Maoyuan 'Raymond' Song

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CONTACT

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RESEARCH INTERESTS

Online algorithms; Learning-augmented algorithms; Sublinear-time and sublinear-space algorithms; Statistical estimation; Computational complexity; Beyond worst-case analysis; Learning theory.

Broadly, the intersection of machine learning, artificial intelligence, and classical algorithms: How to use classical algorithms to augment machine learning and artificial intelligence, and how to use machine learning methods to facilitate classical algorithms, to achieve fairness, efficiency, and reliability.

EDUCATION

Purdue University West Lafayette, IN
Ph.D. Candidate in Computer Science August 2020 - Present

- Advisors: Elena Grigorescu, Paul Valiant.
- Preliminary examination passed, planning to graduate on May 2025.

Carnegie Mellon University Pittsburgh, PA
M.S. in Computer Science May 2019 - May 2020

- Advisor: Carleton Kingsford.
- Thesis: Linear Time Addition of Fibonacci Encodings.

Carnegie Mellon University Pittsburgh, PA
B.S. in Computer Science Aug 2015 - May 2019

- Minor: Discrete Mathematics and Logic.
- Graduated with University Honors.

PUBLICATIONS

Authors are ordered alphabetically, as is common practice in theoretical computer science.

6. Learning-Augmented Algorithms for Online Covering Programs with Convex Objectives.
   Elena Grigorescu, Young-San Lin, **Maoyuan Song**.
   In submission.
5. A Simple Learning-Augmented Algorithm for Online Packing with Concave Objectives.
   Elena Grigorescu, Young-San Lin, **Maoyuan Song**.
   arXiv preprint arXiv:2406.03754, 2024.
4. All-Purpose Mean Estimation over $\mathbb{R}$: Optimal Sub-Gaussianity with Outlier Robustness and Low Moments Performance.
   Jasper C.H. Lee, Walter McKelvie, **Maoyuan Song**, Paul Valiant.
   In submission.

3. Optimality in Mean Estimation: Beyond Worst-Case, Beyond Sub-Gaussian, Beyond $1+\alpha$ Moments.
   Trung Dang, Jasper C.H. Lee, **Maoyuan Song**, Paul Valiant.
   Conference on Neural Information Processing Systems (NeurIPS) (2023).
2. Learning-Augmented Algorithms for Online Linear and Semidefinite Programming.
   Elena Grigorescu, Young-San Lin, Sandeep Silwal, **Maoyuan Song**, Samson Zhou.
   Conference on Neural Information Processing Systems (NeurIPS) (2022). Selected for spotlight presentation.
1. Linear Time Addition of Fibonacci Encodings.
   Maoyuan (Raymond) Song.
   Master's Thesis (2020).

INVITED PROGRAMS

Simons Institute for the Theory of Computing, UC Berkeley Berkeley, CA
Error-Correcting Codes: Theory and Practice January 2024 - March 2024

INVITED TALKS

Simple Switching Strategies for Learning-Augmented Algorithms.
- TTIC Workshop on Learning-Augmented Algorithms, August 2024.

Beyond Worst-Case Optimality in Mean Estimation.
- Conference on Neural Information Processing Systems (NeurIPS), December 2023.
- Carnegie Mellon University Theory Lunch, September 2023.
- Rutgers/DIMACS Theory of Computing Seminar, September 2023.
- Northwestern Theory Seminar, July 2023.

Learning-Augmented Algorithms for Online Linear and Semidefinite Programming.
- Conference on Neural Information Processing Systems (NeurIPS), December 2022.

PROFESSIONAL SERVICE

External Conference Reviewer
- SIAM Symposium on Simplicity in Algorithms (SOSA) 2025.
- The European Symposium on Algorithms (ESA) 2024.
- International Symposium on Theoretical Aspects of Comptuer Science (STACS) 2024.
- ACM Symposium on Theory of Computing (STOC) 2024, 2023.
- Conference on Neural Information Processing Systems (NeurIPS) 2024, 2022, 2021.
- Innovations in Theoretical Computer Science (ITCS) 2023, 2022.
- International Symposium on Symbolic and Numeric Algorithms for Scientific Computing (SYNASC) 2023, 2022.
- Journal of Artificial Intelligence Research (JAIR) 2022.

Organizer
- TCS Reading Group at Purdue, Fall 2024, Fall 2023
- Theoretical Computer Science Seminar at Purdue, Fall 2023 - Fall 2022.
- Advanced Algorithm Reading Group at Purdue, Fall 2020.

PROFESSIONAL ACTIVITIES

Purdue University, Department of Computer Science
Graduate Teaching Assistant

- CS588 Randomized Algorithms — Spring 2022
- CS584 Theory of Computation — Fall 2021
- CS381 Introduction to the Analysis of Algorithms — Fall 2024, Spring 2021
- CS251 Data Structures and Algorithms — Fall 2020

Carnegie Mellon University, Department of Computer Science
Graduate Teaching Assistant

- 15-451 Algorithm Design and Analysis — Spring 2020, Fall 2019

Kingsford Group, Carnegie Mellon University
Student researcher — Summer 2018

Carnegie Mellon University Computer Science Academy
Senior Project Member, Content Manager — Spring 2018 - Spring 2020

Carnegie Mellon University
Student-Led Course Instructor

- 98-205 StuCo: Introduction to Minecraft — Fall 2016 - Spring 2019

AWARDS

Purdue Research Fundation Ross-Lynn Research Scholars Grant. Fall 2022