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蔡詩妤

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RESEARCH INTERESTS

Artificial Intelligence, Algorithm Design for Fairness and Massive Datasets, Scheduling Problems in Robotics and Networking, Solution/Trajectory Privacy, Parallel Programming

EDUCATION

PhD., Computer Science, Stony Brook University (SBU), NY, USA 2015 - May 2023
Title: Graph Algorithms for Diversity and Fairness
advised by Professor Jie Gao and Professor Rezaul A. Chowdhury

M.Sci., Applied Mathematics, National Chiao Tung University (NCTU), Hsinchu, Taiwan 2011
Title: An Efficient Self-stabilizing Algorithm for the Minimal Dominating Set Problem under a Distributed Scheduler
advised by Professor Chiuyuan Chen (陳秋媛)

B. Sci., Applied Mathematics (Minor: Computer Science), NCTU, Hsinchu, Taiwan 2009

HONORS

Resource Access Project Travel Grant, SBU 2019

A Special CS Department Chair Fellowship, SBU 2015

Excellent Thesis Award, Symposium for Young Combinatorialist 2011

Academic Excellence Award, NCTU 2009

Hu-Dun-Fu Scholarship, NCTU 2009

RESEARCH & TEACHING EXPERIENCE

Tenure track Assistant Professor, Information Management and Finance,
National Yang Ming Chiao Tung University, Taiwan Aug 2024

Postdoc at Institute of Information Science, Academia Sinica, Taipei, Taiwan Dec 2023 – June 2024
work with Professor Meng-Tsung Tsai (蔡孟宗)

Research Assistant

Parallel Computing and Computational Geometry, SBU 2016 – 2023

-initiated the study of obtaining sufficiently-diverse, yet approximately-optimal solutions to optimization problems. We provided a general reduction to an associated budget-constrained optimization (BCO) problem and gave bi-approximations to our diverse problem using BCO problem. Further, we proposed polynomial time approximation algorithms for several problems such as maximum matchings, shortest paths, min-cut, minimum spanning trees

-presented novel parallel 2D convex hull algorithms in the binary-forking model by using the connection of 2D convex hull and the upper envelope of sinusoidal waves

-improved the accuracy of network evolution in term of link prediction and the corresponding latency prediction by using a machine learning model of graph neural network with hyperbolic embedding

-came up with heterogeneous tours to improve the security of tour schedules from the adversary attacks

-assigned reducers to memory locations within a fixed budget of extra reusable space to minimize the overall execution time of the parallel shared memory program

-scheduled the internet requests of different priorities to minimize the maximum latency and achieve fairness at the same time.

Institute of Information Science, Academia Sinica, Taipei, Taiwan 2014 – 2015

worked with Professor Tsan-sheng Hsu (徐讚昇)

-improved the endgame compression ratio up to ~80% compared to baselines by using space-filling curve and the domain knowledge of the similar endgame patterns

Institute of Mathematics, Academia Sinica, Taipei, Taiwan 2011 – 2012

-explored generating function for permutations avoiding 321

-proved the minimum periods of S(n,k) modulo m without any advanced mathematics knowledge

Guest Lecturer

-topic: The Alpha Technique and Approximation Algorithms (CSE548: Analysis of Algorithms, Spring 2019

Teaching Assistant,

Object-Oriented Programming (used programming language: Java),
Algorithms, Discrete Math, SBU 2015,2016, 2019, 2021
Calculus, NCTU, Hsinchu, Taiwan 2009 - 2011

Tutor

elementary/senior high/junior high school Mathematics and Calculus, Taiwan 2005 – 2011

SERVICES

Stony Brook University Graduates for Education and Outreach, SBU, New York, USA 2017 - 2018

provided hands-on experiments or activities to elementary school children to excite them about Science.

Volunteer tutor, Education Equal Club, National Tsing Hua University, Hsinchu, Taiwan 2007

LEADERSHIP

Head of Applied Mathematics Woman Basketball Team, NCTU, Hsinchu, Taiwan 2009-2011
Vice-chairman, Applied Mathematics Student Council, NCTU, Hsinchu, Taiwan 2007 - 2008
Head of Artistic Design Department, Applied Mathematics Welcome Camp, NCTU 2006

PUBLICATION SUMMARY

My works are on the cutting edge of technology and have been published in leading flagship conferences in that area of discipline, such as AAMAS (Tier 1 in Autonomous System), SPAA (Tier 1 in Parallelism in Algorithms and Architectures), … etc. I also published some solid works in highly rated international conferences such as International Symposium on Latin American Theoretical Informatics (LATIN: tier 2 in theoretical informatics) and International Symposium on Algorithms and Experiments for Wireless Networks (ALGOSENSORS).

PUBLICATIONS

Tong-Nong Lin, Yu-Cheng Lin, Cheng-Chen Tsai, Meng-Tsung Tsai and Shih-Yu Tsai “Efficient Algorithms for Decomposing Integers as Sums of Few Tetrahedral Numbers” IWOCA 2024: 259-272

Shih-Yu Tsai, “Graph Algorithms for Diversity and Fairness.” State University of New York at Stony Brook 2023

Jie Gao, Mayank Goswami, Karthik C. S., Meng-Tsung Tsai, Shih-Yu Tsai, Hao-Tsung Yang, “Obtaining Approximately Optimal and Diverse Solutions via Dispersion.” LATIN 2022

Shih-Yu Tsai, Hao-Tsung Yang, Kin Sum Liu, Shan Lin, Rezaul Chowdhury, and Jie Gao, "Multi-Channel Assignment and Link Scheduling for Prioritized Latency-Sensitive Applications." ALGOSENSORS 2019

Hao-Tsung Yang, Shih-Yu Tsai, Kin Sum Liu, Shan Lin, Jie Gao, "Patrol Scheduling Against Adversaries with Varying Attack Durations." AAMAS 2019: 1179-1188

Rathish Das, Shih-Yu Tsai, Sharmila Duppala, Jayson Lynch, Esther M. Arkin, Rezaul Chowdhury, Joseph S. B. Mitchell, Steven Skiena, "Data Races and the Discrete Resource-time Tradeoff Problem with Resource Reuse over Paths." SPAA 2019: 359-368

Jie Gao, Mayank Goswami, Rebecca Schley, Shih-Yu Tsai, and Hao-Tsung Yang, "Far-Away Spanning Trees." FWCG 2018: 19-22

Hao-Tsung Yang, Shih-Yu Tsai, Jie Gao, and Shan Lin, "Optimal Safety Patrol Scheduling Using Randomized Traveling Salesman Tour." FWCG 2017: 57-59

Chang Chen, Gang-Yu Fan, Shih-Yu Tsai, Ting-Yu Lin, Tsan-sheng Hsu, "Compressing Chinese Dark Chess Endgame Databases". CIG 2015: 254-259

Well Y. Chiu, Chiuyuan Chen, Shih-Yu Tsai, "A 4n-move Self-stabilizing Algorithm for the Minimal Dominating Set Problem Using an Unfair Distributed Daemon". Inf. Process. Lett. 114(10): 515-518 (2014)

Shih-Yu Tsai, Chiuyuan Chen, "Master Thesis: An Efficient Self-stabilizing Algorithm for the

Minimal Dominating Set Problem under a Distributed Scheduler”, CETD, 2011.