Davin Choo

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Education

National University of Singapore — Singapore
Computer Science PhD — Aug 2021 – Ongoing

- Advisor: Arnab Bhattacharyya
- AI Singapore (AISG) PhD Fellow
- Awarded NUS School of Computing Research Achievement Award

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%)
- *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
- *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

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. Simina Brânzei, Davin Choo, Nicholas Recker. The Sharp Power Law of Local Search on Expanders. Symposium on Discrete Algorithms (SODA), 2023.
2. Yuval Dagan, Constantinos Daskalakis, Anthimos-Vardis Kandiros, Davin Choo. Learning and Testing Latent-Tree Ising Models Efficiently. Conference on Learning Theory (COLT), 2023.
3. Davin Choo, Kirankumar Shiragur. Adaptivity Complexity for Causal Graph Discovery. Uncertainty in Artificial Intelligence (UAI), 2023.
4. Davin Choo, Kirankumar Shiragur. New metrics and search algorithms for weighted causal DAGs. International Conference on Machine Learning (ICML), 2023.
5. Davin Choo, Themistoklis Gouleakis, Arnab Bhattacharyya. Active causal structure learning with advice. International Conference on Machine Learning (ICML), 2023.
6. Davin Choo, Kirankumar Shiragur. Subset verification and search algorithms for causal DAGs. Artificial Intelligence and Statistics (AISTATS), 2023.
7. Davin Choo, Kirankumar Shiragur, Arnab Bhattacharyya. Verification and search algorithms for causal DAGs. Conference on Neural Information Processing Systems (NeurIPS), 2022.
8. Arnab Bhattacharyya, Davin Choo, Rishikesh Gajjala, Sutanu Gayen, Yuhao Wang. Learning Sparse Fixed-Structure Gaussian Bayesian Networks. Artificial Intelligence and Statistics (AISTATS), 2022.
9. Davin Choo, Tommaso d'Orsi. The Complexity of Sparse Tensor PCA. Conference on Neural Information Processing Systems (NeurIPS), 2021.
10. Mélanie Cambus, Davin Choo, Havu Miikonen, Jara Uitto. Massively Parallel Correlation Clustering in Bounded Arboricity Graphs. International Symposium on Distributed Computing (DISC), 2021.

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

12. 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.

13. 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 (NeurIPS Workshop), 2018.

Professional Service

- 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

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

ETH Zürich — Zürich, Switzerland
Post-diplomand (Post-graduate research position under 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

National University of Singapore — Singapore
Research Assistant — SeSaMe (Augmented Reality Library) — Aug 2012 – Dec 2012

- Developed an algorithm that identifies spatial coordinates and orientation of user within a building using visual landmarks

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*: Java, C++, Python, Javascript, MiniZinc, C, C#, Scheme (Basic), Prolog (Basic)
- *Computer Science UROP*: Worked on a reductionist approach to computer vision with applications in robot grasping with uncertainty
- *(Class project) RoCoCo*: Used constraint programming to design a web-based round robin tournament scheduling algorithm
- *(Class project) Poker AI Bot*: Implemented a 2 Player Limit Texas Hold 'em Poker bot using Monte Carlo Tree Search techniques
- *(Class project) Robust Airport Scheduling*: Devised and analysed algorithms for airport gate scheduling. Solution was robust enough to minimise collisions when random delays were introduced to perturb a dataset of actual departure and arrival times