

# Yuxuan Ma

yuxuanma2026@163.com | trendmyx.github.io | github.com/TrendMYX

## Education

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### Southern University of Science and Technology

Department of Computer Science and Engineering

GPA: 3.88/4.0 IELTS: 7.5

Sep 2022 – Jun 2026

B.Eng. in Computer Science and Technology

Turing Class (Honors Program)

### Technical University of Denmark

Department of Applied Mathematics and Computer Science

Adviser: Prof. Carsten Witt

Feb 2025 – Jul 2025

Research Intern

## Research Interests:

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

## Publications

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### 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. [\[Paper\]](#)

### Manuscripts

[Yuxuan Ma](#), Pietro S. Oliveto, John Alasdair Warwicker, "On the Effectiveness of Random Gradient Hyper-heuristics for Multimodal Optimisation", *Artificial Intelligence*, submitted, 8 July 2025.

[Yuxuan Ma](#), Valentino Santucci, Carsten Witt. "Theoretical and Empirical Analysis of Lehmer Codes to Search Permutation Spaces with Evolutionary Algorithms". Under double-blind review at a major AI conference.

## Research Experience

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### Theory of AI Lab

Undergraduate Researcher

Jun 2024 – Present

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  $\text{RLS}_k$ .
- Improved** the previous best-known bound ([Krejca & Witt, 2024](#)) from  $\mathcal{O}(n^{4.5})$  to  $\mathcal{O}(n^{\log_2 18 + \epsilon} \log n)$ .
- Accepted at **GECCO 2025**.
- Extended version submitted to *Artificial Intelligence* (journal).

### Algorithms, Logic and Graphs (AlgoLoG) Section

Research Intern

Feb 2025 – Jul 2025

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  $\mathcal{O}(n^4 \log \log n)$  and  $\Omega(n^2 \log n)$  to  $\Theta(n^2 \log n)$  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.
- Manuscript under double-blind review at a major AI conference.

## Projects

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**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

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**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

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

**Tools:** Git, Bash, Vim, Linux

## Personal Interests and Hobbies

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Table Tennis, Harmonica, Travel