

Maoyuan ‘Raymond’ Song

Department of Computer Science, Purdue University
305 N. University St, West Lafayette, IN 47907

CONTACT

Email: MaoyuanRS@gmail.com
Personal Page: maoyuans.github.io

RESEARCH INTERESTS

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

I am interested in 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 solve theoretical and practical challenges.

SKILLS

Programming Languages: Python, C, C++, LaTeX, Java, Git.
Languages: English (Fluent), Mandarin Chinese (Native).

EDUCATION

Purdue University West Lafayette, IN
Ph.D. in Computer Science August 2020 - Present
Advised by: Elena Grigorescu and Paul Valiant.
Relevant Coursework: Machine Learning Theory, Cryptography, Sublinear Algorithms, Randomized Algorithms, Theory of Computation.

Carnegie Mellon University Pittsburgh, PA
M.S. in Computer Science May 2019 - May 2020
Advised by: Carleton Kingsford.
Thesis Title: Linear Time Addition of Fibonacci Encodings.

Carnegie Mellon University Pittsburgh, PA
B.S. in Computer Science August 2015 - May 2019
Minor in Discrete Math & Logic, graduated with University Honors.
Relevant Coursework: Algorithm Design & Analysis, Machine Learning (PhD), Spectral Graph Theory, Set Theory, Extremal Combinatorics.

PUBLICATIONS

- Authors are ordered alphabetically, as is common practice in theoretical computer science.*
5. Learning-Augmented Algorithms for Online Covering Programs with Convex Objectives.
Elena Grigorescu, Young-San Lin, **Maoyuan Song**.
In submission.
 4. A Simple Learning-Augmented Algorithm for Online Packing with Concave Objectives.
Elena Grigorescu, Young-San Lin, **Maoyuan Song**.
arXiv preprint arXiv:2406.03754, 2024.
 3. 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.
 2. 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).
 1. 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.

INVITED
PROGRAMS

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

Berkeley, CA
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.

OTHER
ACTIVITIES

Carnegie Mellon University, Kingsford Labs

May 2018 - August 2018

Developed and optimized *salmon*, a genetic quantification and alignment software using machine learning. Introduced speed-ups via parallelization using NVIDIA's CUDA library in C++.

Carnegie Mellon University, Computer Science Academy

January 2018 - May 2020

Participated in the design and development of CMU Computer Science Academy, a university-sponsored online curriculum platform for K-12 computer science education. Visited six highschools in the Greater Pittsburgh area as practical and educational support specialist.

AWARDS

Purdue Research Foundation Ross-Lynn Research Scholars Grant.

Fall 2022