the Search team
 - Received an offer for a full-time position in the Search team at Yelp, Inc. by the end of the internship.

- 2013 **Budapest Semester in Mathematics (BSM)**, Budapest, Hungary
Student Researcher, Spectral Clustering of Networks
- Modeled networks by edge-weighted graphs, where edge-weights are pairwise similarities between the sites (vertices of the graph). Investigated clusters (communities) of the vertices such that the information flow between the cluster pairs and within the clusters is as homogeneous as possible
 - Used the smallest eigenvalues of the Laplacian or normalized Laplacian matrix assigned to the graph to estimate minimum multiway cuts, whereas clusters are found by the corresponding eigenvectors.
 - Discovered a new condition in which the modularity matrices are negative semidefinite, which implies that the clusters are indivisible. <http://arxiv.org/abs/1305.2147>
- 2012 **University of California, Los Angeles (UCLA)**, Los Angeles, CA, USA
Student Researcher, Crime Modeling, Research Experiences for Undergraduates (REU)
- Worked with Jonah Breslau (Pomona), Daniel Yazdi (UCLA), Professor Theodore Kolokolnikov (Dalhousie University) and Scott G. McCalla (UCLA)
 - Modeled the formation of hotspots of criminal activity by extending the existing model to use a more realistic model of human locomotion called Lévy flights and how they affect the stability of hot-spots.
 - Performed linear stability analysis and wrote MATLAB code to numerically verify theoretical results.
 - S. Chaturapruek, J. Breslau, D. Yazdi, T. Kolokolnikov, and S.G. McCalla, *Crime Modeling with Lévy Flights*, *SIAM Journal on Applied Mathematics* **73**, 1703-1720 (2013). DOI: 10.1137/120895408.
- Also featured in a [SIAM Nugget](#).

Presentations and Talks

Presentation, *Learning at Scale (L@S)*, London, UK. How a data-driven course planning tool affects college students' GPA: Evidence from two field experiments. Upcoming, June 24-30, 2018.

Presentation, *Pathways through College Research Network*, WI, USA. Upcoming, June 21, 2018.

Presentation, *The 1st Annual ATPAC-MOST-OHEC-IPST Conference*, FL, USA. Designing Information Systems to Support Human Decision Making. Session: Ideas Worth Sharing: Data Science and Technology, January 25-27, 2018.

Also selected to 1) speak during a dinner talk with Air Chief Marshall Prajin Juntong Ph.D., Deputy Prime Minister and Minister of Justice, and 2) present key takeaways from the conference.

Invited Talk, CS 102, Stanford University, CA, USA. Big Data Tools and Techniques, Discoveries and Pitfalls - Autumn 2017-18 Quarter. October, 2017. *Topics:* Course Exploration and Discovery Platform Carta.

Invited Talk, Harvard University, Cambridge, MA, USA. Emerging Challenges in Digital Higher Education. Session: Digital Credentials in Higher Education. April, 2017. *Topics:* Course Exploration and Discovery Platform Carta.

Invited Talk, Asilomar Conference, Pacific Grove, CA, USA. The Second Asilomar Convention for Learning Research in Higher Education, CA. June 2016. *Topics:* Course Exploration and Discovery Platform Carta.

Invited Talk, CS 102, Stanford University, CA, USA. Big Data Tools and Techniques, Discoveries and Pitfalls - Spring 2015-16 Quarter. May, 2016. *Topics:* Course Exploration and Discovery Platform Carta.

Presentation, SIGCSE, Atlanta, GA, USA. The SIGCSE 2016 – The 47th ACM Special Interest Group on Computer Science Education. *Topics:* SAILORS: Towards More Gender Diversity in CS through an Artificial Intelligence Summer Program for High School Girls.

Poster Presentation, NeurIPS, Montreal, Canada. The Conference on Neural Information Processing Systems (NeurIPS) 2015. Asynchronous Stochastic Convex Optimization.

Poster Presentation, SIGCSE, Atlanta, GA, USA. The SIGCSE 2014 – The 45th ACM Special Interest Group on Computer Science Education Technical Symposium

The poster is titled *MyCS: Building a Middle-years CS Curriculum*. Atlanta, Georgia. March 5-8, 2014.

