Ta-Wei Tu 塗大為

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Education

National Taiwan University **Taipei, Taiwan**
B.S. in Computer Science and Information Engineering (CSIE) *Sept. 2018 – June 2022*

- **Overall GPA**: 4.19/4.30, **Major GPA**: 4.23/4.30. Top 5%.

Research Interest

I am interested in theoretical computer science in general, with a focus on the design and analysis of efficient static/dynamic algorithms for graph and combinatorial optimization problems.

Selected Honors

18th Place, 2020 ICPC World Finals **Moscow, Russia**
Two-time Champion, 2018, 2020 ICPC Asia-Pacific Regional Contest, Taipei Site **Taipei, Taiwan**
Three-time Champion, 2018, 2019, 2020 National Collegiate Programming Contest **Taipei, Taiwan**
4th Place, 2018 ICPC Asia-Pacific Regional Contest, Seoul Site **Seoul, South Korea**
8th Place, 2018 Taiwan Olympiads in Informatics (TOI) **Taipei, Taiwan**

Publications

[1] Joakim Blikstad, Sagnik Mukhopadhyay, Danupon Nanongkai, and Ta-Wei Tu. Fast algorithms via dynamic-oracle matroids. Manuscript, 2022
[2] Ta-Wei Tu. Subquadratic weighted matroid intersection under rank oracles. In *33rd International Symposium on Algorithms and Computation (ISAAC 2022)*, volume 248 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 63:1–63:14, 2022

Experience

Max Planck Institute for Informatics **Saarbrücken, Germany**
Research Intern *August 2022 – present*

- Studied matroid-based problems including the spanning tree packing problem.
- Obtained matching algorithms for matroid intersection and improved algorithms for matroid union in a new *dynamic-oracle* model. This implies a unified approach to many fundemental problems such as graphic matroid intersection and an improved algorithm for finding disjoint spanning trees [1].
- Mentor: Prof. Danupon Nanongkai.

Lab of Algorithmic Research **Taipei, Taiwan**
Undergraduate Research Assistant *Feb. 2021 – June 2022*

- Studied various algorithimic problems (mostly related to graphs), including
  - queue and stack layouts of planar graphs,
  - induced subgraph (e.g., odd holes and odd paths) detection in planar graphs, and
  - matroid intersection problem, especially the weighted version of it.
- Obtained the first subquadratic algorithm of the weighted matroid intersection problem under rank oracles [2].
- Advisor: Prof. Hsueh-I Lu.

Compiler Optimization, Virtualization, and Adaptive Runtime Lab **Taipei, Taiwan**
Undergraduate Research Assistant *Sept. 2020 – Jan. 2021*

- Studied the performance of RISC-V vector extension under different parameters and scheduling decisions.
- Advisor: Prof. Wei-Chung Hsu.

Google LLC **New Taipei City, Taiwan**
Software Engineering Intern *June 2021 – Sept. 2021*

- Implemented gRPC core transport using Android Binder for C/C++ (and its test suites).

- Benchmarked and optimized end-to-end performance.
- Ported internal experimental codes to upstream, open-sourced repository.

CSIE Network/System Administration Team **Taipei, Taiwan**
Section Chief, Workstation Services, System Administration Division *Sept. 2021 – June 2022*

- Led a five-person team responsible for daily maintenance of 10+ user-facing Linux workstations and handling various security issues.
- Organized internal training for future members.
- Advisors: Profs. Hsin-Mu Tsai, Hsu-Chun Hsiao, and Shang-Tse Chen.

Teaching Experience

National Taiwan University **Taipei, Taiwan**
Teaching Assistant, Algorithm Design and Analysis *Fall 2019, 2020, 2021*

- Designed and graded homework/exam problems.
- Hosted a weekly discussion session with students.
- Maintained an online judging system for programming problems.
- Received **Best TA Award** twice (2019, 2021).

Teaching Assistant, Compiler Design *Fall 2020*
Teaching Assistant, Network Administration and System Administration *Spring 2021*
Teaching Assistant, Programming Techniques *Fall 2021*
Unofficial Teaching Assistant, Data Structures and Algorithms *Spring 2019*
Unofficial Teaching Assistant, Computer Programming *Fall 2018*

IOICamp **Taipei, Taiwan**
Lecturer / Problem Setter *Winter 2020, 2021, 2022*

- A training camp for prospective high school and college students participating in Olympiads in Informatics and other programming competitions.
- Lectured on dynamic programming techniques/tricks and advanced graph algorithms.

Extracurricular Activity

National Problem Solving Contest **Taipei, Taiwan**
Judge / Problem Setter *Fall 2019, 2020, 2021*

National Taiwan University ICPC Team Ranking Contest **Taipei, Taiwan**
Judge / Problem Setter *Fall 2021, 2022*

Proficient Skills

Programming Languages C, C++, Python, Rust, LaTeX.

Languages Chinese (native), English (fluent).

Relevant Coursework

(* indicates graduate-level courses.)
Algorithm Design and Analysis, Data Structure and Algorithm,
Graph Theory, Special Topics on Graph Algorithms*,
Mathematical Analysis of Algorithms*, Quantum Algorithms*,
Theoretical Aspects of Modern Cryptography*, Topics in Complexity Theory*.