Yuxuan Ma

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Education

Southern University of Science and Technology — Sep 2022 – Jun 2026
Department of Computer Science and Engineering — B.Eng. in Computer Science and Technology
GPA: 3.88/4.0 IELTS: 7.5 — Turing Class (Honors Program)

Technical University of Denmark — Feb 2025 – Jul 2025
Department of Applied Mathematics and Computer Science — Research Intern
Adviser: Prof. Carsten Witt

Research Interests:

ML, Optimization, Heuristics, Computational Intelligence, AutoML, Neuroevolution

Publications

Conference

[GECCO'25] Yuxuan Ma, Pietro S. Oliveto, John Alasdair Warwicker, "Random Gradient Hyper-heuristics Can Learn to Escape Local Optima in Multimodal Optimisation", In Proceedings of the Genetic and Evolutionary Computation Conference, ACM, 13 July 2025. **[Paper]**

[AAAI'26] Yuxuan Ma, Valentino Santucci, Carsten Witt. "Theoretical and Empirical Analysis of Lehmer Codes to Search Permutation Spaces with Evolutionary Algorithms". Accepted by AAAI 2026.

Manuscripts

Yuxuan Ma, Pietro S. Oliveto, John Alasdair Warwicker, "On the Effectiveness of Random Gradient Hyper-heuristics for Multimodal Optimisation". Under review at *Artificial Intelligence*.

Research Experience

Theory of AI Lab — Jun 2024 – Present
Undergraduate Researcher — Southern University of Science and Technology

Advised by Prof. Pietro S. Oliveto

- Analyzed the expected optimization time of **Selection Hyper-Heuristics** (SHHs) on the theoretical benchmark function TwoRates.
- Proposed and proved all main theorems, conducted all experiments, and wrote core technical sections.
- Provided the **first runtime analysis** that considers super-constant low-level heuristic set sizes, up to the complete set of n different neighborhood sizes for RLS_k.
- **Improved** the previous best-known bound (Krejca & Witt, 2024) from $\mathcal{O}\left(n^{4.5}\right)$ to $\mathcal{O}\left(n^{\log_2 18+\varepsilon}\log n\right)$.
- Accepted at ***GECCO 2025***.
- Extended version under review at ***Artificial Intelligence*** (journal).

Algorithms, Logic and Graphs (AlgoLoG) Section — Feb 2025 – Jul 2025
Research Intern — Technical University of Denmark

Advised by Prof. Carsten Witt

- Proposed RLS and $(1+1)$-EA for permutations using the **Lehmer code** representation. Analyzed their expected optimization time via variable and multiplicative drift theorems.
- Designed the algorithms, formulated and proved all main theorems, conducted all experiments, and wrote the theory sections.
- **Tightened** the prior best-known bounds (Doerr & Pohl, 2012) from $\mathcal{O}\left(n^4\log\log n\right)$ and $\Omega\left(n^2\log n\right)$ to $\Theta\left(n^2\log n\right)$ using a refined potential function for drift analysis.

- **Introduced** the unequal-probability coupon collector model into the runtime analysis of evolutionary computation and obtained a bound that is tight up to the leading constant.
- Accepted at ***AAAI 2026***.

Projects

Google Summer of Code 2024 Feb 2024 – Aug 2024

[Project link] GSoC 2024 @ OpenCV (3-person team): Added multi-frame GIF support to `cv::imencode()` and `cv::imdecode()`, removing reliance on external tools for animated GIFs. Led testing and built GoogleTest-based C++ unit test suites. Merged into OpenCV 4.11.0 (PR #25691).

Teaching Assistant

Data Structures and Algorithm Analysis (Honors) Sep 2024 – Jan 2025

Instructor: Prof. Pietro S. Oliveto

Graded weekly lab assignments and the final exam; maintained the course gradebook; answered student questions.

Skills

Programming: C/C++, Java, Python, Mathematica, LaTeX

Tools: Git, Bash, Vim, Linux

Awards

SUSTech "Academic Star" Scholarship Year 2025

Personal Interests and Hobbies

Table Tennis, Harmonica, Travel