Presentation, Joint Mathematics Meetings, Baltimore, MD, USA. Analysis and Partial Differential Equations Session.

Title of Paper: *Crime Modeling with Lévy Flights*, by Sorathan Chaturapruek, Jonah Breslau, Daniel Yazdi, Theodore Kolokolnikov and Scott G. McCalla. January 15-19, 2014.

Poster Presentation, CCMS Colloquium, Claremont, CA, USA.

1) *Crime Modeling with Lévy Flights*, 2) *Conditions for which the Modularity and Normalized Modularity Matrices have Zero as their Largest Eigenvalue* (2 posters). Claremont Center for Mathematical Science (CCMS) Colloquium. Student Poster Session: Research in the Mathematical Sciences 2013. September 18, 2013. ([First poster](#) | [Second poster](#)).

Poster Presentation, Harvey Mudd College, Claremont, CA, USA.

1) *Crime Modeling with Lévy Flights*, 2) *Conditions for which the Modularity and Normalized Modularity Matrices have Zero as their Largest Eigenvalue* (2 posters). The Summer Research Poster Celebration. Harvey Mudd College. September 10, 2013. ([First poster](#) | [Second poster](#)).

Speaker and Organizer, Math GRE Subject Test Preparation Sessions, Harvey Mudd College, USA.

I ran several workshops in both spring and fall semesters, for Harvey Mudd students to prepare for the GRE subject tests in mathematics. We solved problems together and also talked about other interesting mathematical concepts inspired from some GRE problems. 2011-2.

Invited Talk: Mathematics Inspiration, Songkhla, Thailand.

I gave a talk with Professor Paisan Nakmahachalasint to about 200 students in Science Math Ability Project program at Hatyai Wittayalai School, Songkhla, Thailand. 2010

Invited Talk, Princess Chulabhorn's College, Thailand. Polyominoes Workshop

A workshop for about 20 teachers from Princess Chulabhorn's College to give a hands-on experience with polyominoes and some invariances on tiling, a topic I learned from the Math Olympiad camps. 2007.

Advising & Mentoring

Master's students at Stanford University, Carta project

Nick Chow, Management Science and Engineering

Jocelyn Hickcox, Computer Science

Dhruv Joshi, Management Science and Engineering

Malo Marrec, Management Science and Engineering

Undergraduate students at Stanford University, Carta project

Benjamin Dvorak

Nicholas Lai

Srinivas Malladi

Bradley Emi

Michelle Lam

Daniel Ortega

Akshay Kalose

Donny Li

John Reinstra

Chris Koenig

Aaron Levett

Cristobal Sciutto

Margaret Shen

Albert Tung

Po Tsui

Serena Wong

Undergraduate students at Stanford University, SAILORS project

Marie Vachovsky

Grace Wu

Service

Proceedings of the Thirty-Fifth Conference on Uncertainty in Artificial Intelligence (UAI), 2019

Program committee

Proceedings of the Thirty-Second Advances in Neural Information Processing Systems Conference (NeurIPS), 2019

Paper reviewer

Proceedings of the Thirty-Sixth International Conference on International Conference on Machine Learning (ICML), 2019

Paper reviewer

Proceedings of the Sixth ACM Conference on Learning at Scale (L@S), 2019

Paper reviewer

Proceedings of the Thirty-First Advances in Neural Information Processing Systems Conference (NeurIPS), 2018

Paper reviewer

Proceedings of the Twenty-First ACM: Computer-Supported Cooperative Work and Social Computing (CSCW), 2018

Paper reviewer

Stanford Thai Student Association, 2018-19

President

International Mathematical Olympiad (IMO), 2015

Coordinator and grader

Stanford Artificial Intelligence Laboratory's Outreach Summer (SAILORS) program, 2015

Program evaluation chair

CalTech Harvey Mudd Math Competition (CHMMC), 2010 and 2012

Head problem writer and coordinator

Math Club/SIAM Student Chapter at Harvey Mudd College, 2012

Vice president

Science Camp for Rural School Students at Nongkhayang School, Thailand 2009

Leader of Mathematics and Physics sections