Wei-Lin Wu

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SUMMARY

I have a strong passion for problem-solving in computer science and mathematics, with a specialization in **algorithm design**, **graph theory** and **database theory**. I take a logical approach to programming, rigorously deriving code from problem descriptions, with emphasis on **correctness**, **clarity**, **succinctness**, and **optimization**. I am particularly proficient in C as well as pointer manipulations and memory management, and I am well versed in how computer programs work at the system and hardware levels. My key strengths are in **analytical** and **creative** thinking, coupled with a great enthusiasm for acquiring new knowledge and skills.

PROFESSIONAL SKILLS

- Languages: C, C++, Objective-C, Python, Java, Scala, Haskell, SQL, Shell Scripting, x86 Assembly, MATLAB
- Tools: GitHub, SVN, AutoCAD, LaTeX, Dafny, Agda
- Operating Systems: Windows, macOS, Unix, Linux

EDUCATION

- **Ph.D. in Computer Science**, University of California - Santa Cruz, Santa Cruz, CA, USA　　　　12/2023
  - Research Focus: Graph Theory, Algorithm Design, Logic in Computer Science (advisor: Phokion Kolaitis), GPA: 3.96/4.00
  - Publications (alphabetical authorship by convention of theoretical computer science):
    1. [**ICDT**] Balder ten Cate, Víctor Dalmau, Phokion G. Kolaitis, and **Wei-Lin Wu**: When Do Homomorphism Counts Help in Query Algorithms?. In *27th International Conference on Database Theory (ICDT 2024)*, LIPIcs, Volume 290, pages 8:1-8:20, Mar 25-28, 2024.
    2. [**ICALP-affiliated SmP Workshop**] **Wei-Lin Wu**: Query Algorithms Based on Homomorphism Counts. In *Structure Meets Power Workshop ICALP 2022 (Extended Abstract)*, pages 24-26, Jul 4-8, 2022.
    3. [**LICS**] Albert Atserias, Phokion G. Kolaitis, and **Wei-Lin Wu**: On the Expressive Power of Homomorphism Counts. In *36th Annual ACM/IEEE Symposium on Logic in Computer Science*, pages 1-13, Jun 29-Jul 2, 2021
  - Relevant Courses: Machine Learning, Advanced Algorithms, Data Science, Database Principles, Combinatorial Algorithms
  - Selected Projects:
    1. A **Graph-Structure Analyzer** implemented in Python that computes a logical characterization of the k-dimensional Weisfeiler-Leman type of a graph equivalent to its vector representation encoded by the k-dimensional graph neural network (k-GNN)
    2. A **Task Scheduler** implemented in C using a greedy-algorithm approach to schedule a finite set of tasks parameterized by deadlines and penalties with minimal total cost and using a time-efficient implementation of the disjoint-set data structure based on optimal heuristics
  - Teaching Assistant: Analysis of Algorithms, Programming Languages (Python, Scala, Haskll, Prolog), Programming in Java
  - **Regents' Fellowship**, 2017
- **M.S. in Computer Science and Information Engineering**, National Taiwan University, Taipei, Taiwan　　06/2009
  - Research Focus: Graph Theory, Algorithm Design, Computation Theory (advisor: Kun-Mao Chao)
  - Relevant Courses: Analysis of Algorithms, Bioinformatics, Financial Computing, Graph Algorithms, Design of Databases
  - Selected Projects:
    1. A **Grid Indexing Structure** implemented in Java for H2 Database to improve performance with analysis reports of the impact of efficient indexing on database performance and comparisons to the built-in AVL tree indexing of H2 Database
    2. A **Finance Calculator** implemented in C++ to price barrier options using lattice model and to evaluate the risk-neutral value of derivatives with early exercise features (e.g., Bermudan or American style options) using least square Monte-Carlo and lattice model
- **B.S. in Electrical Engineering**, National Cheng Kung University, Tainan, Taiwan　　　　06/2007
  - Relevant Courses: Linear Algebra, Probability and Statistics, Data Structures, Algorithms, Digital Logic Design, Computer Architecture, x86 Assembly, Systems Programming, Operating Systems, Computer Networks, Taguchi Quality Engineering
  - Selected Projects:
    1. A **Simulator for a Simplified MIPS Architecture** implemented in C++ for a RISC computer architecture using linked list data structure for space efficiency with analysis reports of time efficiency
    2. A **Sudoku Solver** implemented in C using advanced backtracking techniques and efficient design of data structures
  - **Outstanding Achievement Award** for Physics Contest, 2004 (top 0.5% among 1630 participants)
  - **Excellent Achievement Award** for Calculus Contest, 2004 (top 2% among 2324 participants)

EXTRACURRICULAR PROJECT

- Annotations to the Book "Mathematical Logic" with a Solutions Manual
  - My GitHub repository for a complete set of self-study notes and a nearly complete set of my solutions to exercises found at `https://github.com/Linisac/Mathematical-Logic-EFT-`

EXPERIENCE

- Research Assistant, **Fonestock Technology Inc.**, Taipei, Taiwan　　　　10/2016-07/2017
  - Assisted research on formal methods of process calculi/session types and research on algorithmic problems and complexity of some fragments of first-order logic with counting
- Software Engineer, **Fonestock Technology Inc.**, Taipei, Taiwan　　　　05/2016-09/2016
  - Performed supportive work in maintenance, restructured source code (in Objective-C) of iOS apps for stock investments, improved app performance by implementing optimal sorting and searching algorithms, and resolved issues of app crashes and database inconsistency
- Research Assistant, **Fonestock Technology Inc.**, Taipei, Taiwan　　　　10/2016-07/2017
  - Performed formal verification and derived formal proofs using theorem-proving languages Agda and Coq, gave tutorials on functional programming (mainly Haskell and Agda) and on formalization of proofs in various logical formalisms