Tong-Nong Lin

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Education

University of Texas at Austin – PhD in Computer Engineering
National Taiwan University – MS in Electrical Engineering
National Taiwan University – BS in Electrical Engineering and Mathematics

Experience

Software Engineer, Mediatek – Hsinchu, Taiwan Sep 2019 – Mar 2023

- Independently designed and developed AES256-GCM cryptographic algorithm in communication chip software.
- Designed authentication protocols and encryption/decryption procedures in boot mode without using RAM.
- Enhanced authentication protocols between phone and server for the SIM-lock feature.
- Implemented certificate framework to support ASN.1 DER format.

Research Assistant, UT Austin – Austin, TX Aug 2024 – Present

- Design and implement an efficient parallel algorithm using the Lattice Linear Predicate Detection framework with PyKokkos
  - Achieved near-benchmark performance compared to `Gunrock` by applying optimizations to the LLP implementation in PyKokkos.
  - Enhanced developer productivity by enabling parallel programming in Python, with automatic translation to C++ and Kokkos for high-performance execution.

Research Assistant, Academia Sinica – Taipei, Taiwan Mar 2023 – Mar 2024

- Researched streaming algorithms for graph problems.
- Designed a deterministic algorithm to find an independent set that meets Turán's Bound.
- Leveraged probabilistic method and derandomization techniques to design the deterministic algorithm.

Research Assistant, National Taiwan University – Taipei, Taiwan Mar 2017 – Mar 2019

- Game Theory, Thesis : Generalized form of risk aversion under uncertainty
  - Propose generalized formulas to represent player's risk aversion under uncertainty.
  - Proved upper and lower bounds on the price of anarchy when players' risk aversion satisfies certain constraints.
  - Showed these bounds are tight or nearly tight for many previously studied risk aversions.

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**", Proceedings of the 35th International Workshop on Combinatorial Algorithms (IWOCA), pp. 259-272, 2024.

- Designed and implemented algorithms that efficiently decompose integers into sums of tetrahedral numbers, improving on known theoretical bounds.
- Developed both probabilistic and deterministic methods with provable time and space complexities.

Projects

Program Analysis, Compiler

- Modified GCC compiler to support a new expression
- Used ANTLR4 for lexing, parsing, and semantic analysis of Trino SQL
- Utilized Java Pathfinder (JPF) to implement memoization techniques and code coverage
- Modified OpenJDK to support a new language construct: [[Expression, Expression, Expression, ...]]

Skills

Compilers, Parallel Programming, Software Testing
Programming Languages: C/C++, Java, Python

Honors and Awards

Graduate School Fellowship, University of Texas at Austin 2024