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%)
- *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 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

1. Arnab Bhattacharyya, Davin Choo, Philips George John, Themistoklis Gouleakis. *Learning multivariate Gaussians with imperfect advice.* International Conference on Machine Learning (ICML), 2025.
2. Davin Choo, 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.
3. Arnab Bhattacharyya, Davin Choo, 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.
4. Davin Choo, Themistoklis Gouleakis, Chun Kai Ling, Arnab Bhattacharyya. *Online bipartite matching with imperfect advice.* International Conference on Machine Learning (ICML), 2024.
5. Davin Choo, Yan Hao Ling, Warut Suksompong, Nicholas Teh, Jian Zhang. *Envy-free house allocation with minimum subsidy.* Operations Research Letters (ORL), 2024.
6. Davin Choo, Kirankumar Shiragur, Caroline Uhler. *Causal discovery under off-target interventions.* International Conference on Artificial Intelligence and Statistics (AISTATS), 2024.
7. Davin Choo, Joy Qiping Yang, Arnab Bhattacharyya, Clément L. Canonne. *Learning bounded degree polytrees with samples.* International Conference on Algorithmic Learning Theory (ALT), 2024.
8. Simina Brânzei, Davin Choo, Nicholas Recker. *The Sharp Power Law of Local Search on Expanders.* Symposium on Discrete Algorithms (SODA), 2024.
9. Yuval Dagan, Constantinos Daskalakis, Anthimos-Vardis Kandiros, Davin Choo. *Learning and Testing Latent-Tree Ising Models Efficiently.* Conference on Learning Theory (COLT), 2023.

10. Davin Choo, Kirankumar Shiragur. *Adaptivity Complexity for Causal Graph Discovery.* Uncertainty in Artificial Intelligence (UAI), 2023.

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

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

13. Davin Choo, Kirankumar Shiragur. *Subset verification and search algorithms for causal DAGs.* Artificial Intelligence and Statistics (AISTATS), 2023.

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

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

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

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

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

19. Davin Choo, 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.

20. Jing Lim, Joshua Wong, Minn Xuan Wong, Lee Han Eric Tan, Hai Leong Chieu, Davin Choo, 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. Davin Choo, Yuqi Pan, Tonghan Wang, Milind Tambe, Alastair van Heerden, Cheryl Johnson. *Adaptive Frontier Exploration on Graphs with Applications to Network-Based Disease Testing*, 2025.

2. Davin Choo, Billy Jin, Yongho Shin. *Learning-Augmented Online Bipartite Fractional Matching*, 2025.

3. Arnab Bhattacharyya, Davin Choo, Philips George John, Themis Gouleakis. *Product Distribution Learning with Imperfect Advice*, 2025.

4. Jia Peng Lim, Shawn Tan, Davin Choo, Hady W. Lauw. *A partition cover approach to tokenization*, 2025.

5. Davin Choo, Chun Kai Ling. *A short note about the learning-augmented secretary problem*, 2024.

Professional Service

- 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

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

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

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

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)