Davin Choo

Postdoctoral Fellow @ Harvard SEAS

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EDUCATION

NATIONAL UNIVERSITY OF SINGAPORE — Singapore
Computer Science PhD — Aug 2021 – Nov 2024

- Advisors: Arnab Bhattacharyya and Seth Gilbert
- AI Singapore (AISG) PhD Fellow
- Awarded NUS School of Computing Research Achievement Award
- *PhD Thesis*: Learning Probabilistic and Causal Models with(out) Imperfect Advice

ETH ZÜRICH — Zürich, Switzerland
Computer Science MSc — Jul 2020

- *Focus track*: Theoretical Computer Science
- *Masters Thesis* (Advisor: David Steurer)
  Studied the statistical-computational gap of sparse tensor PCA, and designed distinguishing & recovery algorithms

NATIONAL UNIVERSITY OF SINGAPORE — Singapore
Computer Science and Mathematics Double Degree Programme — May 2016

- *Computer Science*: Completed focus areas in "Algorithms & Theory" and "Artificial Intelligence"
- *Mathematics*: Majored in Applied Mathematics with additional Mathematics courses such as graduate Recursion Theory
- *Honours*: First Class Honours in Computer Science, First Class Honours in Applied Mathematics, and Dean's List (top 5%)
- *Turing Programme*: Invitation-only special programme in SoC aimed to nurture students who aspire to engage in research careers
- *University Scholars Programme*: A selective (180 students) multidisciplinary academic programme for undergraduates
  Awarded President's Honour Roll which recognizes outstanding academic accomplishments and student-led co-curricular activities
- *Computer Science Thesis* (Advisor: Seth Gilbert)
  Designed methods to maintain dynamic maximal independent sets
  Nominated for NUS Outstanding Undergraduate Researcher Prize (an annual, university-wide competition)
- *Mathematics Thesis* (Advisor: Frank Stephan)
  Studied notions of Kolmogorov complexity of binary strings in automata theory and CFGs

AWARDS

- *NUS Development Grant*: Awarded in 2025
- *NUS School of Computing Research Achievement Award*: Awarded in 2023
- *AISG PhD Fellowship*: Awarded in 2021
- *President's Honour Roll, USP Scholar*: Awarded in 2016
- *DSTA-DSO Undergraduate Scholarship*: Awarded in 2011

PUBLICATIONS

Note that alphabetical ordering of last names is sometimes used for theoretical works

1. <u>Davin Choo</u>, Yuqi Pan, Tonghan Wang, Milind Tambe, Alastair van Heerden, Cheryl Johnson. *Adaptive Frontier Exploration on Graphs with Applications to Network-Based Disease Testing*, Conference on Neural Information Processing Systems (NeurIPS), 2025.

2. <u>Davin Choo</u>, Billy Jin, Yongho Shin. *Learning-Augmented Online Bipartite Fractional Matching*, Conference on Neural Information Processing Systems (NeurIPS), 2025.

3. Jia Peng Lim, Shawn Tan, <u>Davin Choo</u>, Hady W. Lauw. *A partition cover approach to tokenization*, Conference on Neural Information Processing Systems (NeurIPS), 2025.

4. Arnab Bhattacharyya, <u>Davin Choo</u>, Philips George John, Themis Gouleakis. *Product Distribution Learning with Imperfect Advice*, Conference on Neural Information Processing Systems (NeurIPS), 2025.

5. Arnab Bhattacharyya, <u>Davin Choo</u>, Philips George John, Themistoklis Gouleakis. *Learning multivariate Gaussians with imperfect advice.* International Conference on Machine Learning (ICML), 2025.

6. <u>Davin Choo</u>, Chandler Squires, Arnab Bhattacharyya, David Sontag. *Probably approximately correct high-dimensional causal effect estimation given a valid adjustment set.* Conference on Causal Learning and Reasoning (CLeaR), 2025.

7. Arnab Bhattacharyya, <u>Davin Choo</u>, Sutanu Gayen, Dimitrios Myrisiotis. *Learnability of Parameter-Bounded Bayes Nets.* AAAI Conference on Artificial Intelligence (AAAI), 2025. Also presented in ICML workshop Structured Probabilistic Inference & Generative Modeling (SPIGM), 2024.

8. <u>Davin Choo</u>, Themistoklis Gouleakis, Chun Kai Ling, Arnab Bhattacharyya. *Online bipartite matching with imperfect advice.* International Conference on Machine Learning (ICML), 2024.

