

Yen-Hsiang Chang

GRADUATE STUDENT RESEARCHER, UC BERKELEY

✉ yenhsiangc@berkeley.edu | 🌐 yen-hsiang-chang.github.io | 📱 yen-hsiang-chang

Research Interests

Parallel Programming and Algorithms

My research interests lie in the general area of high-performance computing, particularly in parallel programming and algorithms, with the focus on graph algorithms and applied numerical linear algebra.

Education

University of California, Berkeley (UC Berkeley)

PHD IN COMPUTER SCIENCE

• Advisers: James Demmel and Aydın Buluç

Aug. 2023 - Now

Berkeley, California

University of Illinois at Urbana-Champaign (UIUC)

BS IN GRAINGER ENGINEERING

- Major: Computer Engineering, Minor: Mathematics
- Cumulative GPA: 3.99/4.00, Major GPA: 4.00/4.00, Minor GPA: 4.00/4.00
- Graduated with Highest Honors, on completion of an undergraduate thesis of superior quality

Aug. 2018 - May. 2022

Champaign, Illinois

Publications

Parallelizing the Approximate Minimum Degree Ordering Algorithm: Strategies and Evaluation | [Link](#) | [Code](#)

Apr. 2025

Yen-Hsiang Chang, Aydın Buluç, and James Demmel

PREPRINT ON ARXIV

Preprint

- Parallelized the approximate minimum degree algorithm by leveraging multiple elimination on distance-2 independent sets across elimination steps, addressing limited parallelism within individual elimination steps caused by low computational workload and significant memory contention.
- Reduced memory contention through custom-designed data structures tailored for the approximate minimum degree algorithm, including a concurrent graph representation and concurrent approximate degree lists.
- Achieved an 8.30× speedup over the state-of-the-art SuiteSparse implementation.

Parallelizing Maximal Clique Enumeration on GPUs | [Link](#) | [Code](#)

Mohammad Almasri*, Yen-Hsiang Chang*, Izzat El Hajj, Rakesh Nagi, Jinjun Xiong, and Wen-mei Hwu

Oct. 2023

(*Equal contribution)

PUBLISHED IN 32ND INTERNATIONAL CONFERENCE ON PARALLEL ARCHITECTURES AND COMPILATION TECHNIQUES (PACT'23)

Vienna, Austria

- Parallelized the Bron-Kerbosch algorithm for single-GPU and multi-GPUs, with a geometric mean speedup of 4.9× (up to 16.7×) on single GPU and scaled efficiently to multiple GPUs.
- Proposed to parallelize maximal clique enumeration on GPUs by performing depth-first traversal of independent sub-trees in parallel, instead of performing breadth-first traversal to avoid explosion in the number of tree nodes at deep levels.
- Proposed a worker list for dynamic load balancing, as well as partial induced subgraphs and a compact representation of excluded vertex sets to regulate memory consumption.

MLHarness: A Scalable Benchmarking System for MLCommons | [Link](#) | [Code](#)

Nov. 2021

Yen-Hsiang Chang, Jianhao Pu, Wen-mei Hwu, and Jinjun Xiong

PUBLISHED IN 2021 BENCHCOUNCIL INTERNATIONAL SYMPOSIUM ON BENCHMARKING, MEASURING AND OPTIMIZING (BENCH'21)

Virtual

- Proposed MLHarness, a scalable benchmarking harness system for MLCommons.
- MLHarness codifies the standard benchmark process as defined by MLCommons including models, datasets, DL frameworks, and software and hardware systems.
- MLHarness provides an easy and declarative approach for model developers to contribute their models and datasets to MLCommons.
- MLHarness includes the support of a wide range of models with varying inputs/outputs modalities so that it can scalably benchmark these models across different datasets, frameworks, and hardware systems.

Research Experiences

Graduate Researcher, instructed by Prof. James Demmel & Dr. Aydın Buluç

Aug. 2023 - Now

BEBOP AND PASSION LAB, BERKELEY

- Researched on extracting parallelism from the approximate minimum degree algorithm, which reduces fill-ins in Cholesky factorization, by applying multiple elimination on distance-2 independent sets. The non-archival extended abstract **"Parallelizing the Approximate Minimum Degree Ordering Algorithm: Strategies and Evaluation"** is accepted by **SIAM ACDA25**. The preprint with the same title is on arXiv.
- Developed a parallel randomized minimum cut algorithm in shared memory using parallel tree contractions and parallel batched updates and queries.

Undergraduate Researcher, instructed by Prof. Wen-mei Hwu, Prof. Rakesh Nagi & Prof. Jinjun Xiong

May. 2021 - May. 2022

COORDINATED SCIENCE LABORATORY, UIUC

- Researched on graph mining and implemented local k-clique counting kernels on GPUs.
- Researched on maximal clique enumeration, with the focus on implementing variants of Bron-Kerbosch algorithm on GPUs.
- Designed efficient parallel maximal clique enumeration kernels for multi-GPUs, with the characteristics of mitigating load imbalance using a worker list and reducing memory footprint by splitting complicated sets into monotonic sets that can be stored using compact representations.
- Researched on generalizing the worker list technique to mitigate load imbalance on GPUs for other domains.
- Published the paper "**Parallelizing Maximal Clique Enumeration on GPUs**" in **PACT'23**

Undergraduate Researcher, instructed by Prof. Wen-mei Hwu & Prof. Jinjun Xiong

Jun. 2019 - May. 2022

IBM-ILLINOIS CENTER FOR COGNITIVE COMPUTING SYSTEMS RESEARCH (C3SR)

- Researched on MLModelScope, an HW/SW agnostic, extensible, and customizable platform for evaluating and profiling ML models across datasets/frameworks/hardware, and within AI application pipelines.
- Developed MLModelScope Agents in different frameworks, primarily in PyTorch and ONNX Runtime.
- Published the paper "**MLHarness: A Scalable Benchmarking System for MLCommons**" in **BENCH'21**.

Honors & Awards

INTERNATIONAL

- 2022 **17th Place**, 2022 Google Hash Code World Finals
- 2021 **11th Place**, 44th Annual World Finals of the International Collegiate Programming Contest
- 2020 **6th Place**, Microsoft Q# Coding Contest – Summer 2020
- 2020 **Round 4 Qualifier (top 110)**, 2020 Topcoder Open Algorithm Competition
- 2019 **112th Place**, 2019 Google Code Jam Round 3

DOMESTIC

- 2025 **Tong Leong Lim Pre-Doctoral Prize**, Highest distinction in the pre-doctoral examination, UC Berkeley
- 2021 **ECE Alumni Association Scholarship**, Outstanding scholastic record in ECE Department, UIUC
- 2020 **10th Place**, 2020 ICPC North America Championship
- 2020 **Midwest Champion**, 2020 ICPC North America Championship
- 2020 **2nd Place**, 2020 ICPC North America Championship Cyber Challenge
- 2018-22 **Dean's List**, Grainger College of Engineering, UIUC

Skills

Languages C/C++, Python

Libraries/Tools CUDA, OpenMP, MPI

Other Git, Docker, \LaTeX