9. <u>Davin Choo</u>, Yan Hao Ling, Warut Suksompong, Nicholas Teh, Jian Zhang. *Envy-free house allocation with minimum subsidy.* Operations Research Letters (ORL), 2024.

10. <u>Davin Choo</u>, Kirankumar Shiragur, Caroline Uhler. *Causal discovery under off-target interventions.* International Conference on Artificial Intelligence and Statistics (AISTATS), 2024.

11. <u>Davin Choo</u>, Joy Qiping Yang, Arnab Bhattacharyya, Clément L. Canonne. *Learning bounded degree polytrees with samples.* International Conference on Algorithmic Learning Theory (ALT), 2024.

12. Simina Brânzei, <u>Davin Choo</u>, Nicholas Recker. *The Sharp Power Law of Local Search on Expanders.* Symposium on Discrete Algorithms (SODA), 2024.

13. Yuval Dagan, Constantinos Daskalakis, Anthimos-Vardis Kandiros, <u>Davin Choo</u>. *Learning and Testing Latent-Tree Ising Models Efficiently.* Conference on Learning Theory (COLT), 2023.

14. <u>Davin Choo</u>, Kirankumar Shiragur. *Adaptivity Complexity for Causal Graph Discovery.* Uncertainty in Artificial Intelligence (UAI), 2023.

15. <u>Davin Choo</u>, Kirankumar Shiragur. *New metrics and search algorithms for weighted causal DAGs.* International Conference on Machine Learning (ICML), 2023.

16. <u>Davin Choo</u>, Themistoklis Gouleakis, Arnab Bhattacharyya. *Active causal structure learning with advice.* International Conference on Machine Learning (ICML), 2023.

17. <u>Davin Choo</u>, Kirankumar Shiragur. *Subset verification and search algorithms for causal DAGs.* Artificial Intelligence and Statistics (AISTATS), 2023.

18. <u>Davin Choo</u>, Kirankumar Shiragur, Arnab Bhattacharyya. *Verification and search algorithms for causal DAGs.* Conference on Neural Information Processing Systems (NeurIPS), 2022.

19. Arnab Bhattacharyya, <u>Davin Choo</u>, Rishikesh Gajjala, Sutanu Gayen, Yuhao Wang. *Learning Sparse Fixed-Structure Gaussian Bayesian Networks.* Artificial Intelligence and Statistics (AISTATS), 2022.

20. <u>Davin Choo</u>, Tommaso d'Orsi. *The Complexity of Sparse Tensor PCA.* Conference on Neural Information Processing Systems (NeurIPS), 2021.

21. Mélanie Cambus, <u>Davin Choo</u>, Havu Miikonen, Jara Uitto. *Massively Parallel Correlation Clustering in Bounded Arboricity Graphs.* International Symposium on Distributed Computing (DISC), 2021.

22. <u>Davin Choo</u>, Christoph Grunau, Julian Portmann, and Václav Rozhoň. *k-means++: few more steps yield constant approximation.* International Conference on Machine Learning (ICML), 2020.

23. <u>Davin Choo</u>, Mate Soos, Kian Ming A Chai, and Kuldeep S Meel. *Bosphorus: Bridging ANF and CNF Solvers.* Design, Automation & Test in Europe Conference & Exhibition (DATE), pages 468–473. IEEE, 2019.

24. Jing Lim, Joshua Wong, Minn Xuan Wong, Lee Han Eric Tan, Hai Leong Chieu, <u>Davin Choo</u>, and Neng Kai Nigel Neo. *Chemical Structure Elucidation from Mass Spectrometry by Matching Substructures.* Machine Learning for Molecules and Materials (MLMM, a NeurIPS Workshop), 2018.

Preprints (see my website for arXiv links)

1. <u>Davin Choo</u>, Winston Fu, Derek Khu, Tzeh Yuan Neoh, Tze-Yang Poon, Nicholas Teh. *Approximate Proportionality in Online Fair Division*, 2025.

2. <u>Davin Choo</u>, Yohai Trabelsi, Fentabil Getnet, Samson Warkaye Lamma, Wondesen Nigatu, Kasahun Sime, Lisa Matay, Milind Tambe, Stéphane Verguet. *Optimizing Health Coverage in Ethiopia: A Learning-augmented Approach and Persistent Proportionality Under an Online Budget*, 2025.

3. <u>Davin Choo</u>, Chun Kai Ling. *A short note about the learning-augmented secretary problem*, 2024.

Professional Service

- Reviewer for International Conference on Artificial Intelligence and Statistics (AISTATS), 2026
- Reviewer for Innovations in Theoretical Computer Science (ITCS), 2026
- Program Committee for AAAI Conference on Artificial Intelligence (AAAI) Social Impact Track, 2026
- Program Committee for AAAI Conference on Artificial Intelligence (AAAI) Main Track, 2026
- Reviewer for Conference on Neural Information Processing Systems (NeurIPS), 2025
- Reviewer for Transactions on Machine Learning Research (TMLR), 2025
- Reviewer for International Conference on Machine Learning (ICML), 2025
- Reviewer for International Joint Conference on Artificial Intelligence (IJCAI), 2025

- Reviewer for Conference on Neural Information Processing Systems (NeurIPS), 2024; **Top reviewer**
- Reviewer for International Conference on Machine Learning (ICML), 2024
- Reviewer for International Joint Conference on Artificial Intelligence (IJCAI), 2024
- Reviewer for International Conference on Artificial Intelligence and Statistics (AISTATS), 2024
- Subreviewer for Innovations in Theoretical Computer Science (ITCS), 2024
- Reviewer for Conference on Neural Information Processing Systems (NeurIPS), 2023; **Top reviewer**
- Subreviewer for Symposium on Theory of Computing (STOC), 2023
- Subreviewer for International Colloquium on Automata, Languages, and Programming (ICALP), 2023
- Reviewer for International Conference on Artificial Intelligence and Statistics (AISTATS), 2023
- Subreviewer for Conference on Learning Theory (COLT), 2022
- Subreviewer for Scandinavian Symposium and Workshops on Algorithm Theory (SWAT), 2022
- Subreviewer for European Symposium on Algorithms (ESA), 2020

Teaching, Mentorship, and Outreach

National University of Singapore — Singapore
Teaching Assistant — GET1031, GEI1000 — Aug 2021 – Dec 2021
- Collaborated with 2 faculty members on refining teaching materials and pedagogies to suit student needs
- Led discussion groups for a total of 64 students on the topic of computational thinking with 8 nominations for Best Teaching

National University of Singapore — Singapore
Teaching Assistant — CS1101S, CS1231, CS2020, CS3230, CS4344, GET1031 — Aug 2012 – May 2016
- Collaborated with over 8 faculty members on refining teaching materials and pedagogies to suit student needs
- Led discussion groups for a total of 86 students across 6 different courses on topics including programming methodology, computational thinking, data structures and algorithms, design and analysis of algorithms, and discrete structures
- Averaged a feedback score of 4.7/5 across all tutored courses (faculty average: 4.16/5) with 15 nominations for Best Teaching

National University of Singapore — Singapore
University Scholars Programme (USP) Mentor — Aug 2012 – May 2016
- Regularly meet juniors to offer guidance and connect them with faculty and seniors. I also setup a support network for Computer Science students (a minority group within USP at the time) which continues to serve as an active hub for new students to this day.

Temasek Junior College — Singapore
Course Instructor — Jan 2014 – May 2014
- Initiated a student outreach programme to encourage young students to explore the field of Computer Science

Work Experience

Harvard University — Cambridge, Massachusetts
Postdoctoral Fellow (in Teamcore with Milind Tambe) — Dec 2024 – Present
- Working with domain experts in health and policy to translate high-level policy goals into formal problem statements
- Applying tools and techniques from Computer Science to design effective AI/ML solutions

ETH Zürich — Zürich, Switzerland
Post-diplomand (Post-graduate research position, with David Steurer) — Aug 2020 – Mar 2021

DSO National Laboratories — Singapore
Research Scientist — Information Exploitation Lab (IEL) — Jun 2016 – Sep 2018
- Applied AI techniques to security related problems, including cryptanalysis, SAT solving and reverse engineering

DSO National Laboratories — Singapore
Research Intern — Cognitive Fusion Lab (CFL) — May 2013 – Jul 2013
- Worked on a research project to improve the performance of speech-to-text recognition

Defence Science & Technology Agency (DSTA) — Singapore
Research Intern — C4I development (PC8) — Feb 2011 – May 2011
- Designed an in-house Unmanned Aerial Vehicle (UAV) algorithm that maps image points to actual geolocation coordinates

Additional Information

- Visiting PhD student of Bernhard Schölkopf at Empirical Inference group of Max Planck Institute for Intelligent Systems: Summer 2023
- Visiting graduate student to the Simons Institute for the Theory of Computing under the Causality programme: Spring 2022
- *Languages/Technologies*: Python, C++, Java, Javascript, SAT solvers, MiniZinc, C, C#, Scheme (Basic), Prolog (Basic)